MAR GREGORIOS COLLEGE OF ARTS & SCIENCE

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DEPARTMENT OF COMMERCE (ACCOUNTING & FINANCE)

SUBJECT NAME: ELEMENTS OF COST ACCOUNTING

SUBJECT CODE: CPG5B

SEMESTER: V

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SYLLABUS

UnitI:CostAccounting

Definition - Nature and Scope - Principles of Cost Accounting - Cost Accounting andFinancial Accounting - Cost Accounting Vs Management Accounting - Installation ofCostingSystem-ClassificationofCosts-CostCentre-ProfitCentre.

UnitII:CostSheet

Meaning-PreparationofCostSheet-ReconciliationofCostandFinancialAccounts.

UnitIII:MaterialCosting

Material Control - Meaning and Objectives - Purchase of Materials - Stock Levels ofMaterials-EOQ-StoresRecords-ABCAnalysis-IssueofMaterials-MethodsofIssue-FIFO-LIFO-HIFO-BaseStockMethod-SpecificPriceMethod-SimpleandWeightedAverageMethod-StandardandInflatedPriceMethod.

UnitIV : LabourCosting

Direct Labour and Indirect Labour- Time Keeping - Methods and Calculation of WagePayments - Time Wages - Piece Wages - Incentives - Different Methods of IncentivePayments-Idletime-Overtime-LabourTurnover-Meaning,CausesandMeasurement.

UnitV: OverheadsCosting

Overheads - Definition - Classification - Allocation and Apportionment of Overheads -Basis of Allocation - Absorbtion of Overheads - Preparation of Overheads DistributionStatement-MachineHourRate-ComputationofMachineHourRate.

Note:QuestionsinSec.A,B&Cshallbeintheproportionof20:80betweenTheoryandProblems.

SuggestedReadings

1. Jain,S.P&Narang,K.L.,CostAccounting,KalyaniPublishers
2. Khanna,B.S.Pandey,I.M-Ahuja,G.KandAroraM.N.,PracticalCosting,SChand&Sons
3. MurthyA&GurusamyS,CostAccounting,VijayNicoleImprintsPvt.Ltd.Chennai
4. Reddy,T.S.andHariprasadReddy,Y,CostAccounting,MargamPublications
5. Prasad,N.KandPrasad,V.K,CostAccounting,BookSyndicate
6. SaxenaandVashist,CostAccountingSulthanChandandSons,2014,NewDelhi

UNIT-1 INTRODUCTION TO COST ACCOUNTING

Human civilization has been a witness to the concept of cost accounting from times immemorial. The nomenclature and understanding has changed over time. Earlier, the kings used to appoint their representatives to check on the adherence to costs by shopkeepers, imposing heavy penalty on those who attempted to default from the prescribed system. This helped to keep cost constant for a long period in that era.

During the First World War, most of the manufacturing was done on the ‑cost plus‖system. World War II witnessed a blanket control over prices due to government legislations. This made it imperative for industrialists to constantly work towards improvement of quality of products, accuracy in tracing costs of each job/product and to control costs. These objectives were not fulfilled by financialaccounting.

In the modern age, although, determination of profitability has always been the root cause of all commercial activities, still cost accounting has made a place for itself as companies have come to realize that calculation and control over the cost is necessary.

COST, COSTING, COST ACCOUNTING AND COST ACCOUNTANCY

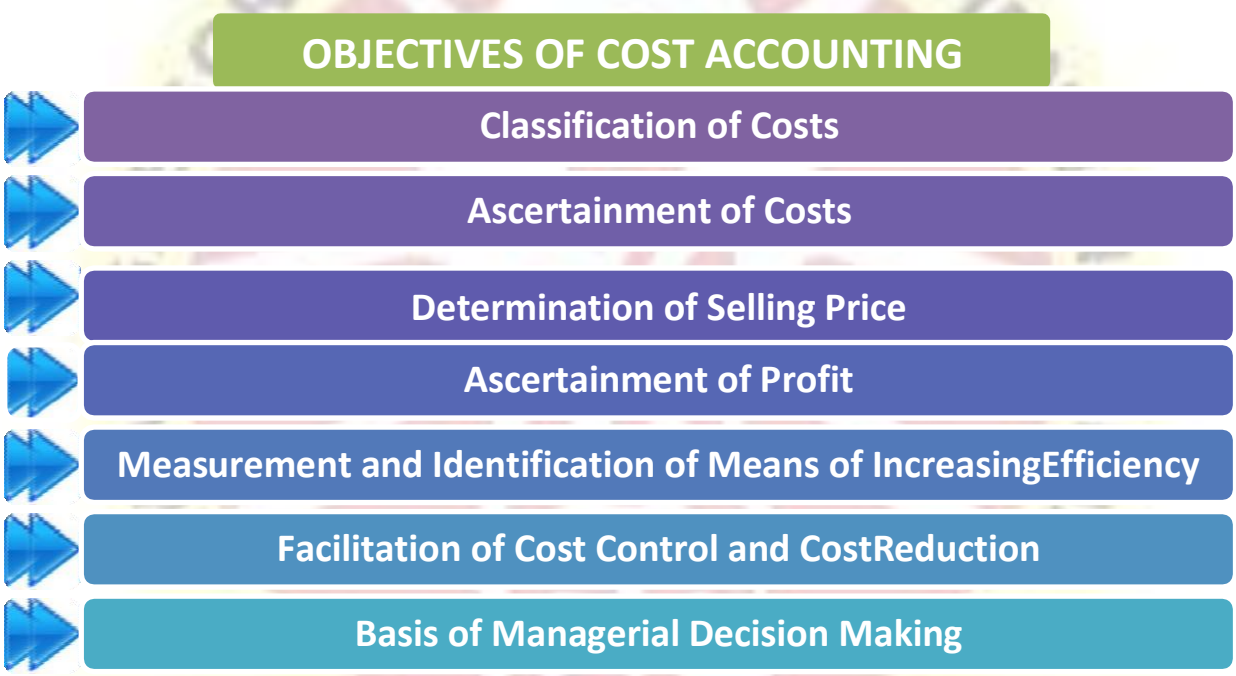
It is important to understand that the terms cost, costing, cost accounting and cost accountancy, which are normally used interchangeably, are not synonyms of each other. The difference can be understood as follows:
As per Chartered Institute of Management Accountants (CIMA) London, cost means‑the amount of expenditure (actual or notional) incurred on, or attributable to, a given thing‖, but the interpretation of the term depends on a number of factors like nature of business or industry. Moreover, it is difficult to determine an exact cost or a true cost because no figure of cost is true under all circumstances and for all purposes.

According to Wheldon, costing is,‑the classifying, recording and appropriate allocation of expenditure for the determination of the costs of products or services; the relation of these costs to sales values; and the ascertainment of profitability.‖ In general, it is understood as process for determiningcost.

Cost Accounting is usually considered as the next step to costing. It involves meticulously accurate analyzing, standardizing, forecasting and comparing relevant costing data so as to interpret and report various concern areas to management. Its scope includes preparation of budgets, determination of standard costs based on technical estimates, identifying variances and reasons thereof,etc.

Cost Accountancy envisages application of costing and cost accounting in a business setup. Itincludes determination of selling price and profitability in addition to forecasting of expenses and future probable incomes. It facilitates management with cost control initiatives, ascertainment of profitability and informed decision making. Besides, costing and cost accounting, the following areas are also covered under costaccountancy:

- Cost Reduction is aimed at achieving real and permanent reduction in the unit cost of goods produced or services rendered without compromising the quality orsuitability
- Cost Control refers to search for better and more economical ways of completing the current operations. It simply identifies and prevents waste within the existing environment.
- Cost Audit includes the verification of cost accounts and a check on their adherence to the cost accounting principles, plans, procedures andobjectives.



COST ACCOUNTING Vs FINANCIAL ACCOUNTING

Financial Accounting and Cost Accounting rest on the same basic principles and use the same records, but each deals with matters specially pertaining to it. Financial Accounting discloses the profit/loss of business as a whole during a particular period while cost accounting makes available the unit costs and profits and/or losses of different product lines.

The importance of both, cost accounting and financial accounting cannot be undermined. The two are different from each other on the basis of meaning, objectives, mode of presentation, recording, analyzing profit, periodicity of reporting, degree of accuracy and method of valuation ofstock.

S. NO.	BASIS FOR COMPARISON	COST ACCOUNTING	FINANCIAL ACCOUNTING
1	Meaning	Cost Accounting facilitates determination, tracking and controlling of various costs incurred in the business.	Financial Accounting records financial information of the business to reflect the profitability and the correct financial position of the company at a particular date.
2	Objective	Reducing and controlling costs.	Keeping complete record of the financial transactions, measuring profit position and financial position.
3	Information recorded	All information relating to material, labour and overhead, which are used in the production process	All transactions which can be measured in monetary terms.
4	Type of cost recorded	Both historical and pre-determined cost	Historical cost only.
5	Mode of Presentation	No statutory forms and voluntary presentation	Prepared according to accounting concepts and conventions, standards and in compliance with various acts and statutes
6	Time period of Reporting	No fixed time period. Reports prepared as and when required.	Financial statements are prepared at the end of the accounting period, which is normally 1 year.

7	Users	Internal stakeholders like management of the organization.	All stakeholders including, both, internal and external parties like customers, creditors, government, shareholders, etc.
8	Valuation of Stock	At cost	Cost or Net Realizable Value, whichever is less.
9	Mandatory	No, except for manufacturing firms it is mandatory.	Yes for all firms.
10	Profit Analysis	Generally, the profit is analyzed for a particular product, job, batch or process, thus, enabling management to eliminate less profitable product lines and maximise the profits by concentrating on more profitable ones	Income, expenditure and profit are analyzed together for business as a whole.
11	Forecasting	Forecasting is possible through budgeting techniques.	Forecasting is not at all possible.

COST ACCOUNTING VS MANAGEMENT ACCOUNTING

S. NO.	BASIS FOR COMPARISON	COST ACCOUNTING	FINANCIAL ACCOUNTING
1	**Meaning**	Cost accounting is an accounting system that aspires to capture an enterprise's costs of manufacturing by evaluating the input costs of every step of manufacturing as well as the fixed costs, namely, depreciation of capital equipment.	Management Accounting refers to the outlining of financial and non-financial data for the utilisation of management of the enterprise. It is also known as managerial accounting.
2	**Data type**	Quantitative	Both Quantitative and Qualitative

3	**Scope**	Focused on distribution, allocation, determination and accounting factors of the cost	Convey (impart) and effect factor of the cost
4	**Objective**	Determined in cost production	Furnishing data to the managers to fix goals and anticipate strategies
5	**Specific procedure**	Yes	No
6	**Planning**	Short term planning	Both Short and long term planning
7	**Recording**	Records both past and present data	Focuses more on scrutinizing for future projects
8	**Interdependency**	Can be installed without a Management accounting	Cannot be installed without cost accounting

CLASSIFICATION OF COSTS

The basis of classification and the respective costs associated under each of the basis have been presented below:

On the basis of Time

- Historical cost refers to the original cost at the time of a transaction. The ascertainment of such cost can be done after it has been incurred. It is objective in nature and can be verified after actual operations takeplace.
- Pre-determined cost is the cost computed even before commencement of an operation or activity. It is ascertained either from past data or as per organizational standards.

On the basis of elements.

- Material
- Labour
- Overheads

The same have been discussed earlier in the chapter.

On the basis of degree of traceability to product

- Direct cost also known as traceable cost, can be directly attributable or traceable to the production of a specific product or service oractivity.
- Indirect cost also known as common cost, is generally common to several products, thus is either difficult to trace to a certain specific product, service or activity or the process of doing so isuneconomical.

Direct cost can be directly allocated to the cost unit or cost centre while the indirect cost needs to be apportioned to different products.

On the basis of association with product

- Product costs are costs which become part of the cost of the product rather than expenses of the period in which they are incurred. They are included in inventory values. They are treated as assets in financial statements until the goods they are assigned to be sold. They become an expense at thattime.
- Period costs are costs which are not associated with production. They are treated as an expense of the period in which they are incurred. Such costs include general administrative costs, salesmen salaries and commission etc. They are charged against the revenue of the relevantperiod.

On the basis of changes in activity or volume

- Fixed cost remains static or constant irrespective of changes in output. The fixed costs have relationship withtime.
- Variable cost changes in direct proportion of change in volume ofoutput.

Theoretically speaking, variable cost remains constant per unit of output and fixed cost remains constant in total or per unit of time. In the long run, these concepts do not hold true. A comprehensive definition of variable cost should include those costs which tend to vary with output or those which have a major relation with output and that of fixed cost should include those costs which tend to be constant at different volumes of output or which have no significant relation with output.

- Semi-variable costs neither change proportionately nor remain static. Eg.Repairs.
- Step costs are costs that remain fixed over a range of activity and then jump to a new level as activitychanges.

On the basis of function: A company performs a number of functions and needs to ascertain the cost of each of these functions. A brief explanation of each of the functional costs is as follows:

The definitions of the various functional costs as given by Chartered Institute of Management Accountants (CIMA), London are as follows:

(i) *Manufacturing/Production cost*. The cost of operating the manufacturing division of a company is production cost. It includes costs beginning with supplying materials, labour and services and ends with the primary packing of the product. Thus, it includes the cost of direct material, direct labour, direct expenses and factoryoverheads.

(ii) *Administration cost*. The cost of formulating the policy, directing the organization and controlling the operations, which is not related directly to a production, selling, distribution, research or development activity or function are administrationcosts.

(iii) *Selling cost*. The cost of seeking to create and stimulate demand (sometimes termed as marketing) and of securingorders.

(iv) *Distribution cost*. The expenditure incurred from making the packed product available for dispatch to making the reconditioned returned empty packages, if any, available for-use. Expenditure incurred in moving articles to and from prospective customers as in the case of goods on sale or return basis is also included in distributioncost.

(v) *Research cost*. The cost of searching for new or improved products, new application of materials, or new or improvedmethods.

(vi) *Development cost*. The cost of implementation of the decision to produce a new or improved product or to employ a new or improved method till the commencement of formal production of that product or by the method is developmentcost.

(vii) *Pre-production cost*. That part of development cost incurred in making a trial production run preliminary to formal production is pre-production cost. It is treated as deferred revenue expenditure and charged to future cost ofproduction.

On the basis of relationship with accounting period

- Capital expenditure is an expense of a non-recurring nature, where the benefit continues over a long period. It generally results in acquisition of permanent assets.
- Revenue expense is of recurring nature, benefits only the current period and is thus, treated as an expense matched with revenues of the current accounting period.

On the basis of controllability

- Controllable costs are costs which can be influenced by the budgetholder.
- Non-controllable costs are costs which are not subject to control at any level of managerialsupervision.

Analytical and decision making costs

- Opportunity cost represents the cost of an alternative given up when a decision is made, i.e. the next best alternative. It is not recorded in books and is used for decision making and comparingalternatives.
- Sunk costs are historical or past costs and cannot be changed by any decision that will be made in the future. They are irrelevant for decisionmaking.
- Differential cost is the difference in total costs between two alternatives. If the cost of alternative results in increased cost, it is incremental cost and if it is decreased cost, it is decrementalcost.
- Imputed or hypothetical costs are costs which do not involve cash outlay. They are not included in cost accounts but are important for taking into consideration while making managementdecisions.
- Out-of-pocket costs mean the present or future cash expenditure regarding a certain decision which will vary depending upon the nature of decision made. They involve payment to outsiders and are more relevant for price fixation during recession or when make or buy decision has to bemade.

On the basis of Avoidability

- Avoidable costs are those costs which will be eliminated, if a segment of the business (e.g. a product or department) with which they are directly related, is discontinued.
- Unavoidable costs are those which will not be eliminated with the segments. Such costs are merely reallocated if the segment isdiscontinued.

Others

- Conversion cost is the cost incurred by the company in transforming direct materials into the finished products is known as the conversion cost. It excludes direct material cost and is usually taken as the aggregate of the cost of direct labour, direct expenses and factoryoverheads.
- Normal cost is the cost which is normally incurred at a given level of output in the conditions in which that level of output isachieved.
- Total cost is the sum total of all costs associated with the product or service, unit orcentre.

IMPORTANCE OF COST ACCOUNTING

The management of the company requires detailed information with respect to cost of operations so as to equip the executives with relevant information required for planning, scheduling, controlling and decision making. This is facilitated by Cost Accounting. By cost management, waste elimination, utilization of idle capacity, cost accounting helps to increase the overall productivity of an organization.

The importance of cost accounting can be summarized by categorizing the major parties benefiting and the respective benefits accruing as follows:

Management

- Aids in pricefixation
- Helps in preparingestimate
- Supports channelizing production on rightlines
- Assists in elimination ofwastages
- Makes comparison possible across periods and across productlines
- Provides data for periodical profit and lossaccounts
- Aids in determining and enhancingefficiency

- Helps in inventorycontrol
- Facilitates costreduction
- Assists in increasing productivity

Employees

- Makes available systems of incentives, bonus plansetc.
- Indirectlybenefitsthroughincreaseinconsumergoodsanddirectlythrough continuous employment and higherremuneration

Creditors

- Provides a base for judgment about the profitability and further prospects ofthe company

Economy

- Facilitatescontrolofcosts,eliminationofwastages andinefficiencies,thus,leading to the progress of the industry and in consequence of the nation as awhole

OBJECTIONS TO COST ACCOUNTING

Despite numerous advantages, some objections are generally raised against cost accounting. As has been discussed earlier, cost accounting is voluntary and no specific stereotyped formats or systems of cost accounting are applicable to all industries. Thus, there is no uniform procedure. This leads to difference in understanding and application of concepts, methods and techniques of cost accounting by different industries.

The major objections are:

1. *It is expensive*: Installation and maintenance of cost accounting system requires resources as analysis,allocation,absorptionandapportionmentofoverheadsrequireconsiderableamountof

Clerical work. Unless benefits accruing from cost accounting are more than the costs involved, it should not be sought.

2. *Different Results from Financial Records*: The results shown by the cost accounts generally differ from those shown by the financial accounts due to a number of reasons. Preparation of reconciliation statements frequently is necessary to verify their accuracy. This leads to increase in workload.

3. *It is inapplicable:* Lack of common formats and systems makes it impossible to apply cost accounting to all industries uniformly. Consequently, the systems need to be adapted by the respective industry on the basis of their nature or the nature of the product manufactured or servicerendered.

4. *It is unnecessary:* Maintenance of cost records leads to duplication of work i.e. preparation of financial accounts as well as cost accounts. Moreover, costing system itself does not control costs or improve efficiency. If the management is alert and efficient, it can control costs without the aid of the costingsystem.

5. *The system is complex*: Cost accounting requires identification, categorization and allocation of the different types of expenses, which is generally considered ascomplicated.

6. *Lack of Accuracy*: Use of notional cost such as standard cost, estimated cost hampers the accuracy of the costresults.

7. *Use of Secondary Data*: Cost accounting depends largely on financial statements. The limitations and errors in the financial information directly affect the costresults.

These objections are flawed. Most of these drawbacks can be avoided if the cost accounting system is well designed after taking into account technical details and advice of technical personnel of the business, setting up an integrated system of accounts and administering the same in an atmosphere of teamwork andco-operation.

FUNDAMENTALS OF COST, ITS ELEMENTS AND CLASSIFICATION

COST UNIT

The Chartered Institute of Management Accountants (CIMA), London, defines a unit of cost as –a unit of quantity of product, service or time in relation to which costs may be ascertained or expressed.‖

The preparation of cost accounts requires selection of a unit for identification of expenditure. The quantity upon which cost can be conveniently allocated is known as costunit.

For example: in case of electricity companies cost unit will be per unit of electricity generated and in case of transport companies, it will be per passenger-km. or per tone -km.

COST CENTRE

According to the Chartered Institute of Management Accountants, England, cost centre means –a location, person or item of equipment or group of these for which costs may be ascertained and used for the purpose of cost control‖. It can be a department or a sub-department or an item of equipment or machinery or a group of persons.

PROFIT CENTRE

A profit center is a business unit or department within an organization that generates revenues and profits or losses. Here, both the inputs and outputs are measured in monetary terms, and accounting for both costs and revenues results in automatic computation of profit with respect to this centre, termed as profit centre.

BASICS OF INSTALLATION OF COSTING SYSTEM

A company should give carefully planned consideration to the installation of a costing system so as to achieve its objectives. There are some practical difficulties faced in the installation of costing system.

MAIN CONSIDERATIONS

The following should be the main considerations to be kept in mind while introducing a costing system in a manufacturing organisation:

1. *The nature of the product*: A product requiring high value of material content requires an elaborate systems of materials control while a product requiring high value of labour content requires an efficient time-keeping and wagesystem.

2. *The size and type of organization:* The costing system should be designed and implemented in a manner to meet the requirements of the organization. Thus, the size of the organization, size of its departments, different levels of management, physical layout of the organization, extent of decentralization of authority, etc. should be given adequateconsideration.

3. *The objective:* The objectives and information which the management wants to achieve and acquire should also be taken careof.

4. *The technical details:* The technical aspects of the business should be analysed in detail seeking assistance and support of the principal members of the supervisory staff andworkmen.

5. *Informative and simple*: The system should be informative and simple, capable of furnishing complete information required, regularly and systematically in standard, detailed and precise printed formats. Data, complete and reliable in all respects, should be provided in a lucid form so that measurement of the variations between actual and standard costs ispossible.

6. *Method of maintenance of cost records:* The Company can maintain cost records in either integral or non-integral accountingsystems.

- In case of integral accounting system no separate sets of books are maintained for costing transaction but they are interlocked with financial transactions into one set ofbooks.

- In case of non-integral system, separate books are maintained for cost and financial transactions. At the end of the accounting period the results shown by the two set of books arereconciled.

7. *Flexibility:* The costing system should be flexible, elastic and capable of adapting to the charging requirements of thebusiness.

8. *Accuracy of data:* The extent or degree of accuracy desired with respect to costing data should bedetermined.

9. *Current practices.* The existing methods and procedures for procurement and payment of materials, labour etc. should becarefully analysed.

OBJECTIVES

1. Ascertainment of Cost

This is the key objective of cost accounting to track and analyze the per unit cost of the product produced by the company. It helps to ascertain cost of each activity such as process, operation, job etc.

2. Fix Selling Price

Cost accounting provides base for determination of selling price of company's product by ascertaining the cost of each product. It helps the management to fix the selling price of products and services.

3. Cost Control

Cost accounting helps the organization to control the cost of production by taking necessary steps to reduce wastage of materials, time and expense while carrying out the operation

4. Assisting In Decision Making

Cost accounting helps management in decision making such as make or buy decision, drop or continue decision, future expansion policies etc. It helps to make a choice out of two or more courses of action.

5. Ascertainment Of Profit

Cost accounting helps in tracking and ascertaining profitability of the product by preparing profit and loss account and balance sheet periodically.

6. Formulating Policies

Cost accounting plays important role to formulate policies of the organization. It provides necessary information and data to the top level management which are essential for framing marketing policies of the company.

7. Basis Of Financial Statement

Cost accounting is the foundation for the preparation of different financial statements (profit and loss account, balance sheet, trial balance etc.) of the company.

COST ESTIMATION AND COST ASCERTAINMENT

Cost Estimations the process of determining the costs of a certain product, job or order in advance for budgeting, measurement of performance efficiencies, preparation of financial statements (valuation of stocks, etc.) make or buy decision, fixation of the sale prices of products etc.

Cost Ascertainment is the process of computing costs on the basis of actual data.

Hence, computation of historical costs is cost ascertainment while computation of future costs is cost estimation.

The inter-relationship and importance of cost estimation and cost ascertainment cannot be undermined. The ascertained costs will greatly help the management in the process of estimation of rational accurate costs, provided the company has a sound costing system is in place.

Advantages of Cost Accounting

- **Elimination of Wastes, Losses, and Inefficiencies –** A good cost accounting system eliminates wastes, losses, and inefficiencies by fixing standards for everything.
- **Cost Reduction –** New and improved methods of production are followed under the cost accounting system. It leads to cost reduction.
- **Identify the reasons for Profit or Loss –** A good cost accounting system highlights the reasons for increasing or decreasing profit. If so, the management can take remedial action to maintain the profitability of the concern. There is no possibility of shutting down of any product or process or department.
- **Advises on Make or Buy Decision –** On the basis of cost information, the management can decide whether to make or buy a product in an open market. The management can rightly choose the best out of many alternatives. Sometimes, spare capacity can be used profitably.
- **Price Fixation –** The total cost of a product is available in the costing records. It is highly useful for the price fixation of a product.
- **Cost Control –** Budgets are prepared and standards are fixed under the cost accounting system. The expenses are not permitted beyond the budget amount. The actual performance is compared with the standard to find the variation. If there is any variation, reasons find out and the management can exercise control. Period to period cost comparison also helps cost control.
- **Assist the Government –** The government can collect reasonable tax from the company and exercise price control.

- **Help the Trade Union –** Bonus calculation is very easy to the trade union. Reasonable remuneration is also fixed on the basis of cost accounting information.
- **Marginal Analysis of Cost –** It is done for facilitating short-term decisions especially during the depression period.
- **Fixation of Responsibility –** Responsibility centers is fixed under the cost accounting system. If responsibility is fixed, it becomes difficult to evade the responsibility of performance and leads to effective performance.
- **Helps to Prepare Financial Accounts –** The information like the value of closing materials, work in progress and finished goods are necessary to prepare financial accounts. This information is supplied by the costing records and helps to prepare financial accounts without any further delay.
- **Prevention of Frauds –** Introducing a cost audits can prevent fraud. If so, correct and reliable data was available from the costing records which are highly useful to the government, shareholders, the creditors, and the like.

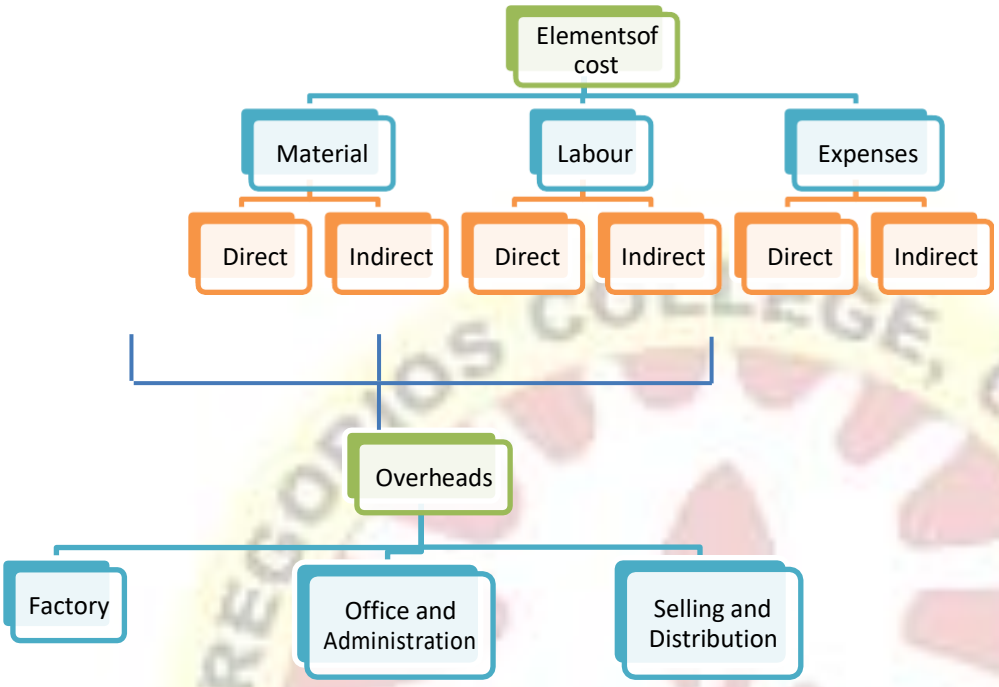
Disadvantages of Cost Accounting –

Cost accounting is not without drawbacks.

- **Costs –** The benefits of cost accounting come with a price. Since costing methods differ from organization to organization, it's not clear how these costs might manifest themselves until a specific firm is examined.
- **Complexity –** Generally speaking, complex cost accounting systems require a lot of work on the front end, and constant adjustments need to be made for improvements.
- **Additional Steps to Verify Accuracy –** Even if the rigidity of financial accounting creates some inherent disadvantages, it does remove the uncertainty and misapplication of accounting guidelines of cost accounting. Uncertainty equals risk, which always comes at a cost. This means additional and often more vigorous reconciliation to verify accuracy.
- **Reliance on Highly-Skilled Talent –** Higher-skilled accountants and auditors are likely to charge more for their services. Employees have to receive extra training and must sufficiently cooperate with data input. Non-cooperation can render ineffective an otherwise beautifully constructed system.

UNIT-2 DIRECT MATERIAL

ELEMENTS OF COST



The broad elements of cost are categorized as Material, Labour and Expenses, which are further classified as direct and indirect. The indirect material, labour and expenses together are termed as overheads.

A brief explanation of the elements has been given below:

1. Material: The basic substance used for producing the product is referred to as material. Material can be direct or indirect innature.

- *Direct Material*: The materials which directly contribute to the production of the product and are easily identifiable in the finished product are called direct materials. Cloth in shirt, paper in books and wood in furniture are examples of directmaterials.

- *Indirect Material*: Other material which is ancillary in the production of any finished product and cannot be conveniently assigned to specific physical units is called indirect material. For example, printing in stationery, scissors used in cutting cloth for shirt, nails in shoes orfurniture.

2. Labourrefers tothe human effort needed for conversion of materials into finished goods.Labour can be direct orindirect.

- *Direct Labour:*Labour which takes an active and direct part in the production of a particular commodity and can be directly co-related to any specific activity of production is termed as direct labour. Process labour, productive labour, operating labour, manufacturinglabour, direct wages etc are used synonymously with directlabour.

- *Indirect Labour:*Employees who do not directly take part in the manufacturing process and whose cost cannot be identified with the individual cost centre are included under indirect labour. Such labour does not alter the construction, composition or condition of theproduct. Salary of foreman, salesmen and director are some examples of indirectlabour.

3. Expenses:Costs incurred in the production process but not included under material or labour are generally expenses. They can be direct orindirect.

-*Direct Expenses:*These are expenses which can be directly, conveniently and wholly allocated tospecificcostcentresorcostunits.Directexpensesare sometimesalso describedas‖chargeable expenses.‖

- *Indirect Expenses:*All expenses other than direct expenses are indirect innature.

OVERHEADS

People generally use the terms overheads and indirect expenses synonymously. But, it needs to be understood that ‖overheads‖has a wider meaning than the term ‖indirect expenses‖. Overheads include the cost of indirect material, indirect labour besides indirectexpenses.

Indirect expenses may be classified under the following three categories:

- *Factory (Manufacturing, works or production) Overheads:* All expenses incurred in the factoryfor its smooth functioning including production management expenses are included here. Examples: Rent, rates, insurance, power etc. offactory.
- *Office and Administrative Overheads*includeexpensespertaining to the management and administration of business. Example: Rent of office, lighting, heating, printing, stationery,etc.

- *Selling and Distribution Overheads:* These are expenses incurred for marketing of a commodity, for securing orders for the articles, dispatching goods sold, and for making efforts to find and retaincustomers.

ITEMS EXCLUDED FROM COST ACCOUNTS

The cost and the financial accounts do not always give the same results. The reason can be attributes to certain items which are included in financial accounts but not in cost accounts. These itemscan be categorized under three major heads:

Appropriation of profits

(i) Appropriation to sinkingfunds.

(ii) Dividendspaid.

(iii) Taxes on income andprofits.

(iv) Transfer to general reserves.

(v) Excess provision for depreciation of buildings, plant etc. and for baddebts.

(vi) Amount written off—goodwill, preliminary expenses, underwriting commission, discount ondebentures issued; expenses of capital issue,etc.

(vii) Capital expenditure specifically charged torevenue.

(viii) Charitabledonations.

Matters of pure finance

(a) Purely financial charges:

(i) Losses on sale of investments, buildings,etc.

(ii) Expenses on transfer of company'soffice.

(iii) Interest on bank loan, debentures, mortgages, etc.

(iv) Damagespayable.
(v) Penalties andfines.

(vi) Losses due to scrapping ofmachinery.

(vii) Remuneration paid to the proprietor in excess of a fair reward for servicesrendered.

(b) Purely financial incomes:

(i) Interest received on bankdeposits.

(ii) Profits made on the sale of investments, fixed assets,etc.

(iii) Transfer feesreceived.

(iv) Rentreceivable.

(v) Interest, dividends, etc., received oninvestments.

(vi) Brokeragereceived

(vii) Discount, commissionreceived.

Abnormal gains and losses

(i) Losses or gains on sale of fixedassets.
(ii) Loss to business property on account of theft, fire or other naturalcalamities.

In addition to above abnormal items (gains and losses) may also be excluded from cost accounts.Alternatively, these may be taken to Costing Profit and Loss Account.

COMPONENTS OF TOTAL COST

The total cost comprises of four major components:

1. *Prime Cost*includes all the direct costs, viz. direct material, direct labour and direct expenses. It is also known as basic, first or flatcost.
2. *Factory Cost*comprises of prime cost and factory overheads. It is also known as works cost, production or manufacturingcost.
3.*Office Cost*summates office and administration overheads and factory cost. This is also termed as administration cost or the total cost of production.
4.*Total Cost or cost of sales* is the sum total of selling and distribution overheads and the total cost ofproduction.

Problem: 1

1. From the following information calculate the cost of direct materials consumed	
Direct material purchased	80,000
Cost of material sold (due to unsuitability)	1,000
Materials returned to suppliers (Defective materials)	2,000
Sale of direct material scrap	1,000
Closing stock of materilas	10,000
Opening stock of materials	8,000
Octroi and customs duties on materials purchased	6,000
Carrisge inwards	2,000

Solution: 1

COST SHEET

PARTICULARS	**Rs.**	**Rs.**
Opening stock of materials		8,000
Add:		
Direct material purchased	80,000	
Octroi and customs duties on materials purchased	6,000	
Carrisge inwards	2,000	88,000
		96,000
Less:		

Cost of material sold (due to unsuitability)	1,000	
Materials returned to suppliers (Defective materials)	2,000	
Sale of direct material scrap	1,000	
Closing stock of materilas	10,000	14,000
Direct materials consumed		**82,000**

Problem: 2

In a Factory 20,000 units of product A were Manufactured in the month of july 2001. From the following prepare a cost sheet showing cost per unit	
Opening stock of raw material	5,000
Purchases	55,000
Closing stock of Raw Material	10,000
Direct Wages	25,000
Factory overheads	40,000
Office and administration overheads	20,000

Solution: 2

COST SHEET

Particulars	Amount	Amount
Opening stock of raw material	5,000	
Add: Purchase	55,000	
	60,000	
Less: Closing stock of Raw material	10,000	
Material consumed	50,000	50,000
Direct Wages		25,000
Prime cost		75,000
Add:Fatory overheads		40,000
Work /factory cost		1,15,000
Add: Office &Aministration overhead		20,000
Cost of Production		1,35,000

Problem: 3

4. Draw a statement of cost from the following particulars.	
Opening stock: Materials	200,000
work in progress	60,000
Finished goods	5,000
closing stock: Materials	180,000
work in progress	50,000
Finished goods	15,000
Materials Purchsed	500,000
Direct Wages	150,000
Manufacturing Purchased	100,000
Sales	800,000
Selling and Distribution expenses	20,000

Solution: 3

COST SHEET

Particulars	Amount	Amount	

Opening stock material		2,00,000	
Add:			
Materials Purchsed	5,00,000	5,00,000	
		7,00,000	
Less:			
closing stock of Materials	1,80,000	1,80,000	
Material consumed			5,20,000
Direct Wages			1,50,000
			6,70,000
Add: Work/Fatory overheads			
Manufacturing Purchase	1,00,000		1,00,000
			7,70,000
Add: Opening Work in progress			60,000
			8,30,000
Less: Clson Work in progress			50,000
Work cost			7,80,000
Add: Office and Administration Overheads			NIL
Cost of production			7,80,000
Add: Opening Stock of Finished goods			5,000
			7,85,000
Less: Closing stock of finised goods			15,000
Cost of production of goods sold			7,70,000
Add: Selling and Distribution expenses			20,000
Cost of sales			7,90,000
Add: Profit (b/f)			10,000
Sales			8,00,000

Problem: 4

Mr. Gopal furnishes the following data relating to the manufacture of a standard product during the month of April 2000

Raw material consumed	15,000
Direct labour charges	9,000
Machine hours worked	900
Machine hour rate	Rs.5
Administrative overheads	20% on work cost
Selling overheads	Re. 0.50 per unit
Unit produced	17,100
Units sold	16,000 at Rs. 4 per unit

You are required to prepare a cost sheet from the above showing:

(a) The cost per unit

(b) Profit per unit sold and profit for the period.

Solution: 4

COSTSHEET			
PARTICULARS	**AMOUNT**	**Cost p.unit (17,100 unit)**	
Raw material consumed	15,000	0.88	15,000/17,100
Direct labour wages	9,000	0.52	9,000/17,100
Direct expenses	Nil	Nil	
Prime cost	24,000	1.4	
Add: Work over head			
Machine hour X Rate per hour			
900 X5	4,500	0.27	4,500/17,100
Work cost	28,500	1.67	
Add: Administration overhead			
20% on Work cost			
28,500 X20/100	5,700	0.33	5,700/17,100
Cost of production	34,200	2	
Less: Closing stock of finished goods			
(Unit produced - Unit sold)			
(17,100 - 16,000 = 1100 X 2 = 2,200)	2,200	nil	
Cost of production of good sold	32,000	2	
Add: Selling & distribution overhead			
16,000 X 0.50	8,000	0.5	
Cost of sales	40,000	2.5	
Add:Profit (B/F)	24,000	1.5	
Sales (16,000 X 4)	64,000	4	

Problem: 5

A factory produces a standard product.
Direct materials Rs. 91,000
Direct wages Rs. 29,000
Direct expenses Rs. 11,000
Factory overheads 80% of direct wages
Administration overheads 10% of work cost
Selling and distribution expenses Rs. 2per unit sold.
Unit produced and sold during the month 10,000,
If profit of 20% on sales is to be realised
what would be the selling price of each unit of the commodity?
Prepare cost sheet.

Solution: 5

COST SHEET		
PARTICULAR	AMOUNT	AMOUNT
Direct materials		91,000
Direct wages		29,000

Direct Expenses		11,000
Prime cost		1,31,000
Add: Work Overhead(29,000X 80/100)		23,200
Work cost		1,54,200
Add: Administration overhead (1,54,200X10/100)		15,420
Cost of production		1,69,620
Add: Selling & distribution overhead (10000X2)		20,000
Cost of sales		1,89,620
Add: Profit (20% on sales) 1,89,620 X20/80		47,405
Sales		2,37,025

Problem: 6

Prepare a stestement showing cost and profit from the following details.

Particulars	Rs.	Particulars	Rs.
Direct wages	1,50,000	Direct materials	5,00,000
Power	2,500	Oil and water	2,500
Storekeeper's wages	5,000	Transfer to general reserve	5,000
Factory rent	25,000	Foreman's salary	12,500
Office rent	12,500	Factory lighting	7,500
Repairs on factory plant	17,500	Office lighting	2,500
Repairs on office building	2,500	Depreciation on plant	2,500
Goodwill written off	2,500	Depreciation on office building	6,250
Consumable stores	12,500	Office stationery	2,500
Directors fees	6,250	Postage	1,250
Telephone rent	625	Travelling expenses	2,500
Salesman's salaries	6,250	Warehouse rent	2,500
Advertising	6,250	Dividend paid	10,000
Income tax	50,000	Manager's salary	25,000
Sales	9,47,500		

Solution: 6

COST SHEET

PARTICULARS	AMOUNT	AMOUNT
Direct material		5,00,000
Direct wages		1,50,000
Prime cost		6,50,000
Add: Work Overhead		
Power	2,500	
Store keeper	5,000	
Factory rent	25,000	
Repairs on factory plant	17,500	
Consumble stores	12,500	
Oil &water	2,500	
Foreman's salary	12,500	
Factory lighting	7,500	

Depreciation of plant	2,500	87,500
Work cost or factory cost		7,37,500
Add: Office overhead		
Office rent	12,500	
Repairs on office building	2,500	
Directors fees	6,250	
Telephone rent	625	
office lighting	2,500	
Depreciation of office building	6,250	
Office stationery	2,500	
Pstage	1,250	
Manager's salary	25,000	59,375
Cost of production		7,96,875
Add:Selling & Distribution over head		
Salesman's salary	6,250	
Advertise	6,250	
Travelling expenses	2,500	
Warehouse rent	2,500	17,500
cost of sales		8,14,375
Add: Profit (B/F)		1,33,125
Sales		9,47,500

Problem: 7

Prepare cost sheet from the following particulars:

Raw material purchased = Rs. 2, 40,000

Paid freight charges = Rs 20,000

Wages paid to laborers = Rs 70,000

Directly chargeable expenses = Rs 50,000

Factory on cost = 20% of prime cost

General and administrative expenses = 4% of factory cost

Selling and distribution expenses = 5% of production cost

Profit 20% on sales

	Opening stock (Rs.)	Closing stock (Rs.)
Raw material	30,000	40,000
Work in progress	35,000	48,000
Finished goods	40,000	55,000

Solution: 7

COST SHEET

Particulars	Amount (Rs.)	
Opening stock of raw material	30,000	
Add:Raw material purchased	2,40,000	
Add: freight charges	20,000	
	2,90,000	
Less:- closing stock of raw material	40,000	
Raw material consumed		2,50,000

wages paid to labour		70,000
Directly chargeable expenses		50,000
Prime cost		3,70,000
Add:- Factory overhead (20% of prime cost) 3,70,000X20/100		74,000
		4,44,000
Add:- Opening stock of work in progress		35,000
		4,79,000
Less:- closing stock of work in progress		48,000
Factory on work cost		4,31,000
Add:- Office & administrative Over head (4% of factory cost) 4,31,000X4/100		17,240
Cost of production		4,48,240
Add:- opening stock of finished goods		40,000
Cost of production		4,88,240
Less:- closing stock of finished goods		55,000
cost of production of good sold		4,33,240
Add:- selling and distribution expenses (5% of production cost) 4,33,240X5/100		21,662
Cost of sales		4,54,902
Add:- Profit (20% on sales) 4,54,902 X20/80 (cost of salesXRate/100-rate)		1,13,726
Sales		5,68,628

Problem: 8

A Manufacturing of scooters find that in 1998 it cost him Rs. 7,20,060 to manufacture 175 scooters. Which he sold Rs. 5,400 each. The cost is made up of:

Materials	2,82,000
Direct Wages	3,24,000
Factory overhead	48,600
Office overhead	65,460

For the next year he estimates that:

a) Each scooter will require materials of Rs. 1,600 and labour Rs. 1,800

b) The factory overhead will bear the same relation to wages as in the previous year.

c) The office overhead percentage on factory cost will be the same as in the past. Prepare a sttement showing the profit he would make per unit, If he reduces the price of the scoter by rs. 200.

Solution: 8

COST SHEET

PARTICULARS	AMOUNT	Cost P.U

Materials	2,82,000	1,611.43	2,82,000/175
Direct Wages	3,24,000	1,851.43	3,24,000/175
Prime cost	6,06,000	3,462.86	
Add: Factory over head	48,600	277.71	48,600/175
Work cost	6,54,600	3,740.57	
Add: Office overhead	65,460	374.06	65,460/175
Cost of production	7,20,060	4,114.63	
Add: Selling & distribution overhead	NIL	NIL	
Cost of sales	7,20,060	4,114.63	
Add: Profit (B/F)	2,24,940	1,285.37	
Sales (175 X 5,400)	9,45,000	5,400.00	
% of factory overhead			
Factory overhead/wagesX100			
48,600/3,24,000X 100= 15%			
% of Office overhead			
office overhead/work costX100			
65,460/6,54,600X100= 10%			
ESTIMATED COST SHEET FOR THE NEXT PERIOD			
PARTICULAR	AMT	C.P.U	
Material 175X1600	2,80,000	1,600	
labour 175X1,800	3,15,000	1,800	
Prime cost	5,95,000	3,400	
Add: Factory overhead			
15% of wages (3,15,000X15/100)	47,250	270	47250/175
Work cost/Factory cost	6,42,250	3,670	
Add: Office /Administration overhead			
10% on factory cost (6,42,250X10/100)	64,225	367	64225/175
Cost of production	7,06,475	4,037	
Add: Profit (B/F)	2,03,525	1,163	
Sales 175X5,200 (5,400-200)	9,10,000	5,200	

Problem: 9

Compute the cost of Raw materials purchased from the data below:

Opening stock of raw materials	10,000
Closing stock of raw materials	15,000
Expenses on purchases	5,000
Direct wages	50,000
Prime cost	1,00,000

Reconciliation of Cost & Financial Accounting

When cost accounts and financial accounts are maintained in two different sets of books, there will be prepared two profit and loss accounts - one for costing books and the other for financial books. The profit or loss shown by costing books may not agree with that shown by financial books. Such a system is termed as, 'Non-Integral System' whereas under the integral system of accounting, there are no separate cost and financial accounts. Consequently, the problem of reconciliation does not arise under the integral system.

However, where two sets of accounting systems, namely, financial accounting and cost accounting are being maintained, the profit shown by the two sets of accounts may not agree with each other. Although both deal with the same basic transactions like purchases consumption of materials, wages and other expenses, the difference of purpose leads to a difference in approach in a collection, analysis and presentation of data to meet the objective of the individual system.

Financial accounts are concerned with the ascertainment of profit or loss for the whole operation of the organisation for a relatively long period, usually a year, without being too much concerned with cost computation, whereas cost accounts are concerned with the ascertainment of profit or loss made by manufacturing divisions or products for cost comparison and preparation and use of a variety of cost statements. The difference in purpose and approach generally results in a different profit figure from what is disclosed by the financial accounts and thus arises the need for the reconciliation of profit figures given by the cost accounts and financial accounts.

The reconciliation of the profit figures of the two sets of books is necessary due to the following reasons:
1. It helps to identity the reasons for the difference in the profit or loss shown by cost and financial accounts.
2. It ensures the arithmetical accuracy and reliability of cost accounts.
3. It contributes to the standardization of policies regarding stock valuation, depreciation and overheads.
4. Reconciliation helps the management in exercising a more effective internal control.

Reasons for disagreement between Profits as per financial accounting and Profits as per cost accounting

The difference in the profitability of cost and financial records may be due to the following reasons.

1. Items included in the financial accounts but not in cost accounts.
• **Purely financial income:** such as interest received on bank deposits, interest and dividend on investments, rent receivables, transfer fee received, profit on the sale of assets etc.

• **Purely financial charges:** such as losses due to scraping of machinery, losses on the sale of investments and assets, interest paid on the bank loans, mortgages, debentures etc., expenses of company's transfer office, damages payable at law etc.

• **Appropriation of profit:** the appropriation of profit is again a matter which concerns only financial accounts. Items like payment of income tax and dividends transfer to reserve, heavy donations, writing off of preliminary expenses, goodwill and patents appear only in profit and loss appropriation account and the costing profit and loss a/c is not affected.

2. Items included in cost accounts only: There are certain items which are included in cost accounts but not in financial accounts. They are: Charges in lieu of rent where premises are owned, interest on capital employed in production but upon which no interest is actually paid.

3. Under/Over absorption of overhead expenses: In cost accounts, overheads are absorbed at predetermined rates which are based on past data. In the financial accounts the actual amount incurred is taken into account. There arise a difference between the actual expenses and the predetermined overheads charged to product or job.
If overheads are not fully recovered, which means that the amount of overheads absorbed in cost accounts is

less than the actual amount, the shortfall is called as under recovery or under absorption. If overhead expenses recovered in cost accounts are more than that of the actually incurred, it is called over absorption. Thus, both the over and under recovery may cause the difference in the profits of both the records.

4. Different basis of stock valuation: In cost accounts, the stock of finished goods is valued at cost by FIFO, LIFO, average rate, etc. But, in financial accounts stocks are valued either at cost or market price, whichever is less.
The valuation of work-in-progress may also lead to variation. In financial books only prime cost may be taken into account for this purpose whereas in cost accounts, it may be valued at prime cost plus factory overhead.

5. Different basis of depreciation adopted: The rates and methods of charging depreciation may be different in two sets of accounts.

Preparation on Reconciliation Statement or Memoran Reconciliation Account
A Reconciliation Statement or a Memorandum Reconciliation Account should be drawn: up for reconciling profits shown by the two sets of books. Results shown by any sets of books may be taken as the base and necessary adjustment should be made to arrive at the results shown by the other set of books. The technique of preparing a Reconciliation Statement as well as a Memorandum Reconciliation account is discussed below:

When there is a difference between the profits disclosed by cost accounts and financial accounts, the following steps shall be taken to prepare a Reconciliation Statement:

1. Ascertain the various reasons of disagreement (as discussed above) between the profits disclosed by two sets of books of accounts.
2. If profit as per cost accounts (or loss as per financial accounts) are taken as the base:

ADD:
(i) Items of income included in financial accounts but not in cost accounts.
(ii) Items of expenditures (as interest on capital, rent on owned premises, etc.) included in cost accounts but not in financial accounts.
(iii) Amounts by which items of expenditure have been shown in excess in cost accounts as compared to the corresponding entries in financial accounts.
(iv) Amounts by which items of income have been shown in excess in financial accounts as compared to the corresponding entries in cost accounts
(v) Over-absorption of overheads in cost accounts.
(vi) The amount by which closing stock of inventory is under-valued in cost accounts.
(vii) The amount by which the opening stock of inventory is over-valued in cost accounts.

DEDUCT:
(i) Items of income included in cost accounts but not in financial accounts
(ii) Items of expenditure included in financial accounts but not in cost accounts.
(iii) Amounts by which item of income have been shown in excess in cost accounts over the corresponding entries in financial accounts.
(iv) Amounts by which items of expenditure have been shown in excess in financial accounts over the corresponding entries in' cost accounts.
(v) Under absorption of overheads in cost accounts.
(vi) The amount by which closing stock of inventory is over-valued in cost accounts.
(vii) The amount b which the opening stock of inventory is under -valued in cost accounts.

3. After making all the above additions and deductions, the resulting figure will be profit as per financial accounts.

1. The profit shown by the cost ledger for the year ending 31st December 2013 is Rs. 21,560 but the profit

and loss account prepared as per financial books shows a net profit of 24,600.
You find that the closing stock is overvalued in financial books by Rs. 1,200. The factory overheads under-absorbed in financial accounts amounts to Rs.2, 400. The company has paid Rs.160 as bank charges and Rs. 800 as interest on loan during the year 2013. It has received dividend of Ts. 400 on shares in other companies. Prepare a reconciliation statement.
Solution: 1
Reconciliation statement

Particulars	Amount	Amount
Profit as per cost accounting		21,560
Add: Closing stock is overvalued in financial book Over head under absorbed Dividend received	 1,200 2,400 400	 4,000
		25,560
Less: Bank charges Interest on loan	 160 800	 960
		24,600

2. The profit disclosed by a company's cost accounts for the year was Rs. 30, 114, while the net profit shown by the financial accounts amounted to Rs. 19,760. On reconciling the figures, the following differences are brought to light:
(a) Overheads in the cost accounts were estimated at Rs. 7,500. The charge for the year shown in the financial accounts was Rs. 6,932. (568)
(b) Directors' fees not charged in the cost accounts amounted to Rs. 750.
(c) The company has allocated Rs. 600 for provision for debts.
(d) Depreciation of Rs. 600 is omitted from cost accounts.
(e) Transfer fees received amounted to Rs. 28.
(f) The amount charged to income tax is Rs. 9,000.

Solution: 2
Reconciliation statement

Particulars	**Amount**	**Amount**
Profit as per cost accounts		30, 114
Add: Overheads over absorbed in the cost accounts Transfer fees received	 568 28	 596
		30,710
Less: Directors' fees not charged in the cost accounts provision for debts not charged in the cost accounts Depreciation is omitted from cost accounts. Income tax charged	 750 600 600 9,000	 10,950
		19,760

3. From the following figures prepare a reconciliation statement.

	Rs.
Net profit as per financial records	1, 28,755
Net profit as per costing records	1, 72,400
Works overheads under recovered in cost	3,120
Administrative overhead recovered in excess	1,700
Depreciation charged in financial records	11,200
Depreciation recovered in costing	12,500

Interest received but not included in costing	8,000
Obsolescence loss charged in financial records	5,700
Income tax provided in financial books	40,300
Bank interest credited in financial books	750
Stores adjustments (credit in financial books)	475
Depreciation of stock charged in financial books	6,750

Solution: 3

Reconciliation statement

Particulars	**Amount**	**Amount**
Net profit as per costing records		1, 72,400
Add:		
Administrative overhead recovered	1,700	
Depreciation recovered in costing	12,500	
Interest received	8,000	
Bank interest	750	23,425
Stores adjustments	475	
		1,95,825
Less:		67,070
Works overheads under recovered in cost	3,120	
Depreciation	11,200	
Obsolescence loss	5,700	
Income tax provided	40,300	
Depreciation of stock	6,750	
		1,28,755

4. Ascertain the profits as per financial book from the following information:

	Rs.
Profit as per cost accounts	25,000
Closing stock over valued in cost books	12,500
Preliminary expenses written off	3,000
Profit on sale of building	30,000
Administrative expenses over recovered in cost books	50,375
Works overhead under recovered in cost books	30,375
Bank interest and transfer fee in financial books	5,000
Interest on investment recorded in financial books	10,000
Depreciation shown excess in cost books	4,000
Provision made for income tax	40,000

Solution: 4

Reconciliation statement

Particulars	**Amount**	**Amount**
Net profit as per costing records		25,000
Add:		
Profit on sale of building	30,000	
Administrative expenses over recovered in cost books	50,375	
Bank interest and transfer fee in financial books	5,000	
Interest on investment recorded in financial books	10,000	
Depreciation shown excess in cost books	4,000	99,375
		1,24,375
Less:		
Closing stock over valued in cost books	12,500	

Preliminary expenses written off	3,000	
Works overhead under recovered in cost books	30,375	
Provision made for income tax	40,000	85,875
Profit as per Financial book		38,500

5. Prepare a reconciliation statement from the following data.

	Rs.
Net loss as per cost accounting	1,72,400
Net loss as per financial accounting	2,16,045
Works overheads under recovered in cost	3,120
Administrative overhead recovered in excess	1,700
Depreciation over charged in cost accounts	1,300
Interest on Investment	8,750
Goodwill written off in financial accounts	5,700
Income tax paid	40,300
Stores adjustments (credit in financial books)	475
Depreciation of stock charged in financial books	6,750

Solution: 5

Reconciliation statement

Particulars	**Amount**	**Amount**
Net loss per costing accounts		1,72,400
Add:		
Works overheads under recovered in cost	3,120	
Goodwill written off in financial accounts	5,700	
Income tax paid	40,300	
Depreciation of stock charged in financial books	6,750	55,870
		2,28,270
Less:		
Administrative overhead recovered in excess	1,700	
Depreciation over charged in cost accounts	1,300	
Interest on Investment	8,750	
Stores adjustments (credit in financial books)	475	12,225
Net loss per financial accounts		2,16,045

UNIT-3 Material costing

INTRODUCTION TO MATERIAL

MEANING OFMATERIAL:

The first and the most important element of the product cost is material. Material is a substance, an integral part, from which the product is made. And constitutes a significant component of total cost. Depending upon the type of product manufactured, the material cost may go upto 70-80% of the total cost.

Material may be classified in three broadcategories:

1. RAW MATERIAL: Materialsentering the production process at the very beginning in their natural or raw form.The materials might be appearing in the final product, for example raw cotton (KAPAS) in the Production of Cotton textile or disappearing in the production process without forming a tangible part of the output, for example,Coal.

2. SEMI FINISHED MATERIAL: Partly finished materials purchased from outside or produced within the organization for assembling into a final product, e.g., unpolished furniture purchased from outside andpolished in-house beforesale.

3. FINISHED MATERIAL:Finished Material are products that are used in the form they are manufactured without any further value addition, e.g., an automobile is a finished product used directly by the consumer. However, finished components can also be used as raw materials or semi-finished materials for manufacturing of the final product e.g.Tyres, batteries, engine, and other components are finished material used by automobilemanufacturers.

   Material Cost may be either direct or indirect:

DIRECT MATERIAL:

Direct Materials are those that can be conveniently and wholly identified with specific units of output/ product/Job/ contract/ processor operations. These become the part of finished product itself. Example: Leather in leather products, Wood in Furniture production etc. At times, certain materials of small value though traceable to specific cost unit are treated as indirect material because the time, energy and cost involved in record keeping of such small value is not worth achieving a slightly higher accuracy in ascertaining the costing. Glue, nails, nut bolt etc.in furniture production. However, material, of whatever value, used in contracts performed as special sales outside the factory are ascertained as direct materials as they are for specific contractonly.

INDIRECT MATERIAL:

All those materials that cannot be classified as direct material are called indirect materials. Indirect materials, generally, do not physically constitute a part of the product as direct material do. Indirect materials include:

1. Materials, though used in production, which have so small or complex consumption that it is not feasible to try to trace them to specificproducts.

2. Production supplies & materials which cannot be identified with specific cost units e.g. Grease, Lubricating oil, scrap, small tools etc. used in afactory.

Material forms an important part of the cost of the product and, therefore, proper control over material is necessary from the time the order is placed with the supplier till they are consumed.The segregation of materials into direct and indirect categories facilitates control. The direct material having high value, require direct control while indirect materials having low value need not require excessive controls. An efficient material control system leads to significant reduction in production cost.

MEANING OF MATERIAL CONTROL:

Material Control is a system which ensures the provision of the right quantity of material of the right quality, at the right time with a minimum amount of investment. It is a systematic control over the procurement, storage, and usage of materials so as to maintain an even flow of materials andat the same time avoiding excessive investment in inventories. The essentials of a good system of material control include scheduling the requirements of purchasing, receiving, inspecting, maintaining stock records and material accounting and recording. In fact, Material control is a matter of coordination among the purchase department, receiving andinspection department, store keeping department, product control department and stock Control department. The success of abusiness concern largely depends upon the efficiencyof its Material Control System.

OBJECTIVES OF MATERIAL CONTROL:

1. *Continuous supply of materials for uninterrupted flow of production:* Situation of production stoppage due to materials running out of stock should be avoided. Such production stoppage is very costly in terms of overheads, denial of sales or panicpurchases.
2. *Optimum investment in materials:*Excessive investments due to over stocking of materials reduce profitability of the business as it locks large capital without any returns as well as increased storage cost.
3. *Economy in purchasing:* Material should be purchased at the lowest possible cost without sacrificing the quality,regularity, and dependability ofsupplies.
4. *Strict quality control:* There should be a strict system of quality control. The order of supplies of right quality of raw materials should be authorized. Material should be tested at the time of their receipt and a report should be generated initialed by the person who has tested them for fixingresponsibility.
5. *Minimum handling cost and time:* Material should be stored at such a place and in such manner,that:
   - Material can be located at ease
   - Made available to the user departments with least efforts
   - Time consumed in tracing material and making them reach the user department should be the least.
6. *Control on payment formaterials:* Ensure that no payment is made for materials not ordered though received, or for material not received or for materials of defectivequality.
7. *Authorized issues:* Ensure that no issue from the store takes place without a proper authorization. The store keeper has to be made accountable for allissues.
8. *Minimize wastages:* Minimizing wastages in handling at the time of receipt of materials in stores,during their issues and during use in the user department. Norms should be fixed for

wastages at each stage and wastages above the norms should beinvestigated.

9. *Control on the pilferages and leakages and other losses:* A system should be put in place to ensure that pilferages of material do not take place. Special control is required to be put in place for material prone topilferage.
10. *Detect the slow moving and fast moving materials:* The system should detect, on a regular basis, the items of material which are slow moving and items which are not moving at all. This will help in regulating further purchases of such materials and prevent losses. Many times, disposal of non-moving items is better than keeping them in sores and incurring storagecost.
11. *Control on misappropriations:* Ensure that no misappropriation of materials take place as once leakages develop in the system, they tend to become recurring innature.
12. *Regular and dependable information about materials:* There should be regular and dependable record of information of each type of material- the stock position, minimum level, maximum level, special problems with respect of certain materials and the list of dependable suppliers. This will help in placing order of the right quantity at the right time and to the rightsupplier.

INGREDIENTS/ ESSENTIALS OF SOUND MATERIAL CONTROL SYSTEM

1. *Organization for Material Control*: There should be a proper coordination and internal check between sales, production, purchases, receiving, testing, and storage and issue functions.
2. *Material Planning*: Material requirement should be determined in advance. Through the adoption of perpetual inventory system, the quantity of material in hand and its value is always available, which helps in avoiding the situation of over and understocking.
3. *Material Purchasing and Receiving*: Exploration of different sources of materials and its reliable suppliers should be regularly reviewed and revised. A proper system should be laid down for comparing quotations, receiving and inspection of materials and testing the quality of materialsreceived.
4. *Storage of Material*: Location and layout of the stores should be such that the time and transportation cost involved in receiving and issue of materials to the users is least. It should facilitate strict control on the stores by adopting perpetual inventory Bin card system.
5. *Issue of Material:* Materials should be issued only against a proper Material Requisition slip. Surplus material, if any, should only be returned to the Stores department and direct transfer of surplus material from one job to another should bediscouraged.
6. *Material Accounting and Reporting*: A complete record of all purchases, issues, returns, transfers and losses of material should be prepared and an efficient system of internal audit should beestablished.

INVENTORY SYSTEMS

Inventory records in quantity and value can be maintained asper any of the following system:

1. Periodic inventory system: In this case the value and amount of inventory is found out only at the end of accounting period after having physical verification of units in hand. This system does not continuously provide information regarding quantity and value of material in stock.
2. Perpetual Inventory system: In this system, the quantity of stock in hand and its value is available after each issue or receipt of material. The system thus provides a rigid control

over the stock of materials as physical stock can be verified anytime with stockrecords.

ADVANTAGES OF MATERIAL CONTROL:

1. Wastages in the use of material are reduced tominimum.
2. Risk of loss from fraud and theft is almosteliminated.
3. The records maintained under material control cycle facilitate the preparationof proper and accurate reports for the management.
4. Cost of storage isreduced.
5. Investment in inventories is reduced.

Thus, there is a need to make a perfect synchronization between the availability of Material and its utilization.The quantitative and financial aspects of Material Control are mutually complementary in nature as the control on physical units of Material at the time of purchasing, storage and use in production will also result in lower investment. Material Control helps in reconciling the conflict in the objectives of the Purchase department, Production department and the Finance department. The purchase department is interested in bulk purchase at the lowest price and overhead cost, though thismay lead to large investment in materials.

The production manager is interested in havingregular supplies so that production never stops or slows down due to inadequate supplies of materials, which also may lead to large investment in inventories. On the other hand, the finance Manager aims at cutting unnecessary investment in inventories. His objective is to facilitate smooth production with minimum necessary investment in inventories. Thus Material Control entails synergy through managing the conflicting interests of these departments and reaching an optimal solution.

MATERIAL CONTROL -PLANNING, PURCHASE, RECEIPT, INSPECTION AND STORAGE

Materials are the most basic and important substances from which a useable product is made. In order to have an uninterrupted flow of materials for production at least cost, an organization should have a proper material control system.

MATERIAL CONTROL:

Material control, as already discussed in the previous chapter, is a system which ensures the provision of material in the right quantity, of the right quality at the right time with minimum investment. It is a systematic control over the procurement, storage and usage of material avoiding, at the same time, any excessive investment in inventories. Thus, there should be a perfect synchronization between the availability of material and their utilization.Material Control System (MCS) involves monitoring the entire cycle starting from the initiation ofmaterial requirement, passing through the placement of order, receiving, Inspection a storage of Material, Issue of material and ending at the replenishment of material consumed, which is also the beginning of the cycle as well. Responsibilities are assigned at all these places by observing appropriate procedures, documentation and accounting systems tailor made to suit the requirements of individualorganization.

The steps involved in a sound MCSare:

1. MaterialPlanning.
2. MaterialPurchasing.

3. MaterialReceiving.
4. MaterialInspection.
5. Materialstorage.
6. MaterialIssue.

The 1st five steps will be discussed in this chapter while the 6th step will be taken care of in the next chapter.

MATERIAL PLANNING:

It includes the following:

1. Suitable classification and Codification of all material items to facilitate the other functions ofMCS
2. Ascertainment of the requirement of material inadvance.
3. Adoption of perpetual inventory system (chronological recording of receipts and issue of materials) so that the quantity and value of material in stock is continuously available after everytransaction.
4. Ascertainment of the quantity of material to be purchased through centralized or throughdecentralizedpurchasing.
5. Ascertainment of Economic order quantity, Maximum Level, Minimum Level and Re-order level for each materialseparately.
6. Adoption of ABC (Always Better control) analysis for selective and focused control on high value low volumeitems.
7. VED (Valuable, Essential, and Desirable) analysis can be used for controlling spareparts.

Material Requirement Planning (MRP)

Automated planning for materials that works on the requirement of materials by first ascertaining the amounts and timings of finished goods required and then working back to determine the demand for sub components, raw material etc. at various stages of productions.

MATERIAL PURCHASING:

Efficiency in purchasing function is crucial to the success of an organization as it leads to timely availability of right type and quantity of material necessary for supply of right quality and quantity of products to its customers. A separate purchasing department ensures that the right type of materials inthe right quality and quantity is purchased from a right source at the right price and time.

Whether an organization opts for centralized purchasing or decentralized purchasing depends on a number of factors such as size of the organization, Percentage of materials in the total cost and nature of materials. In case of centralized purchasing there is one central purchase department which makes purchases of all types of materials for all departments in the organization. The central purchase department can be located at one place or it may have its sub units located at different places.All departments which require any type of material supplies, services, tools, components etc. send their requirements in the form of indents or purchase requisitions to the centralized purchasing department which makes the purchases as per specifications, specific procedures andnorms.

In case of decentralized purchasing each branch or department does its own purchasing. In this case theadvantages of centralized purchasing like bulk discounts, specialized knowledge, less purchasing overhead cost per unit, expert quality testing is not available. But on the other hand, when branches and departments are located far and wide, it may not be practical to do centralized purchasing and hence decentralized purchasing is done. More so in case of urgent needs, small purchases, highly technical material requiring testing by the user department, decentralized purchasing issuitable.

In most of the cases, a blend of centralized and decentralized purchasing is adopted. Material of standard specifications and required in bulk are reserved for centralized purchasing while highly technical materials, small value materials or materials available cheaper in local markets are allowed to be purchased by the user department.

Just in Time Purchasing (JIT):

This concept aims at eliminating avoidable investment in stocks of raw materials, work in progress and finished goods. Raw material is procured just when they are required for production and production is fully synchronized with sale. This leads to minimization of loses due to pilferage, spoilage and obsolescence. This needs a close relationship with suppliers and frequent deliveries of small quantities so that deliveries just precede their use. The guaranteed quality of materials is directly delivered to the shop floor just when needed.

Purchase Procedure:

The initiation of purchase begins with the receipt of purchase requirement/ requisition slip by the purchase department from either the stores department for regular stocks items or by the departmental head for specialized materials. The purchase requisition is the formal request made by the stores or the user department to the purchase department. This requisition contains complete details such as the date of making the request, the quantity, quality, any specific characteristic of material demanded, code number of material required, the latest date by which material should be available etc.

STORAGE OF MATERIALS:

After the purchase process has been completed and materials have reached the stores it is necessary to ensure that these are efficiently stored. The store keeper should accept the materials only after verifying the material received with consignment note, material received report and inspection report.

Classification and Codification:

Classification is the process of arranging items in groups and sub groups according to common characteristics. Materials should be classified according to the nature (subjective Classification) or the purpose to be fulfilled (objective classification). The subjective classification is useful for identification, storage, ordering and accounting of materials. The objective classification is useful for costingpurposes.

Classification and codification go together. Classification is the first step and Codification is the next step. Codification is the process of assigning a symbol or number to different items of material falling in different groups and subgroups. According to ICMA terminology "a code has been defined as a system of symbols designed to be applied to a classified set of items". Classification facilitates identification of items on the basis of description while coding is the process of assigning symbol or code number on the basis of classification. Code is shorter, precise and substitute for long and imprecise description.

The codification can be as per any of the three methods.

a) Alphabetical
b) Numerical
c) Alphabetical cumNumerical

Bins and Racks:

The store should be divided into several sections for particular types of material. Each section should have various suitable containers for keeping different variety of that material. Such containers or place are called as bins or racks. Each bin or rack is properly numbered and indexed for easy identification. The floor plan also exhibit at the entrance of store room for ready location of various sections and corresponding bins. The card is hung outside each bin and whenever the material is received or issued, entry is made in the card by the store keeper and correspondingly the balance is shown after every transaction. Thus, bin card consist of three columns only and gives the ready reference for finding the balance of material available at any point oftime.

Stores Ledger:

The cost office maintains a store ledger in which separate card is maintained for each type of raw material and spare parts in the store. Stores ledger gives the same information as is available in the bin cards except that it gives the monetary information also, such as the rate, amount of receipts, issues and the balance of materials. So the stores ledger account has threebroad sections – receipts with quantity, rate and amount, issues with quantity, rate and amount and balance with quantity, rate and amount. Sometimes it also consists of a fourth section-for material ordered. This column enables the planning of production without unnecessary reference to other books andaccounts.

Distinction between Bin card and stores ledger:

1.Bin Card contains only quantitative record of receipt, issue and balance of different materialswhile stores ledger records both quantities and value ofmaterials.

2.Bin card is maintained by the store keeper in the stores department while the stores ledger is maintained by the cost clerk in the costingdepartment.

3.Posting in the bin card is made simultaneously with the receipt and issue of materials whilethe in the stores ledger, it is made after thetransaction.

4. Bin card is not a basic accounting record while stores ledger is a basic accountingrecord.

5.Inter department transfer or inter job transfer are only recorded in the stores ledger and not in the bincard.

Investment in Materials:

One of the basic objectives of Material Control is to make the best use of every Rupee invested in inventories. This requires that the right quantity of material should be ordered at the right level of stock so that the production and sales process goes on smoothly. This avoids excess investment in materials, maintain necessary cushions in the forms of safety stocks which act as a buffer against contingencies, ensure availability of all material items just in time and control scraps, wastages, spoilage and defectives. There should be neither overstocking nor under stocking. This leads to minimization of material holding relatedcost.

Safety Stock:

Safety stock serves the same purpose in a business unit as a shock absorber in a vehicle. It maintains a cushion for contingencies arising out of uncertainties on either demand/supply side. Higher the degree of uncertainties, greater is the need for safety stock. Each producer has to exercise the balance between the cost of having plenty of safety stocks and the risk of lack of safety stocks. The objective should be to optimize the total cost/risk entailed in fixing the level of safety stock.

VALUATION OF MATERIALS
ISSUING OF MATERIALS

Various products, jobs, processes, contracts, etc. are charged with the cost of materials used by them. In case, the materials have been exclusively purchased for a job or a contract, these can be charged at the same rate at which these materials were purchased. But if, the raw materials have been issued from the stores it becomes necessary to decide about the price which is to be charged for a material requisition to be used for a particular job or acontract.

MATERIAL REQUISITION:

It is a formal request by the user department to the store keeper for the issue of material. This request should be duly signed by an officer authorized to make such request. It serves as an

authority to the store keeper to issue materials. It is prepared in triplicate. All the three copies are signed by the store keeper. One copy is returned to the requisitioning department along with the materials. Second copy is retained by the store keeper which helps him completing its own record of issue in Bin Cards/ Store Ledger. The third copy is send to the costing department as a basis of debiting the requisitioning department. This copy facilitates the ascertainment of the cost of the job, products and processes for which these materials have beenused.

VALUATION OF INCOMING MATERIALS

The receipt of materials means incoming materials meant for conversation into final product. The incoming materials are to be valued at invoice price subject to trade or quantity discount plus all expenses incurred up to the point of placing materials in a condition suitable for issuance from the stores. These Expensesincludes:

- Transportation including cartage expenses.
- Receiving unpacking and inspecting costs.
- Insurance and storage costs.
- Accounting and purchasing costs.

The basic price of Materials is to be adjusted upwards considering the cost of containers and the discount availed. The supplier of materials may charge separately for the containers that he has used for supplying materials. In case these containers are not returnable, their cost must be added to the cost of materials received. If the containers are returnable at a price less than the cost charged the difference must be charged to the cost of material received. In case they are to be returned at full cost charged their cost should not be added to the cost of incoming materials. Sales Tax, excise duty, custom duty, Insurance etc. are to be added to the purchase price. The price of material is to be adjusted with respect to discount too. Discount is of three types:

Trade Discount:It refers to allowance which is permitted by the vendor to a purchaser who must resell the articles. The allowance is permitted to compensate the purchaser for storage, bulk breaking and delivering small quantities.

Quantity Discount: Such discount is allowed by the supplier to the buyer to encourage him to place large orders. Both trade and quantity discounts should be taken into account while valuing the incoming materials.

Cash Discount:Such discount is allowed by the vendor to the buyer to encourage him to make prompt payment of invoice.Itisgiven only when the debtor gives the payment within the

Stipulated period. As it is a financial incentive, it is not to be included in valuing the incoming cost of materials.

I Computation of Material cost:

1. The following quotation is received from a supplier in respect of Material X
   Lot Price: 10,000 units at Rs. 25 per unit
   20,000 units at Rs. 20 per unit

Trade discount 25% and cash discount at 5% (if payment is made within a week.)

Freight charges Rs. 1,000 per order. Containers, one for every 1,000 units, are charged at Rs. 250 each. If they are returned within 2 months, credit will be given at Rs. 230 each.

Calculate the material cost for 20,000 units, assuming the containers will be returned.

Statement of cost of quotation for Materials

Ordering quantity 20,000 units **Particulars**	Amount	Amount
20,000 units at Rs 20 per unit (20,000X 20) Less: Trade discount at 25% (4,00,000X25/100)		4,00,000 1,00,000
		3,00,000
Add: Freight charges 1 container =1000 units ? =20000units (20000/1000= 20containers (20X 250) = 5,000 Less: credit on return230X20=4,600	1,000 400	 1,400
Total cost of material		3,01,400

2. The following quotation is received from a supplier in respect of Material X as follows:

Lot price: 1000 kg. at Rs.5.00 per kg
5000 kg. at Rs.4.50 per kg
10,000 kg. at Rs.4.00 per kg

Trade discount 20% and cash discount at 5% if payment is made within 15 days. One container is required for every 1,000 Kg. of the material and containers cost Rs. 100 each but Rs. 90 will be credited if returned within 3 months.
Transport charges for any order Rs. 500
Storage charges Rs. 150

Calculate the material cost for 5,000 Kg. of material, assuming containers are returned in due course

Statement of cost of quotation for Materials

Ordering quantity 5,000 Kg **Particulars**	Amount	Amount
5,000 Kg at Rs 4.50 Less: Trade discount at 20% (22,500X20/100)		22,500 4,500
		18,000
Add: 1 container =1000 Kg ? =5000Kg (5000/1000= 5 containers (5X 100) = 5,00 Less: credit on return(5X90) = 450 Transport charges Storage charges	 50 500 150	 700

Total cost of material		18,700

Cost of material per Kg= 18,700/5000= Rs. 3.74

3. A quotation is received from a supplier in respect of Material as follows:
Lot price: 10,000 kg. at Rs.50 per kg
50,000 kg. at Rs.45 per kg
1,00,000 kg. at Rs.40 per kg
Trade discount 25% and cash discount at 10% if payment is made within 15 days. One container is required for every 10,000 Kg. of the material and containers cost Rs. 10,000 each but Rs. 9,000 will be credited if returned within 3 months. Calculate the material cost for 50,000 Kg. of material, assuming containers are returned in due course.

II. Selection of suppliers

4. The following quotation received from two suppliers for a material after inviting tenders:
Supplier I: Rs. 1.80 per unit
Supplier II: Rs. 1.60 per unit plus Rs. 5,000 fixed charges per order.
1. Calculate the order quantity for which the purchase price will be the same per unit.
2. Which supplier should be chosen for the following order quantities?
(a) 20,000 units (b) 30,000units

Solution:4

1. Quotation of supplier –I is Rs. 0.20 more per unit without fixed charges
Quotation of supplier –II is Rs. 0.20 less per unit with fixed charges

The order of quantity for which the purchase price per unit will be the same

$$\frac{\text{Amount of fixed charges}}{\text{Different in purchase price per unit}}$$

$$\frac{5,000}{0.20} = 25,000 \text{ units}$$

At order quantity of 25,000 units both supplier quotation are equal

Supplier- I = 25,000 X 1.80= 45,000
Supplier- II = 25,000X1.60+5,000 = 45,000

2. (a) If order of quantities in 20,000 units
For supplier- I = 20,000 X1.80 = 36,000
For supplier-II = 20,000X 1.60 +5,000 =37,000
Supplier- I is better. Because it cost is cheaper than supplier-II
(b) If order of quantities in 30,000 units
For supplier- I = 30,000 X1.80 = 54,000
For supplier-II = 30,000X 1.60 + 5,000 =53,000
Supplier- II is better. Because it cost is cheaper than supplier-I

III Material losses

5. One parcel containing two vital components was received by a factory and the invoice relating to the same discloses the following:

Material-I 500 Kgs. at Rs. 2 per Kg	1,000
Material-II 600 Kgs. at Rs. 1.60 per Kg	960
Insurance	39.20
Sales Tax	98
Freight	55

Transit loss of 10 units of Material-I and 6units of Material-II was noted. However no insurance claim could be made.

Find the issue rate per unit of each material. If a provision for obsolescence of 10% is to be made. Find the revised issue rates.

Solution: 5

Statement of cost of material

Particular	Material -I	Material- II
Invoice value	1,000	960
Add:		
Insurance(1,000: 960)	20	19.20
Sales tax	50	48
Freight	28	27
	1,095	1057.20

Working notes

Insurance:
Material- 1 39.20X1000/1960 = 20
II 39.20X960/1960 19.20

Sales tax:
98X1000/1960=50
98X960/1960=48

Freight
55X1000/1960=28
55X960/1960=27

Particular	Material -I	Material- II
	(500-10)	(600-6)
	(490X 2)	(594X1.60)
Purchase quantity	980	950.40
Less: Provision 10%	98	95.04
Net weight	882	855.36

Net weight in units = 882/2= 441units 855.36/1.60= 534.6unit

Issue rate per unit = Material –I =1095/441=2.483 per unit

Materilal – II = 1057.20/534.60= 1.978 per unit

IV Inventory Turnover ratio

Inventory turnover ratio enables the management to avoid capital being locked up in undesirable stocks. This ratio indicates the efficiency or inefficiency with which inventories are maintained.

Inventory turnover Ratio = Cost of material consumed
Cost of Average stock

Average stock
= Opening stock of material + closing sock of material
2

Inventory turnover in days = Days in the period
Inventory turnover ratio

6. Calculate the Material turnover ratio for the year 2002 from the following details.

	Material A	Material B
Opening Stock	25,000	87,500
Closing Stock	15,000	62,500
Purchases	1,90,000	1,25,000

Determine the fast moving Material.

Inventory turnover Ratio = Cost of material consumed
Cost of Average stock

Material= A

Cost of Production or cost of material consumed
= Opening stock + Purchases – Closing stock
= 25,000+ 1, 90,000 – 15,000
= 2, 00,000

Cost of Average stock = Opening stock + Closing stock
2
=25,000 + 15,000
2
= 20,000

Inventory turnover Ratio= 2,00,000
20,000
= 10 times

Material= B

Cost of Production or cost of material consumed
= Opening stock + Purchases – Closing stock
= 87,500+ 1, 25,000 – 62,500
= 1,50,000

Cost of Average stock = Opening stock + Closing stock
2
=87,500+ 62,500

2

= 75,000

Inventory turnover Ratio= 1,50,000

75,000

= 2 times

The **Inventory turnover Ratio of Material A is higher than Material B. Therefore Material A is fast moving compared to material B**

7. The following information is available from the books of a company for the year ended 31st December 2004.

	Rs.
Opening stock of Material A	14,000
Purchase of Material A	2, 30,000
Closing stock of Material A	10,000

Calculate the material turnover ratio of Material A and also ascertain such turnover in terms of days.

8. From the following information obtained from the books Ajay & Co., for the year ended 31st Dec. 2004 , Calculate

(a) Material turnover Ratio

(b) Material turnover period in days and also months

(c) Faster moving Material

	Opening stock Units	Purchases Units	Closing stock Units
Material J	75,000	2,00,000	25,000
Material K	25,000	4,00,000	50,000

a) Material turnover Ratio

Inventory turnover Ratio = Cost of material consumed

Cost of Average stock

Material= J

Cost of Production or cost of material consumed

= Opening stock + Purchases – Closing stock

= 75,000+ 2, 00,000 – 25,000

= 2, 50,000

Cost of Average stock = Opening stock + Closing stock

2

=75,000 + 25,000

2

= 50,000

Inventory turnover Ratio= 2,50,000

50,000

= 5 times

b) Material turnover period in days and also months

Material turnover period in days = 365= 73 days
5

Material turnover period in months = 12 = 2.4 months
5

Material= K

Cost of Production or cost of material consumed
= Opening stock + Purchases – Closing stock
= 25,000+ 4, 00,000 – 50,000
= 3,75,000

Cost of Average stock = Opening stock + Closing stock
2
=25,000 + 50,000
2
= 37,500

Inventory turnover Ratio= 3,75,000
37,500
= 10 times

b) Material turnover period in days and also months

Material turnover period in days = 365= 36.5 days
10

Material turnover period in months = 12 = 1.2 months
10

c)The Inventory turnover Ratio of Material K is higher than Material J. Therefore Material K is fast moving compared to material B

V Economic Order Quantity (EOQ):

It refers to the size of the purchase order for a material which results in making material available in a year at minimum total material related costs. Cost relating to materialsis:-

1) PurchaseCost
2) OrderingCost
3) StorageCost
4) Stock OutCost

The order size which results in lowest material related costs for meeting a given material requirement in a period is EOQ. Thus, if EOQ is adopted as ordering quantity or the re-order quantity than the sum total of prices paid for materials, ordering cost and storage costs will be least. In case the prices of the materials do not change with change in order size than EOQ is determined by only ordering cost and storage costs.

Purchase cost:

The cost of acquiring the raw material from the supplier is called as Purchase Cost.

Ordering Cost:
All costs involved in placing the orderis considered as Ordering Cost. Example: transportation cost, travelling allowances of purchases officers, telephone bills, printing and stationery bills etc. are the few examples of ordering costs. It is assumed that ordering cost per orderremain constant. Larger the order size, less is the number of orders and therefore smaller is the total ordering cost in a given period and viceversa.

Storage Cost:
It includes all costs involved in holding costs example: interest on investment in stocks, insurance, godown rent, cost of bins, pilferage, spoilage, obsolescence etc. All these costs are closely related to the number of units held in stores and therefore larger the order size larger is both the average investing and total storage cost and vice versa.

Stock out Cost:
The cost arising from non-fulfillment of delivery promises is called the Stock Out cost- like, loss of sales, loss of goodwill, loss of customers, etc. It is associated with carrying too little inventory.

Graphic Determination of EOQ: Ordering cost exercises pull in favour of larger order size because that will result in smaller no. of orders and smaller total ordering cost. Storage cost exercise pull in favour of smaller order size because smaller order size will result in smaller average inventory and hence smaller storage cost.

EOQ or least cost order size is determined at a point where both these pulls exactly meet each other. Thus, EOQ is determined by the intersection of ordering cost curve and storage cost line.

At EOQ,

1. Total Ordering Cost = Total Storage Cost; *and*
2. The total of the two costs is theleast.

So EOQ refers to that size of purchase order for a material which results in making material available in a given year at a minimum total material related cost (i.e. Ordering Cost + Storage Cost). At any other quantity of material ordered the total cost of ordering and storage will be more.

MATHEMATICAL FORMULATION OF EOQ

Determination of EOQ has been explained graphically above. The same can be calculated mathematically with a greater degree of accuracy as explained below:

Economic Ordering Quantity

$$EOQ = \sqrt{\frac{2CO}{I}}$$

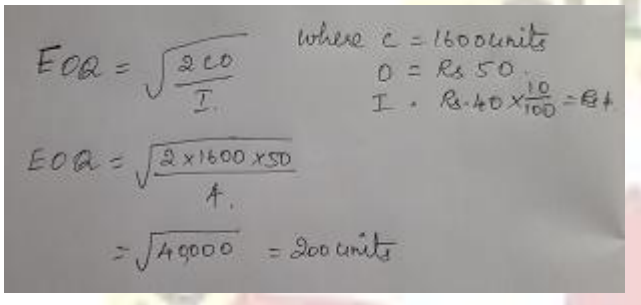
Where EOQ = Economic Order Quantity
C = Consumption of the material in units per year

O = Ordering Cost

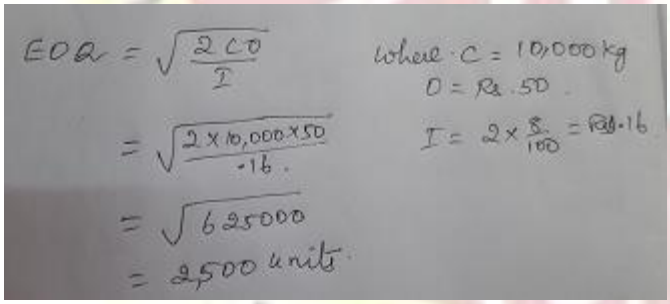
I =Interest and carrying cost per unit per annum

9. Calculate economic ordering quantity from the following particulars.
Annual requirement = 1,600 units
Cost of material per unit = Rs. 40
Cost of placing and receiving one order Rs. 50.
Annual carrying cost of inventory is 10% of inventory value.

Solution: 9



9. Calculate the economic ordering quantity from the following information.
Consumption of material per annum 10,000 Kg.
Ordering cost per Kg of raw material Rs. 2
Store cost 8% on inventory.



10. Calculate economic ordering quantity:

Actual consumption	600 units
Order cost	Rs. 12 per order
Cost price per unit	Rs. 20
Storage & Carrying cost	20%

$$EOQ = \sqrt{\frac{2CO}{I}}$$

$$= \sqrt{\frac{2X600X12}{4}}$$

= $\sqrt{3,600}$

= 60 units

11. Calculate the economic ordering quantity from the following information.

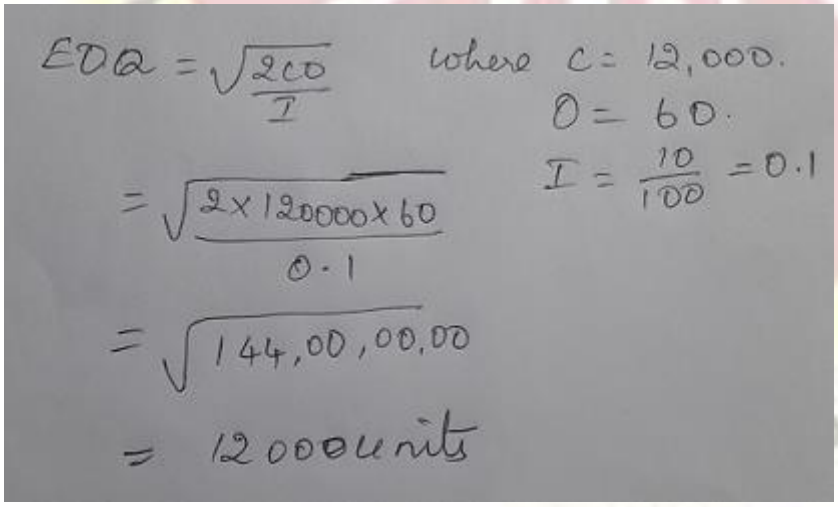
Annual usage	20,000 units
Buying cost per order	Rs. 10
Cost per unit	Rs. 100
Cost of carrying inventory 10% of cost.	

12. From the following information determine the EOQ.

Actual consumption	90,000 units
Cost price per unit	Rs. 50
Buying cost per order	Rs. 10
Cost of carrying inventory	10% of cost

13. Find out the EOQ from the following particulars

Annual usage	Rs. 1, 20,000
Cost placing and receiving one order	Rs. 60
Annual carrying cost	10% of inventory value



14. Calculate EOQ. Also state the number of orders to be placed in a year

Consumption of material per annum 10,000 Kg.

Order placing cost per order Rs. 50

Cost of material per Kg. Rs.2

Storage cost 8% on Average inventory.

Maximum Level, Minimum Level and Reorder Level:

Maximum Level: In order to avoid over and under investment in materials the management should decide the maximum and minimum quantity of materials to be stored at any point of time. The fixation of

maximum level is necessary in order to avoid unnecessary blocking of capital, losses on account of obsolescence, deterioration of materials, thefts, storage cost etc.

Minimum Level: The fixation of Minimum Level of materials is again a necessary requirement in order to have un-interrupted production cycle.

Reorder Level: In order to maintain these levels, it is very necessary to determine the re-order level i.e. at what level of stock the fresh order should be placed for Economic order quantity so that at the time of the receipt of ordered quantity, the material level should reach at the maximum level.

Average level indicates the average stock held by the concern. It can be calculated with the help of following formula.

VI Computation of Stock Levels

(a) Reorder Level = Maximum Consumption X Maximum Reorder Period

Or

R.L = M.C X M.R.P

(b) Minimum Level = Reorder Level – (Normal consumption X Normal Reorder Period)

Or

Min. L. = R.L – (N.C. X N.R.P.)

(c) Maximum stock level = Reorder level + Reorder quantity – (Minimum Consumption X Minimum Reorder period)

Max. L. = R.L + R.Q – (Min. C. X Min. R.P)

(d) Average Level = Minimum level + ½ of reorder quantity

Or

= ½ (Maximum level + Minimum level)

(e) Danger Level = Average Consumption X Maximum reorder period for emergency purchase

Reorder quantity – 3,600 units

Reorder period –10 – 15 days
Normal re order period – 12 days

Answer:

Reorder Level = Maximum Consumption X Maximum Reorder Period

= 420 X15 = 6,300

Maximum stock level = Reorder level + Reorder quantity – (Minimum Consumption X Minimum Reorder period)

= 6,300 + 3,600 – (240 X 10)
= 9,900 – 2400
= 7,500 units

Minimum Level = Reorder Level – (Normal consumption X Normal Reorder Period)

= 6,300 – (300 X12)
=6,300 – 3,600
= 2,700 units

Average Level = Minimum level + ½ of reorder quantity

= 2,700+ ½ x 3,600
= 2,700 +1,800 = 4,500 units

Or

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

$$= \frac{7,500 + 2,700}{2}$$

$$= \frac{10,200}{2} = 5,100 \text{ units}$$

16. From the following information, Calculate:

a) Maximum stock level
b) Minimum stock level
c) Reorder level
d) Average stock level.

Normal Consumption per day	500 Kgs.
Minimum Consumption per day	200 Kgs
MaximumConsumption per day	800 Kgs
Lead time	10 to 16
Reorder quantity	3000 Kgs

Answer:

Reorder Level = Maximum Consumption X Maximum Reorder Period

= 800 X16 = 12,800 units

Maximum stock level = Reorder level + Reorder quantity – (Minimum Consumption X Minimum Reorder period)

= 12,800 + 3,000 – (200 x10)

=15,800 - 2000

= 13,800 units

Minimum Level = Reorder Level – (Normal consumption X Normal Reorder Period)

Normal reorder period = $\frac{\text{Minimum reorder period + Maximum Reorder period}}{2}$ = $\frac{10 + 16}{2}$

= $\frac{26}{2}$ = 13

= 12,800 – (500 X13)

= 12,800- 6,500 = 6,300 units

Average Level = Minimum level + ½ of reorder quantity

= 6,800 + ½ x 300 = 7,800 units

Or

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

= $\frac{13,800 + 6,300}{2}$

=10,050 units

17. A company manufactures 5000 units of a product per month. The cost of placing an order is Rs. 100. The purchase price of a raw material is Rs. 10/kg. The re-order period is 4 to 8 weeks. The consumption of raw material units is 100kg to 450 kg / week. The average Consumption is 275 kg. The carrying cost inventory is 20% / annum. You are required to calculate:

1. Re-orderquantity
2. Re-order Level
3. MaximumLevel
4. MinimumLevel
5. Average StockLevel

Annual Requirement of material= 275 X 52weeks = 14,300

EOQ = $\sqrt{\frac{2CO}{}}$

$$= \sqrt{\frac{2 \times 14{,}300 \times 100}{I}}$$

$$= \sqrt{14{,}30{,}000}$$

=1196

Where EOQ = Economic Order Quantity
C = Consumption of the material in units per year = 14,300
O = Ordering Cost = 100
I =Interest and carrying cost per unit per annum =10 x20/100= 2

Reorder Level = Maximum Consumption X Maximum Reorder Period

= 450 X 8 = 3,600

Maximum stock level = Reorder level + Reorder quantity – (Minimum Consumption X Minimum Reorder period)

=3,600 + 1,196 – (100 x 4)
=4,796 – 400
= 4,396

Minimum Level = Reorder Level – (Normal consumption X Normal Reorder Period)
=3,600 – (275 X 6)
3,600 – 1,650 = 1,950

Normal reorder period = $\frac{\text{Minimum reorder period + Maximum Reorder period}}{2}$ = $\frac{4 + 8}{2}$

= $\frac{12}{2}$ = 6

Average Level = Minimum level + ½ of reorder quantity
= 1,950 + ½ x 1,196
= 1,950 + 598 =2548

Or

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

= $\frac{4{,}396 + 1{,}950}{2}$

=5,371

18. The components A and B are used as follows.
Average Consumption 40 units

Normal usage 50 units per week
Minimum usage 25 units per week
Re-order quantity A : 300 units
B : 500 units
Re-order period A : 4 to 6 weeks
B : 2 to 4 weeks
Maximum lead time for emergency purchases A : 1 day
B : 2 days

Calculate for the each component: (a) Re-order level (b) Minimum level (c) Maximum stock level (d) Average level (e) Danger level.

Answer: A

Reorder Level = Maximum Consumption X Maximum Reorder Period

=80 units X 6 = 480 units

$\frac{\text{Min} + \text{max}}{2} = \frac{40 + \text{Max}}{2}$

Max= 40X 2 =80

Maximum stock level = Reorder level + Reorder quantity – (Minimum Consumption X Minimum Reorder period)

= 480 + 300- (25X 4)
=780- 100
= 680 units

Minimum Level = Reorder Level – (Normal consumption X Normal Reorder Period)

=480 – (40X 5)
= 480-200
= 280 units

Normal reorder period = $\frac{\text{Minimum reorder period + Maximum Reorder period}}{2} = \frac{4 + 6}{2}$

$= \frac{10}{2} = 5$

Average Level = Minimum level + ½ of reorder quantity

= 280 + ½ x 300
= 280 +150 = 430units

Or

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

$= \frac{280 + 680}{2}$

=480 units

(e) Danger Level = Average Consumption X Maximum reorder period for emergency purchase

= 40 unit X 1
= 40

Answer: B

Reorder Level = Maximum Consumption X Maximum Reorder Period

=80 units X 4 = 320 units

$\frac{\text{Min + max}}{2} = \frac{40 + \text{Max}}{2}$

Max= 40X 2 =80

Maximum stock level = Reorder level + Reorder quantity – (Minimum Consumption X Minimum Reorder period)

= 320+ 500- (25X 2)
=820- 50
= 770 units

Minimum Level = Reorder Level – (Normal consumption X Normal Reorder Period)

=320 – (40X 3)
= 320-120
= 200 units

Normal reorder period = $\frac{\text{Minimum reorder period + Maximum Reorder period}}{2} = \frac{2 + 4}{2}$

$= \frac{6}{2} = 3$

Average Level = Minimum level + ½ of reorder quantity

= 200+ ½ x 500
= 200 +250 = 450units

Or

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

$$= \frac{200 + 770}{2}$$

=585 units

(e) Danger Level = Average Consumption X Maximum reorder period for emergency purchase

= 40 units X 2
= 80 units

19. Two material A and B are used as follows:

Normal consumption - 50 units per week each.
Minimum consumption – 25 units per week each.
Maximum consumption - 75 units per week each.
Re-order quantity: A - 300 units
B – 500 units
Reorder period: A – 4 to 6 weeks
B – 2 to 4 weeks

Calculate for the each component: (a) Re-order level (b) Minimum level (c) Maximum stock level (d) Average level

Component - B
Reorder Level = Maximum Consumption X Maximum Reorder Period

Maximum stock level = Reorder level + Reorder quantity – (Minimum Consumption X Minimum Reorder period)

Minimum Level = Reorder Level – (Normal consumption X Normal Reorder Period)

Normal reorder period = $\frac{\text{Minimum reorder period + Maximum Reorder period}}{2}$ $= \frac{4 + 6}{2}$

Average Level = Minimum level + ½ of reorder quantity

Or

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

Component - A

Reorder Level = Maximum Consumption X Maximum Reorder Period

= 75X6= 450 units

Maximum stock level = Reorder level + Reorder quantity – (Minimum Consumption X Minimum Reorder period)

=450+ 300- (25X4)

=750 - 100

= 650 units

Minimum Level = Reorder Level – (Normal consumption X Normal Reorder Period)

=450- (50X 5)

= 450-250 = 200 units

Normal reorder period = $\frac{\text{Minimum reorder period + Maximum Reorder period}}{2}$ = $\frac{4 + 6}{2}$

= $\frac{10}{2}$ = 5

Average Level = Minimum level + ½ of reorder quantity

= 200 + ½ x 300

= 200 + 150 =350 units

Or

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

= $\frac{650+ 200}{2}$

=425 units

METHODS OF PRICING ISSUES:

The problem of pricing the issues arises only when large quantities of materials purchased at different prices remain in the stock for a period of time making it difficult to identify which unit of material was purchased at what price and hence which price is to be charged for which issue. The pricing of issues only deals with the assigning of pricing to the issues. It has nothing to do with the actual physical movement of materials.The objective of material pricing are:

1. To provide satisfactory basis for the evaluation of closing stock to prepare the final accounts.
2. To charge the cost of material used for measuring the cost of production and cost of sales.When materials are issued from the stores to the various production departments, the pricing of the issued materials can be done according to

different methods. Each methodhas

Its own area of suitability depending on the nature of materials, price trends and the management policy.

FIRST IN FIRST OUT (FIFO):

Under this method, issues are priced on the assumption that materials purchased first are issued first. The actual physical movement may or may not follow this pattern. Materials issued are priced at the oldest price recorded in stores lodger for materials in stock. So the closing stock of material is valued at the price of the latest purchases.

The method is particularly suitable in case of perishable materials and in the period of falling prices. The issues are priced at oldest prices which are higher and hence facilitate the recovery of higher costs. The closing stock is valued at the latest prices which are lower. These results in lower value of closing stock and hence lower book profits thereby lower tax liability. In case of rising prices, the effect is the reverse.

Advantages:

1. Most suitable in Perishable product as pricing method more on less corresponds with actual movement ofMaterials.
2. Simple tounderstand.
3. All issues are priced at cost price, hence entire cost of materials arerecovered.
4. The method results in lower book profits and hence lower tax liability during the period of fallingprices.
5. The value of closing stock is realistic as it is valued at the price of latestpurchases.

Disadvantages:

1. The issue price differs for different issues of the same quality of raw material at the same time. Therefore cost comparisons getdistorted.
2. During the period of rising prices, it results in higher book profits and therefore high tax liability. This is because closing stock appearing on the credit side is valued at higher prices and the cost ofproduction appearing on the debit side is valued lowerprices.
3. For pricing one material requisition more than one price may be involved and hence leads tohigher probability of clericalerrors.

LAST IN FIRST OUT (LIFO):

Under this method, issues are priced on the assumption that material purchased last are issued first, though the actual physical movement of materials may not follow this

pattern. Issues are priced at the price of latest purchases of materials remaining unissued at per records. As a result the closing stock gets priced at the price of the earliest purchases of materials lying unutilized as per records. The method is particularly useful in the case of rising prices. The production is charged at the price of latest purchases while the closing stock at the earliest prices which are lower. This leads to lower book profit and hence less tax liability. In case of falling prices the effect is reverse.

Advantage:

1. Method gives good matching of sales and cost of sales.
2. Method is simple tounderstand.
3. Issues are priced at cost and hence entire cost of material used is recovered from production.
4. It results in lower book profits and hence lowertax.

Disadvantages:

1. The issue price differs in different issues and hence distorts costcomparison.
2. During the period of falling prices this method gives high profits and higher taxliability.
3. For pricing are material requisition more than one prices may be involved and hence higher probability of clerical errors incalculations.

AVERAGE COST METHOD:

Average costs methods are based on the assumptions that the material purchased in different lots are stored together and their identity gets lost. Therefore these materials should be charged to production at an average price. *This issue price can be calculated either on the basis of simple average method or on the basis of weighted average method.*

$$\text{Simple average Price} = \frac{\text{Total of different prices of Materials in the stock from which the materials are}}{\text{No. of prices used in calculating total value.}}$$

The method is very simple but is unscientific and can offer highly misleading and absurd results. This method can also result in large under absorption or over absorption of material cost. Therefore, this method is generally not used except when all the purchases made are more or less

in equal lot size. In such situations, simple average method will give the same result as weighted average method.

Weighted average Price = Total Cost of material in the stock as on the issue date
Total quantity of material in the stock

This method considers the prices as well as the quantity of different lots of material in stores. Before each issue new weighted price is calculated.

Advantages:

a. The method is systematic and not subject tomanipulations.
b. The method recovers full cost ofmaterials from theproduction.
c. It smoothensthe fluctuations in the issue prices. So different material requisitions will be charged almost the same price
d. The issue price is generally close to marketprice.

Disadvantages:

- Fresh rate needs to be calculated after every fresh receipt of materials, which generally comes infraction.

- Issue price is different from the actual cost of materials for the individual's issues and so some nominal profit or loss will appear simply because of the use of averagemethod

PRICING OF MATERIAL ISSUE
FIFO
20. The following information is extracted from the storesledger:

Sep1	Opening balance	500 units at Rs. 10
6	Purchases	100 units at Rs. 11
20	Purchases	700 units at Rs. 12
27	Purchases	400 units at Rs. 13
Oct.13	Purchases	1,000 units at Rs. 14
20	Purchases	500 units at Rs. 15
Nov. 17	Purchases	400 units at Rs. 16

Issues of Materials:

Sep. 9	500 units
22	500 units
30	500 units
Oct. 15	500 units
22	500 units
Nov.11	500 units

Issues are to be priced on the principle of 'FIFO'. Write the stores ledger account.
Answer:

STORES LEDGER ACCOUNT

		Receipt			**Issue**			**Balance**		
Date	Particulars	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Sep, 1	Balance b/d							500	10	5,000
6	G.R.N. No	100	11	1,100				500 100	10 11	5,000 1,100
9	M.R.N.No				500	10	5,000	100	11	1,100
20	G.R.N .No	700	12	8,400				100 700	11 12	1,100 8,400
22	M.R.N				100 400	11 12	1,100 4,800	300	12	3,600
27	G.R.N.No	400	13	5,200				300 400	12 13	3,600 5,200
30	M.R.N No				300 200	12 13	3,600 2,600	200	13	2,600
Oct 13	GRN NO	1,000	14	14,000				200 1,000	13 14	2,600 14,000
15	M.R.N No				200 300	13 14	2,600 4,200	700	14	9,800
20	G.R.N.No	500	15	7,500				700 500	14 15	9,800 7,500
22	M.R.N No				500	14	7,000	200 500	14 15	2,800 7,500
Nov 11	M.R.N No				200 300	14 15	2,800 4,500	200	15	3,000
17	G.R.N.No	400	16	6,400				200 400	15 16	3,000 6,400
								600		9,400

Closing stock = 600 units valued at 9,400

21. From the following transactions extracted from the books of accounts of a manufacturing concern as on 31st Dec. 1994, work out (a) Consumption Value of raw materials in the month and (b) Value of closing stock as on 31. Dec. 1994 under the FIFO method of pricing issues. Show results in a tabular form.

1994 Dec	Quantity In units	Quantity in units	Rate per unit (Rs.)
1	Opening stock	300	9.70
3	Purchases	250	9.80
11	Issues	400	
15	Purchases	300	10.05
20	Issues	210	
25	Purchases	150	10.30
29	Issues	100	

STORES LEDGER ACCOUNT

		Receipt			**Issue**			**Balance**		
Date	Particulars	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
1994 Dec.1	Balance b/d							300	9.70	2,910
3	G.R.N. NO	250	9.80	2,450				300 250	9.70 9.80	2,910 2,450
11	M.R. No				300 100	9.70 9.80	2,910 980	150	9.80	1,470
15	G.R.N. NO	300	10.05	3,015				150 300	9.80 10.05	1,470 3,015
20	M.R. No				150 60	9.80 10.05	1,470 603	240	10.05	2,412
25	G.R.N. NO	150	10.30	1,545				240 150	10.05 10.30	2,412 1,545
29	M.R. No				100	10.05	1,005	140 150	10.05 10.30	1,407 1,545
					710		6,968	290		2,952

(a) Consumption Value of raw materials in the month = 710 units valued at 6,968

(b) Value of closing stock= 290 units valued at 2,952

22. (Materials Return)

From the following particulars prepare stores ledger account under 'FIFO' method of

pricing issues.

1992 Jan. 1	Opening Balance	50 units at Rs. 30 per unit.
5	Issued	20 units.
7	Purchased	48 units at Rs. 40 per unit.
9	Issued	20 units.
19	Purchased	36 units at Rs. 35 per unit.
24	Received back	10 units out of the units issued on 9th January.
27	Issued	15 units.

STORES LEDGER ACCOUNT

		Receipt			**Issue**			**Balance**		
Date	Particulars	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
1992 Jan1	By balance b/d							50	30	1,500
5	M.R. No				20	30	600	30	30	900
7	G.R.N. No	48	40	1,920				30 48	30 40	900 1,920
9	M.R. No				20	30	600	10 48	30 40	300 1,920
19	GRN NO	36	35	1,260				10 48 36	30 40 35	300 1,920 1,260
24	Material returned note. no	10	30	300				10 48 36 10	30 40 35 30	300 1,920 1,260 300
27	M.R.No				10 5	30 40	300 200	43 36 10	40 35 30	1,720 1,260 300
								89		3,280

Closing stock 89 units valued at 3,280

LAST IN FIRST OUT

23. From the following particulars, prepare the stores ledger under Last In First Out method.

Dec. 1	Stock in hand	500 units at Rs. 20.
Dec. 2	Issued	200 units
Dec. 3	Purchased	150 units at Rs. 22
Dec. 4	Issued	100 units
Dec. 5	Purchased	200 units at Rs. 25

STORES LEDGER ACCOUNT (LIFO)

		Receipt			**Issue**			**Balance**		
Date	Particulars	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Dec. 1	By balance b/d							500	20	10,000
2	M.R.No				200	20	4,000	300	20	6,000
3	G.R.N. No	150	22	3,300				300 150	20 22	6,000 3,300
4	M.R. No				100	22	2,200	300 50	20 22	6,000 1,100
5	G.R.N. No	200	25	5,000				300 50 200	20 22 25	6,000 1,100 5,000
								550		12,100

Closing stock 550 units valued at 12,100

24. The following information provided by manufacturing unit for the fortnight of April 1996.

Stock on	1-4-96	100 units at Rs. 5 per unit
Purchases:	5-4-96	300 units at Rs. 6.
	8-4-96	500 units at Rs. 7.
	12-4-96	600 units at Rs. 8.
Issues:	6-4-96	250 units
	10-4-96	400 units
	14-4-96	500 units

Calculate the value of material consumed during the period under LIFO method

STORES LEDGER ACCOUNT (LIFO)

		Receipt			Issue			Balance		
Date	Particulars	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
1-4-96	By balance b/d							100	5	500
5-4-96	G.R.N. No	300	6	1,800				100 300	5 6	500 1,800
6-4-96	M.R. No				250	6	1,500	100 50	5 6	500 300
8-4-96	G.R.N. No	500	7	3,500				100 50 500	5 6 7	500 300 3,500
10-4-96	M.R. No				400	7	2,800	100 50 100	5 6 7	500 300 700
12-4-96	G.R.N. No	600	8	4,800				100 50 100 600	5 6 7 8	500 300 700 4,800
14-4-96	M.R. No				500	8	4,000	100 50 100 100	5 6 7 8	500 300 700 800
								350		2,300

Closing stock 350 units valued at 2,300

HIFO

25. Prepare a store ledger account assuming that issues are priced on the principles of highest in first out.

Dec.1	Received	1,000 units at Rs. 20 per unit.
10	Received	500 units at Rs.22 per unit
11	Received	200 units at Rs.21 per unit
15	Issued	500 units
20	Issued	150 units
22	Received	700 units at Rs. 23 per unit.
24	Received	300 units at Rs. 19 per unit.
28	Issued	500 units
30	Received	200 units at Rs. 18 per unit.
31	Issued	300 units

STORES LEDGER ACCOUNT (HIFO)

		Receipt			**Issue**			**Balance**		
Date	Particulars	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Dec.1	G.R.N. No	1,000	20	20,000				1,000	20	20,000
10	G.R.N. No	500	22	11,000				1,000 500	20 22	20,000 11,000
11	G.R.N. No	200	21	4,200				1,000 500 200	20 22 21	20,000 11,000 4,200
15	M.R. No				500	22	11,000	1,000 200	20 21	20,000 4,200
20	M.R. No				150	21	3,150	1,000 50	20 21	20,000 1,050
22	G.R.N. No	700	23	16,100				1,000 50 700	20 21 23	20,000 1,050 16,100
24	G.R.N. No	300	19	5,700				1,000 50 700 300	20 21 23 19	20,000 1,050 16,100 5,700
28	M.R. No				500	23	11,500	1,000 50 200 300	20 21 23 19	20,000 1,050 4,600 5,700
30	G.R.N. No	200	18	3,600				1,000 50 200 300 200	20 21 23 19 18	20,000 1,050 4,600 5,700 3,600
31	M.R. No				200 50 50	23 21 20	4,600 1,050 1,000	950 300 200	20 19 18	19,000 5,700 3,600
								1,450		28,300

Closing stock 1,450 units valued at 28,300

Simple average and weighted average Method.

26. The following transactions took place in respect of an item of material.

	Receipt Quantity	Rate	Issue Quantity
2-3-2002	200	2.00	-
10-3-2002	300	2.40	-
15-3-2002	-	-	250

18-3-2002 20-3-2002	250 -	2.60 -	- 200

Record the above transactions in stores ledger, pricing issues at simple average rate and weighted average rate.

		Receipt			**Issue**			**Balance**		
Date	Particulars	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
2-3-2002	G.R.N. No	200	2	400				200	2	400
10	G.R.N. No	300	2.4	720				500	2.24 (1,120/500)	1,120
15	M.R No				250	2.24	560	250	2.24	560
18	G.R.N. No	250	2.6	650				500	2.42 (1,210/500)	1,210
20	M.R No				200	2.42	484	300	2.42	726

STORES LEDGER ACCOUNT (weighted average)

Closing stock 300 units valued at Rs. 726

STORES LEDGER ACCOUNT (Simple Average method)

		Receipt			**Issue**			**Balance**		
Date	Particulars	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
2-3-2002	G.R.N. No	200	2	400				200	2	400
10-3-2002	G.R.N. No	300	2.40	720				500 (200+300)	-	1,120 (400+720)
15-3-2002	M.R. No				250	2.20 (2+2.4/2)	550	250	-	570 (1,120-550)
18-3-2002	G.R.N. No	250	2.60	650				500	-	1,220
20-3-2002	M.R. No				200	2.5 (2.4+2.6/2)	500	300	-	720

Closing stock 300 units valued at Rs. 720

27. X Company has purchased and issued material as under:

1998

June	1	Stock of material	200 units at Rs. 2.50 per unit.
	3	Purchased	300 units at Rs. 3 per unit
	7	Purchased	500 units at Rs. 4 per unit
	10	Issued	600 units
	12	Purchased	400 units at Rs. 4 per unit
	18	Issued	500 units
	24	Purchased	400 units at Rs. 5 per unit
	28	Issued	200 units

Prepare store ledger account using FIFO and LIFO method

STORES LEDGER ACCOUNT (FIFO)

		Receipt			**Issue**			**Balance**		
Date	Particulars	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
1998 June. 1	By balance b/d							200	2.50	500
3	G.R. N. Number	300	3	900				200 300	2.50 3	500 900
7	G.R. N. Number	500	4	2000				200 300 500	2.50 3 4	500 900 2000
10	M.R. No				200 300 100	2.50 3 4	500 900 400	400	4	1600
12	G.R. N. Number	400	4	1600				400 400	4 4	1600 1600
18	M.R. No				400 100	4 4	1600 400	300	4	1200
24	G.R. N. Number	400	5	2000				300 400	4 5	1200 2000
28	M.R. No				200	4	800	100 400	4 5	400 2000
								500		2400

Closing stock 500 units valued at 2400

STORES LEDGER ACCOUNT (LIFO)

		Receipt			Issue			Balance		
Date	Particulars	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
1998 June. 1	By balance b/d							200	2.50	500
3	G.R. N. Number	300	3	900				200 300	2.50 3	500 900
7	G.R. N. Number	500	4	2000				200 300 500	2.50 3 4	500 900 2000
10	M.R. No				500 100	4 3	2000 300	200 200	2.50 3	500 600
12	G.R. N. Number	400	4	1600				400 400	4 4	1600 1600
18	M.R. No				400 100	4 4	1600 400	300	4	1200
24	G.R. N. Number	400	5	2000				300 400	4 5	1200 2000
28	M.R. No				200	5	1000	300 200	4 5	1200 1000
								500		2200

Closing stock 500 units valued at 2200

28. The following transactions occur in the purchase and issue of a material.

May	1	Balance in hand	300 units at Rs. 2 per unit
	2	Purchased	200 units at Rs. 2.20 per unit
	4	Issued	150 units
	6	Purchased	200 units at Rs. 2.30 per unit
	11	Issued	150 units
	19	Issued	200 units
	22	Purchased	200 units at Rs. 2.40 per unit
	27	Issued	150 units

Prepare store ledger account using Simple average and weighted average method.

STORES LEDGER ACCOUNT (Simple Avg. method)

		Receipt			Issue			Balance		
Date	Particulars	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
May, 1	By balance b/d							300	2	600
2	G.R. N. No	200	2.20	440				500		1040
4	M.R. No				150	2.1	315	350		725

6	G.R. N. No	200	2.30	460				550		1185
11	M.R. No				150	2.25	338	400		847
19	M.R. No				200	2.25	450	200		397
22	G.R. N. No	200	2.40	480				400		877
27	M.R. No				150	2.35	353	250		524

Closing stock 250units valued at 524

2+2.20=4.20/2 2.20+2.30=4.50/= 2.25 2.30+2.40=4,70/2=2.35

1040/500=2.08

STORES LEDGER ACCOUNT (Weighted Avg. method)

		Receipt			**Issue**			**Balance**		
Date	Particulars	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
May, 1	By balance b/d							300	2	600
2	G.R. N. No	200	2.20	440				500	2.08	1040
4	M.R. No				150	2.08	312	350	2.07	728
6	G.R. N. No	200	2.30	460				550	2.16	1188
11	M.R. No				150	2.16	324	400	2.16	864
19	M.R. No				200	2.16	432	200	2.16	432
22	G.R. N. No	200	2.40	480				400	2.28	912
2	M.R. No				150	2.28	342	250	2.28	570

Closing stock 250 units valued at570

1185/550= 2.15

29. The standard price of material is fixed at Rs. 20 per unit. Show the stores ledger entries as they would appear when using the standard price method.

Date	Particulars	Units	Rates
2005,May1	Balance in hand b/f	400	20
4	Purchased	500	21
6	Issued	600	
8	Issued	200	
10	Purchased	700	19
12	Issued	150	
14	Issued	200	

16	Issued	100	
19	Purchased	800	22
20	Issued	400	
25	Issued	300	

Calculate the material price variance

STORES LEDGER ACCOUNT (Standard Price method)

		Receipt			**Issue**			**Balance**		
Date	Particulars	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
2005, May 1	By balance b/d							400	20	8,000
4	G.R.N.No	500	21	10,500				900		18,500
6	M.R.No				600	20	12,000	300		6,500
8	M.R.No				200	20	4,000	100		2,500
10	G.R.N.No	700	19	13,300				800		15,800
12	M.R.No				150	20	3,000	650		12,800
14	M.R.No				200	20	4,000	450		8,800
16	M.R.No				100	20	2,000	350		6,800
19	G.R.N.No	800	22	17,600				1,150		24,400
20	M.R.No				400	20	8,000	750		16,400
25					300	20	6,000	450		10,400

Closing stock is 450units valued at 10,400

Material price variance = Closing stock in unit X Standard price – Closing stock in value

= 450X20 – 10,400

= 9,000 -10,400 = 1,400 (Adverse)

If standard price is not :

Standard price = $\frac{\text{Opening stock in value+ Debit balance of material variances}}{\text{Opening stock in units}}$

EXERCISE:

1. From the following information calculate the Economic Order Quantity and the number of orders to be placed, in one quarter of theyear.
   (i) Quarterly consumption of material2000kg.
   (ii) Cost of placing one orderRs50
   (iii) Cost per unitRs40
   (iv) Storage and carrying cost 8% on averageinventory. (*Answer. EOQ=500Kg. No. oforders=4)*

2. Following data relate to material „Y". Find (a) Re- Order Level, (b) Minimum Level,and
   (a) MaximumLevel.
   Normal usage 450 unitsperweek Re-Order Quantity 3,200units
   Maximum usage 750 unitsperweek Re-Order
   Period 3-5 weeks Minimum usage 300 units perweek

   (*Answer. (a) 3,750 units (b) 1,650 units (c) 6,050 units)*

3. About 50 items are required everyday for a machine. A fixed cost of Rs. 50 per order is incurred in placing the order. The inventory carrying cost per item amount to Re. 0.02 per day. The lead period is 32 days. Compute (a) Economic Order Quantity, (b) Re-Order Level.
   (*Answer. (a) 500 items, (b) 1,600 items)*
4. Maya Aids Co. manufactures a special product „B". The following particulars were collected for the year2016.
   (a) Monthly demand of „B" 1,000units
   (b) Cost of placing an orderRs100
   (c) Annual carrying cost per unitRs15
   (d) Normal usage 50 units perweek
   (e) Minimum usage 25 units perweek
   (f) Maximum usage 75 units perweek
   (g) Re-order Period 4 to 6weeks

   Compute from the above:
   i. Re-order Quantity
   ii. Re-order Level
   iii. MinimumLevel
   iv. MaximumLevel
   v. Average StockLevel.

(*Answer. i.186 units' ii*. 450 *units' iii. 200 units iv. 536 units v. 368 units)*

5. Calculate the Minimum Stock Level, Maximum Stock Level and Re-ordering Level from the followinginformation:
   i. Minimum consumption: 100 units perday
   ii. Maximum consumption: 150 units perday
   iii. Normal consumption: 120 units perday
   iv. Re-order Period: 10-15days
   v. Re-order Quantity: 1500units
   vi. Normal Re-order Period:

   12 (*Answer. 810 units, 2250units*

   and 250units)

6. From the following data, calculate the (i) Maximum Level,(ii) Minimum Level and (iii) Re-ordering Level:
   Re-order Quantity:1500units" Minimum consumption: 250 units per week Re-order Period:4-6weeks Normal consumption: 300 units per week Maximum consumption: 400 units perweek

   (*Answer. (i) 2,900 units (ii) 900 units (iii) 2,400 units)*

7. Twocomponents,,X"and,,Y"areusedas follows: Normal usage: 50 units per weekeach
   Re-order quantity: X 300 units, Y 500 units Minimum usage: 25 units per week each
   Re-order period: X 4 to 6 weeks, Y 2 to 4 weeks Maximum usage: 75 units per week each
   Calculate, for each component: (a) Re-order Level, (b) minimum Level, (c) Maximum Level and (d) Average Stock Level.
8. From the following particulars of material X, maintained the stores ledger according to FIFO and LIFOmethods:

1.1.2016	Opening stock	10,000 units @5 each
3.1.2016	Purchased	9,000 units @5 each
10.1.2016	Issue	12,000 units
12.1.2016	Purchased	8,000 units @5 each
16.1.2016	Purchased	3,000 units @5 each
18.1.2016	Issue	4,000 units

20.1.2016	Issue	6,000 units
21.1.2016	Purchased	3,000 units @5 each
25.1.2016	Issue	4,000 units

(Answer: Closing stock FIFO 4000 units @ Rs 6.00 andClosing stock LIFO 4000 units @ Rs 5.00)

9. Prepare a stores ledger using weighted average method of pricing the issue from the followingtransactions.

1.4.2016	Opening stock	50 units @5 each
3.4.2016	Issue	20 units
10.4.2016	Purchased	120units@Rs 5.50 each
15.4.2016	Issue	70 units
20.4.2016	Purchased	130 units @5.60 each
28.4.2016	Received back	10 units which were issued on 15th
30.4.2016	Issue	100 units

(Answer: 20 units @ Rs5, 70 units @Rs 5.40, 100 units @Rs 5.516, closing stock 120 units @ Rs 5.516)

10. From the following information for the year 2015-16, prepare the income statement of the year and show the value of the Closing stock on the basis of (i) FIFO (ii) LIFO (iii) weighted averagemethod.

1. Opening Stock 1000 units @15 perunit.
2. Purchases during the year 30,000 units @ Rs 17 per unit.
3. Sales during the year 25,000 units @ Rs 20 perunit.

*(Answer: Closing Stock: FIFO:(6000*17)=1,02,000LIFO:(1000*15+500*17)=1,00,000*
*Weighted average: (6000*5,25,000/31000)=1,01,613)*

11. Ltd. Has purchased and issued the material on the following order. Prepare Stores Ledger account, pricing the issues under FIFO method.

January 1 Purchased 300 units @ Rs.3 per unit.
4 Purchased 600 units @ Rs.4 per unit.
6 Issued 500 units.
10 Purchased 700 units @ Rs.5 per unit.
15 Issued 800 units.

12 . Two components X and Y are used as follow:
Minimum usage: 50 units per week each; Maximum usage: 150 units per week each.
Normal usage: 100 units per week each; Ordering quantities: X – 600 unit and Y – 1,000 units

Delivery period: X – 4 to 6 weeks and Y – 2 to 4 weeks.Maximum recorder period for emergency purchases X:2 weeks and Y:2 weeks. Calculate for each component: a) Recording level b) Maximum levelc) Minimum leveld) Danger level

UNIT- 4 LABOUR COST

MEANING OF DIRECT LABOUR

Labour is the work force which contributes towards the completion of the manufacturing process of any organisation. Without manual horse power only machines cannot complete the process. Labour can be bifurcated in two parts; direct labour and indirect labour. Labour which is directly associated with a manufacturing process or his contribution is directly identifiable with a particular process will be called as direct labour while when the contribution of the labour cannot be associated with a particular manufacturing process or specifically not identifiable with a particular product or process is called as indirect labour. For example in a factory of readymade garments, wages paid to a tailor are direct wages.

While in some cases it is very complicated to differentiate between direct and indirect labour. A worker might be engaged in doing a particular work concerned with manufacturing commodity and after an hour the same worker might be placed on a different job say time-keeping, repairing etc. In aforementionedscenarios initial one hour will be treated as direct and later hours will be treated as indirect.

CONTROL OVER LABOUR COST

Labour majorly contributes to the growth and development of any organization. Without efficient and effective utilization of man power resources organization cannot achieve the goal of profit maximization by reduction in cost and improvement in quality of the products. Generally, following five departments are established by the organization to control cost.

1. PersonnelDepartment
2. Engineering and Works StudyDepartment
3. Time-KeepingDepartment
4. Pay- Master'sDepartment
5. Cost AccountingDepartment

PERSONNEL DEPARTMENT

The personnel department is responsible for hiring the right person at the right place at the right time. Role of personnel department is not over with the hiring of the workforce rather they have to train them before sending them to the workplace. Whenever a new worker is employed, the Personnel Department sends a notification to the time keeping department and paymaster department for their compensations.

Personnel department maintains following important records:

The personnel department first receives the following requisition slip from the concerned departments who are having need of the workforce. After receiving the requisition records will be checked by the personnel department about the availability of the employees in the required category. If required employees are not available in the organisation then action will be taken to recruit more employees. Following is the format of Labour RequisitionSlip.

ENGINEERING DEPARTMENT

This department is committed to provide congenial work environment to its employees also controlling over the production methods and processes followed in the various departments. This department is majorly involved in planning and conducting motion studies, work studies, time studies, job analysis and setting piece rates, providing safe and efficient working conditions, supervising production activities in various production departments.

Work Study

Work study may be defined as a technique of management which involves analytical study of jobs/operation with the object of determining the exact operations to be performed and measuring the work content of jobs. The object of work study is overall improvement by saving time, reducing loss of materials, developing new methods of work,etc.

Time Study

Time study is helpful in determining the standard time for an operation on the basis of the observations of the ongoing operations. Its major motive is to control the labour time and cost also to run the operations smoothly.

Motion Study

Motion study is conducted by recording the movement of the workers and machines on the job. The purpose of the motion studies is to replace the ineffective processes or methods of work by introducing effective, efficient and least tiring processes. Motion studies are conducted through observing various factors like use of both hands without undue straining, linking motions to each other in the most economical sequence, using equipment which would both speed up the work and make it easier to perform.

Job Analysis

Job analysis is concerned with the preparation of job description. Job description refers to the skill set required to perform a particular job smoothly and efficiently.

Job Evaluation

Job evaluation is done to analyze the worth of a particular job whether the job is useful for the organization or not.

TIME-KEEPING DEPARTMENT

The time-keeping department plays important role in the accounting and controlling of labour cost. The main function of this department is to accurately record the time spent by each worker on the work place and it will be forwarded to the pay-master department then this department will process it further to prepare the compensations of theemployees.

There are various methods of time keeping. Some most prevalent methods are as follows:

1. Attendance register
2. Token or discmethod
3. Time-recordingclocks
4. Biometric timeclock

PAYROLL DEPARTMENT

The payroll department is concerned with the compensation of the workers. This department takes data from the time keeping department and computes the salaries of the employees at the end of every month.

COST ACCOUNTING DEPARTMENT

Cost accounting department is the final destination of the all types of costs related to labour is it direct cost or indirect cost. For the purpose of collecting the data it makes use of clock cards, daily or weekly time sheets, payroll sheets etc.

The cost accounting department collates, analyze and present a report reflecting the true picture of direct labour cost and indirect labour cost in front of management to take decision.

TREATMENT OF IDLE TIME, HOLIDAY PAY, OVERTIME ETC. IN COST ACCOUNTS

Idle Time: wastage of time during working hours is considered as idle time. Idle time may arise due to normal and abnormal reasons. Idle time affects the productivity of the labour. For controlling the cost of labour reduction in idle time is essential. The reasons behind the idle time must be identified and then steps should be taken to control them.

Normal Reasons of Idle Time It refers that any loss of time is inherent in every situation which cannot be avoided. Any cost which is associated with the normal idle time mostly fixed in nature. The normal idle time arises due to the following reasons:

- Time taken for personal affairs.
- Time taken for lunch tea breaks.
- Time taken for obtaining work.
- Time taken by the workers to walk between factory gate and place of work.

Abnormal Reasons of Idle Time it generally occurs because of shortage of raw material, machine break-down, lock-out, strikes etc. Abnormal idle time can be reduced and avoided by maintaining the operational efficiency in the organization. Following are the major reasons of abnormal idle time:

- Improper planning.
- Lack of planning and co-ordination.
- Power failure.
- Time lost due to delayed instructions.
- Time lost due to inefficiency of workers.
- Time lost due to non-availability of raw materials, spare parts, tools etc.
- Time lost due to strikes, lock outs and lay-off.

Accounting Treatment:

- Cost for normal reasons should be segregated under a separated standing order number and charged as an item of factoryoverhead.

- Cost for uncontrollable and normal reasons may be charged to the job by inflating the job rate.
- Cost because of abnormal reasons should be charged from costing profit and loss account.

OVER-TIME

Over time refers to the extra time spent by the workers on the job than the normal or pre-fixed working hours. According to the Factories Act, 1949 workers are paid double wages for the over time. For paying the over-time wages strict monitoring mechanism of workers is required during working hours, so that they should not miss the stipulated hours in the leisure activities.

Effect of Over Time Payment on Productivity:

Repercussions of over time payment on productivity of workers are as follows:

(1) Cost of product would increase because of extra payment for over time spent by theworkers.

(2) Workers might not work efficiently during their normal working hours in lieu of earning extra money through overtimepremium.

Treatment of Overtime Wages

Over-time wages can be treated as direct as well as indirect it depends on the reason of over-time by the workers. If the over-time has been spent by the worker for the completion of a critical project on the demand of the customers and associated to a particular job onlythen it will be treated as direct expense. On the contrary, if over-time has been spent by the worker because of abnormal reasons like Machine break-down, shortage or raw material etc. should be treated as an abnormal expense and it will be charged to costing profit and loss account.

HOLIDAY PAY

Worker are paid for the holidays on weekend, festivals or on gazette offs. Their wages are treated as indirect cost and charged from the factory overheads account and thus it will be recovered from the production.

LABOUR REMUNERATION

Remuneration refers to the compensation for the efforts made by the employees in the completion of a job. Various methods of wage payment are prevalent as per the requirement of

the industry. In some industries time rate system is suitable while in others piece rate system is more suitable therefore according toreh

TIME WAGE PAYMENT SYSTEM

Worker's remuneration is based on the hours spent by the workers on the job under time wage payment system. A major drawback of this system is that the workers are more concerned about completing their time on the job rather than the output on the job therefore, close supervision is required.

Advantages of Time Wage Payment System

- Workers are self motivated to stay on the work there is no need to force them.
- This system is easy to understand by the labour and easy to implement by the employer.
- Generally, under this system workers get fixed monthly, daily, hourly wage rates for smooth functioning of their life.
- This method is comparatively cheaper than the other methods.

Disadvantages of Time Wage Payment System

- It is difficult to make distinction between efficient and inefficient workers.
  Workers concentrate more on hour's completion rather than work which hampers the productivity of the organization.
- This system of wage payment restricts the flexibility of labour also even in case of no work is assigned to them but they are liable to complete thetime.
- There is discontentment among the efficient workers for their efforts are not properly rewarded.
- It affects the efficiency of the employees. They become laggards over a period oftime.

PIECE WAGE PAYMENT SYSTEM

Under piece wage payment system, compensation is paid on the basis of units produced by the workers rather time spent by the workers on the workplace. Generally, workers are given a target for production if their performance is less than the target they are not paid, if performance is more than the target they will get the higher wages, if performance is up to the mark than they will get the standardrate.

Wages = Number of units X per piece wagerate

Suitability of Piece WageSystem

Piece wage system is suitable where close supervision is not possible.
This is also suitable in the highly demanding industries.
This method is also suit in the industry where more emphasize is given on the quantity than quality.

Advantages of Piece Rate Wage System

Labours are self motivated to work and complete the targets.

Labours get flexible work environment as employers are concerned with the output than the time consumed by the workers at work place.

- This method of wage payment increases the efficiency and productivity of theworkers.

Disadvantages of Piece Rate Wage System

- Sometimes, under this method, labours compromise with the quality of product in the hurry of completing thetargets.

  Maintaining the record of production by each worker is difficult on the daily basis. Maintaining discipline in working regarding entry and exit time is also difficult under this system.

- In the anxiety of producing more and more goods labours may damage the machines and waste the rawmaterial

GROUP PIECE WORK

Group or collective piece work system is that where the workers are paid remuneration on a group basis because they perform a particular job or operation after making collective effort. The workmen of a particular group can, afterwards, divide the earnings in any proportion. The basis of distribution is generally their basic time earnings.

(Hours spent on operation X Hourly basic rate or wages)

Advantages

1. The system recognizes the merit and efficiency of workers and, therefore, can be regarded as more equitable than time wagesystem.

2. The workers are induced to work hard with the result that production is enhanced. This reduces the fixed overhead expenses per unit and, finally the total cost ofproduction.

3. The total labour cost per unit or job is accurately ascertained if this system isemployed.

Disadvantages

1. Since the workers are paid for the quantity of units produced irrespective of the time they have spent, they take no precaution to improve the quality ofproducts.

2. Rough use of tools and machine at the workplace byworkers.

3. Speedy and excessive work, in a bid to earn more, proves injurious to the health of the worker.

INCENTIVE PLANS

MEANING OF INCENTIVE

Incentive is additional wages paid to workers for improving their efficiency and to motivate them. Various incentive plans are available according to the need and suitability of the organization. These plans are also helpful in overcoming the loopholes of both types of wage payment plans be it piece wage system or time wagesystem.

Factors before Introducing Incentive Plans

The main factors that should be taken into account before introducing a scheme of incentives are stated below:

Stringent Quality Control Measures: For introducing the incentive plans on the basis of production stringent quality control measures should be implemented in the organisation. In case quality assurance is not possible in the existing system then workers should be paid on time basis incentive plans should not be introduced.

Stringent Quantity Measurement Techniques: Where the quantity of work done cannot be measured precisely, incentive schemes cannot beoffered.

Fixation of Performance Standards: Standard of performance should be precisely decided by the management and should be properly communicated to the employees before introducing the incentive plans. When this requires heavy expenditure, incentive schemes may be rather costly.

No Discrimination: With the introduction of incentive plans workers should not feel discrimination. If for instance, an incentive scheme makes it possible for unskilled workers to earn high wages, the wage rates for skilled workers must also be raised (if they are paid on time basis) to avoid dissatisfaction among them. In that event, the incentive scheme may raise labour cost instead of lowering it. If incentive plans are creating discrimination amongst the employees then it might badly affect the efficiency of theworkers.

Cost Benefit Analysis: Before implementation incentive plans should be analyzed in terms of cost and benefit received to the organization from the same. Benefits accruing to the firm should be more than the cost incurred it its implementation.

INCENTIVE PLANS

Taylor's Differential Piece Work System–This method was introduced by F.W.Taylor‟s for wage payment by which the goal of maximum output may be achieved. Differential Piece Rate System aims at rewarding efficient workers by providing increased piece rate beyond certain level of output. Under this system two widely differing piece rates are prescribed for each job.Thelowerrateis83%ofthenormalpiecerateandthehigherrateis125% of the normal piece rate. In other words the higher rate is 150% of the lower rate. The lower rate is given to a worker when his efficiency level is lessthan100%.The higher rate is offered at efficiency level of either 100% or more. Due to the existence of the two piece rates, the system is known as differential piece rate system.

Advantages

1. It is simple to understand and operate.
2. The incentive is very good andattractive for efficient workers.
3. It has a beneficial effect where overheads are high as increased
4. Production has the effect of reducing the incidence per unit of production.

Disadvantages

1. This system is quite harsh to workers.
2. A slight reduction in output may result in alarge reduction in the wages of the workers.
3. This system is no longer in use in itsoriginal form.

Merrick Differential Piece Rate System

Gantt Task and Bonus System: This system provides a combination of time and piece work system. In this incentive plan, guaranteed payment will be made according to the time and if the standards are achieved or exceeded, the payment to the concerned worker is made at a higher piece rate.

Thus, even if the worker does not attain the standard he will get the guaranteed wages as time rate. Wage calculations under this plan are as follows:

Efficiency Levels	Rate Applicable
Output below standard	Guaranteed time rate.
Output at standard	Time rate + bonus of 20% (usually) of time rate.
Output above standard	High piece rate on worker's whole output. It is so fixed, so as to include a bonus of 20% of the time rate.

Advantages

1. It motivates the workers by protecting their minimum wages in any situation and also provides incentive to the efficientworkers.
2. It is simple to understand and operate.
3. It encourages better supervision and planning.

Disadvantages

1. Minimum guaranteed time rate may provide leverage to the workers and they might be lethargic.

Emerson's Efficiency System: Under this system minimum time wages are guaranteed.

But beyond ascertain efficiency level, bonus in addition to minimum day wages is given.

A worker who is able to attain efficiency, measured by his output equal to 2/3rd

of the standard efficiency, or above, is deemed to be an efficient worker deserving encouragement.

The scheme thus provides for payment of bonus at a rising scale at various levels of efficiency, ranging from 66.67% to 150%.

Efficiency Levels	Rate Applicable
Below 66.67%	Only time rate
Above 66⅔% to 100%	Bonus varies between 0.01% and 20%.
Above 100%	Bonusof20%ofbasicwagesplus1%foreach1%increasein Efficiency is admissible.

Advantages

- It motivates the comparatively slow workers to work at least beyond a certain level to be eligible for thebonus.
- It also releases stress of the workers by not expecting high degree of average performance.
- Wages on time basis are guaranteed.

Points Scheme or Bedeaux System: Under this scheme, firstly the quantum of work that a worker can perform is expressed in Bedeaux points or B"s. These points represent the standard time in terms of minutes required to perform the job. The standard numbers of points in terms of minutes are ascertained after a careful and detailed analysis of each operation or job. Each such minute consists of the time required to complete a fraction of the operation or the job, and also an allowance for rest due to fatigue.

Workers who are not able to complete tasks allotted to them within the standard time are paid at the normal daily rate. Those who are able to improve up on the efficiency rate are paid a bonus, equal to the wages for time saved as indicated by excess of B"s earned (standard minutes for work done) over actual time. Workers are paid 75% of the time saved.

Hayne's System: Under this system, also the standard is set in minutes. The standard time for the job is expressed in terms of the standard man-minutes called as*"MANIT*". In the case of repetitive work the time saved is shared between the worker and the foreman in the ratio 5:1. If the work is of non-repetitive nature, the worker, the employer and the fore man share the value of time saved in the ratio of 5:4:1. Each worker is paid according to hourly rate for the time spent by him on the job.

Premium Bonus Methods: Under these methods, standard time is established for performing a job. The worker is guaranteed his daily wages (exception Barth System), if his output is below and up to standard. In case the task is completed in less than the standard time, the worker will get the bonus for the timesaved.

Halsey and Halsey Weir Systems: Under Halsey System a standard time is fixed for each job or process. If there is no saving on this standard time allowance, the worker is paid only his day rate. He gets his time rate even if he exceeds the standard time limit, since his day rate is guaranteed. If, however, he does the job in less than the standard time, he gets a bonus equal to 50percent of the wages of time saved; the employer benefits by the other 50percent. The scheme also is sometimes referred to as the Halsey fifty percentplan.

Formula for calculating wages under Halsey System

=Time Taken × Time Rate+50% of Time Saved ×Time Rate.

The Halsey Weir System is the same as the Halsey System except that the bonus paid to workers is 30% of the time saved i.e.

=Time taken ×Time rate + 30% of time saved ×Time rate.

Advantages

1. Time rate is guaranteed while there is opportunity for increasing earnings by increasing production.

2.The systemize quit able in as much as the employer gets a direct return for his efforts in improving production methods and providing betterequipment.

Disadvantages

1. Incentive is not as strong as with piece rate system. In fact the harder the worker works, the lesser he gets perpiece.
2. The sharing principle may not be liked byemployees.

Rowan System: According to this system a standard time allowance is fixed for the performance of a job and bonus is paid on the
Time saved. Formula for calculating wages under Rowan system is as follows:

=Time taken× Rate per hour+ Time allowed ×Time taken × Rate per hour
Advantages

1.It is claimed to be a fool- proof system in as much as a worker can never double his earning seven if there is bad rate setting.

2. It is admirably suitable for encouraging moderately efficient workers as it provides a better return for mode rate efficiency than under theHalsey Plan.

3.The sharing principle appeals to the employer as being equitable

Disadvantages

1. The system is a bit complicated.
2. The incentive is weak at a high production level where the time saved is more than 50% of the time allowed.
3. The sharing principle is not generallywelcomed by employees.

LABOUR TURNOVER

Labour Turnover may be defined as "the rate of changes in labour force, i.e., the percentage of changes in the labour force of an organization during a specific period. Frequent and higher labour turnover rate will affect the efficiency of the workers and operational efficiency of the firm as well. In case of high labour turnover rate cost of recruitment and training will increase and at end will impact to the overall profitability of the firm. The determinant result of labour turnover is expressed in terms ofpercentage.

Methods of Measurement of Labour Turnover
There are three methods of measurement of labour turnover. The details of the methods are as follows:

1. Separation Method: In this method, percentage of people left or discharged from the organization over average number of workers in the organization will be considered for measuring the labourturnover.

$$\text{LabourTurnover} = \frac{\text{No. of employees separated during aperiod}}{\text{Average Number of workers during the period}}$$

2. Replacement Method: Under this method, labour turnover will be measured by taking into consideration the number of employees replaced during a period over average workers during theperiod.

$$LabourTurnover = \frac{\text{No. of employees Replaced during aperiod}}{\text{Average Number of workers during the period}}$$

3. Flux Method: In this method, labour turnover will be measured by taking into consideration both the number of employees separated and replaced during a period over average workers during theperiod.

$$LabourTurnover = \frac{\text{No. of employees separated} + \text{No. of employees Replaced}}{\text{Average Number of workers during the period}}$$

Labour Turnover

Methods of Measurement of labour turnover

1. Labour turnover under Separation method

$$\text{Labour Turnover} = \frac{\text{Number of employees left from the organization during a period}}{\text{Average number of employee during a period}} \times 100$$

2. Labour turnover under Replacement method

$$\text{Labour Turnover} = \frac{\text{Number of employees replaced during a period}}{\text{Average number of employee during a period}} \times 100$$

3. Labour turnover under Flux method

$$\text{Labour Turnover} = \frac{\text{Number of employees left} + \text{Number of employees recruited during a period}}{\text{Average number of employee during a period}} \times 100$$

1. From the following particulars supplied by the personnel department of a firm, calculate labour turn over:

Total no of employees at the beginning of the month	2010
Number of employees who are recruited during the month	30
Number of employees who left during the month	50
Total no of employees at the end of the month	1990

1. Labour turnover under Separation method

$$\text{Labour Turnover} = \frac{\text{Number of employees left from the organization during a period}}{\text{Average number of employee during a period}} \times 100$$

$$\text{Avg. No. of Employee} = \frac{\text{No of workers in the beginning} + \text{No of Workers at the end}}{2}$$

$$= \frac{2010 + 1990}{2}$$

$$= 2{,}000$$

$$\text{Labour turnover under Separation method} = \frac{50 \times 100}{2{,}000}$$

$$= 2.5$$

2. Labour turnover under Replacement method

$$\text{Labour Turnover} = \frac{\text{Number of employees replaced during a period}}{\text{Average number of employee during a period}} \times 100$$

$$= \frac{30 \times 100}{2{,}000}$$

$$= 1.5\%$$

3. Labour turnover under Flux method

$$\text{Labour Turnover} = \frac{\text{Number of employees left} + \text{Number of employees recruited during a period}}{\text{Average number of employee during a period}} \times 100$$

Average number of employee during a period

$= \frac{50 + 30}{2{,}000} \times 100$

$= 4\ \%$

2. Raghavendra metal company gives the following information:

Number of employees on 1-4-1999	200
Number of employees on 31-3- 2000	240
Number of employees resigned	20
Number of employees discharged	5
Number of employees replaced	18

Calculate labour turnover by applying three methods

1. Labour turnover under Separation method

Labour Turnover = $\frac{\text{Number of employees left from the organization during a period}}{\text{Average number of employee during a period}} \times 100$

Avg. No. of Employee = $\frac{\text{No of workers in the beginning + No of Workers at the end}}{2}$

$= \frac{200 + 240}{2}$

$= 220$

Labour turnover under Separation method = $\frac{25}{220} \times 100$

$= 11.36\%$

2. Labour turnover under Replacement method

Labour Turnover = $\frac{\text{Number of employees replaced during a period}}{\text{Average number of employee during a period}} \times 100$

$= \frac{18}{220} \times 100$

$= 8.18\%$

3. Labour turnover under Flux method

Labour Turnover = $\frac{\text{Number of employees left +Number of employees recruited during a period}}{\text{Average number of employee during a period}} \times 100$

$= \frac{25 + 18}{220} \times 100$

$= 19.55\ \%$

Normal and overtime wages

3. Calculate the normal and overtime wages payable to worker

Monday	8
Tuesday	10
Wednesday	9
Thursday	11
Friday	9
Saturday	4

Normal working hours – 8 hours per day
Normal Rate: Rs. 2 per hour
Overtime: Double the usual rate

Statement showing over time hours

Days	Total hours worked	Normal working hours	Over time hours
Monday	8	8	-
Tuesday	10	8	2
Wednesday	9	8	1
Thursday	11	8	3
Friday	9	8	1
Saturday	4	4	-
		44	7

Wages for normal working hours = 44 X2 = 88
Wages for over time working hours= 7 X 4= 28

4. Calculate the normal and overtime wages payable to a workman from the following

Monday	8
Tuesday	10
Wednesday	9
Thursday	11
Friday	9
Saturday	4
	51 hours

Normal working hours: eight per day, normal rate- Re. 0.50 per hour.

Overtime: up to nine hours in a day at single rate and over nine hours in a day at double rate or up to 48 hours in a week at a single rate and over 48 hours at double rate, whichever is more beneficial to the workmen?

Statement showing over time hours

Days	Total hours worked	Normal working hours	Over time hours(Single rate)	Over time hours(Double rate)
Monday	8	8	-	-
Tuesday	10	8	1	1
Wednesday	9	8	1	-

Thursday	11	8	1	2
Friday	9	8	1	-
Saturday	4	4		-
		44	4	3

Wages for normal working hours = 44 X0.5 = 22.00
Wages for over time working hours
At single rate = 4 X0.5 = 2.00
At double rate= 3X 1 = 3.00
27.00

CASH REQUIRED FOR WAGE PAYMENTS

5. From the details given below, compute the amount of cash required for payment of wages to a worker in a month:

a) Wage for normal hours worked Rs. 2000 p.m.
b) Wage for overtime Rs. 200 p.m.
c) Leave wages Rs. 150 p.m.
d) Worker's contribution to P.F Rs. 200 p.m.
e) Worker's share of premium to E.S.I. Rs. 50 p.m.
f) House Rent to be recovered Rs. 100 p.m.

Answer:

STATEMENT SHOWING NET WAGES PAYABLE

PARTICULARS		AMOUNT
Normal wages		2,000
Over time wages		200
Leave wages		150
		2,350
Less: Deductions:		
Worker's contribution to P.F	200	
Worker's share of premium to E.S.I.	50	
House Rent to be recovered	100	
		350
		2,000

6. From the following details, ascertain the amount of cash required for payment of salaries in a firm for the month of January:

1. Normal time salaries Rs. 65,000
2. Dearness Allowances: 20% of (1) above
3. Leave wages 5% of (1 and (2) above
4. Employee's contribution to P.F and E.S.I. 5% and 3% respectively on (1 and (2) above
5. Income tax deducted at source Rs. 4,000
6. Deduction for insurance premium Rs. 5,000
7. Festival advance to be recovered from 60 employees at Rs. 100 per employee.

STATEMENT SHOWING NET WAGES PAYABLE

PARTICULARS	AMOUNT
Normal wage	65,000
Dearness allowances(65,000 X20/100)	13,000
Leave wages (65,000 +13,000= 78,000 X5/100)	3,900
	81,900
Less: Deductions:	
Employee's contribution to P.F (78,000X5/100) 3,900	
Worker's share of premium to E.S.I (78,000X3/100)2,340	
Insurance premium 5,000	21,240
Festival advance recovered 6,000	
Income tax 4,000	
Cash required for payment of salaries	60,660

Labour Cost to the Employer

7. From the following data prepare a statement a showing the cost per day of eight hours of engaging a particular type of labour:

a) Month basic salary plus D.A. Rs. 400
b) Leave salary 5% of (a)
c) Employer's contribution to P.F. 8% of (a) and (b)
d) Employer's contribution to ESI – 2.5% of (a) and (b)
e) Pro-rata expenditure on amenities to labour Rs.35 per head p.m
f) Number of working hours in a month 200.

STATEMENT SHOWING LABOUR COST (Per labour day of 8 hours)

PARTICULARS	AMOUNT
Monthly salary Plus DA (400/25)	16.00
Leave salary 16X5/100	0.80
Employer's contribution to P.F(16.80X 8/100)	1.34
Employer's contribution to ESI(16.80X2.5/100)	0.42
Pro-rata expenditure on amenities (35/25)	1.40
	19.96

Number of working hours in a month 200.
Working hours per day = 8 hours
1day = 8 hours
? =200hours

Working days in the month= $\frac{200}{8}$ =25 days

8. From the following data prepare a statement showing the cost per man day of eight hours.
   a) Basic salary plus D.A. Rs. 300 p.m.
   b) Leave salary to the workman 6% of the basic and D.A.
   c) Employer's contribution to P.F. 6% of (a) and (b)
   d) Employee's contribution to P.F – 6% of (a) and (b)
   e) Pro-rata expenditure on amenities to labour Rs.25 per head p.m
   f) Number of working hours in a month 200.

PARTICULARS	AMOUNT
Monthly salary Plus DA (300/25)	12.00
Leave salary 12X6/100	0.72
Employer's contribution to P.F(12.72X 6/100)	0.76
Pro-rata expenditure on amenities (25/25)	1.00
	14.48

NOTE: Ignore Employee contribution to P.F

Number of working hours in a month 200.
Working hours per day = 8 hours
1day = 8 hours
? =200hours

Working days in the month= $\frac{200}{8}$ =25 days

9. From the following data prepare a statement showing the cost per man day of eight hours.
   a) Basic salary – Rs. 2 per day
   b) Dearness allowance -25 ps for every point over 100 (cost of living index for working class). Current cost of living index is 700 points.
   c) Leave salary - 10% of (a)and (b)
   d) Employer's contribution to P.F. 8% of (a), (b) and (c)
   e) Employer's contribution to ESI – 2.5% of (a), (b) and (c)
   f) Expenditure on amenities to labour Rs.20 per head per mensem
   g) Number of working days in a month -25 days of 8 hours each.

Worker's Earnings, Labour cost and its allocation to jobs

10. Calculate the earnings of workers A and B from the following particular for a month and allocate the earnings of each to jobs X,Y and Z.

Basic wages	Rs. 100	Rs. 100
Dearness allowance % on basic wages	50%	55%
Provident fund on basic wages	8%	8%
Employees state Insurance (on basic eages)	2%	2%
Overtime	10 hours	-
Idle time and leave	-	16 hours

The normal working hours for the month are 200. Overtime is paid for at double the normal rate plus DA. Employee's contribution to state insurance and provident fund are at equal rates with the employer's contribution. The month has 25 working days and one paid holiday.

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

	X	Y	Z
A	40%	30%	30%
B	50%	20%	30%

Overtime was done on Job

Straight piece rate system

Under this system workers paid according the number of units produced at a fixed rate per unit.

Differential Piece Rate System

Differential Piece Rate System was introduced by Taylor, the father of scientific management. The underlying principle of this system is to penalise a slow worker by paying him a low piece rate for low production and to reward an efficient worker by giving him a higher piece rate for a higher production. Taylor was of the view that an inefficient worker should have no place in the organisation and he should be compelled to leave the organisation by paying him a low piece rate for low production.

Taylor proceeded on the assumption that through time and motion study it is possible to fix a standard time for doing a particular task. To encourage the workers to complete the work within the standard time, Taylor advocated two piece rates, so that if a worker performs the work within or less than the standard time, he is pad a higher piece rate, and if he does not complete the work within the standard time, he is given a lower piece rate.

11. A Company employs workers on time wages cum piece wages basis. Workers get payment as per the method more beneficial for them

During a week of 44 hours, production was as under:

Gopu 100 units; Somu 140 units

Time rate Rs. 2.5 per hour; piece rate Re. 1 per unit.

Calculate the earnings of each worker.

Time wage: Gopu : 44 hours X Rs. 2.5= Rs. 110

Piece wage: Somu : 140 units X Re .1 = Rs. 140

Taylor's differential piece rate system

Earnings = Production of workers x Difference piece rate

12. Rajan Ltd., follows Taylor's differential piece rate system – 80 and 120 being the differentials for below standard and above standard work.

From the following ascertain the earnings of workers X and Y.

Standard time 15 minutes per unit

Time worked 8 hours

Units produced X: 28 Y: 35

Normal piece rate per unit Rs. 2

1. Level of performance of workers

Standard Production for 15 minutes = 1 unit

Standard Production for 1 hour= 60 minutes
15 minutes
= 4 units

60 minutes = ?
15 minutes = 1 unit

Standard Production for 1day of 8 hours= 8hrsX4 units
= 32units

Worker X Produced= 28 units is below standard
Worker Y Produced = 35 units is above standard

2. Calculation of piece rates:
Normal rate =2
Standard rate for X= 2X80/100= 1.6per unit
Standard rate for Y= 2x120/100=2.4perunit

Earnings of the workers= Production of worker X
Differential piece rate
X= 28X1.6 =44.8
Y= 35X 2.4=84

13. Calculate the earning of the worker A and B under Straight piece rate system and Taylor's differential piece rate system from the following particulars:
Normal rate per hour – Rs. 1.80
Standard time per unit – 20 seconds
Differentials to be applied
80% of piece rate below standard
120 % of piece rate above standard
Workers A Produces 1,300 units per day and worker B produces 1,500 units per day.

1. Level of performance of workers
Standard Production for 20 seconds= 1 unit
20 secods =1unit
60second = 3 units

1 minutes = 3units
60 minutes=
Standard Production for 1 hour= 60 minutes X3 = 180 units
1 minutes

Standard Production for 1day of 8 hours= 8hrsX180 units = 1440 units
Worker A Produced= 1300 units is below standard
Worker B Produced = 1500 units is above standard

2. Calculation of piece rates:
Straight piece rate system= Units produced X rate per unit
180 units= 1.80
1 unit = ? Normal rate =1.80/180= 0.01Per unit
A = 1300 x 0.01=13
B = 1500x 0.01=15

Taylor's piece rate system

Normal rate =0.01
Standard rate for A= 0.01X80/100= 0.008 per unit
Standard rate for B= 0.01x120/100= 0.012perunit
Earnings of the workers= Production of worker X Differential piece rate
A= 1300X0.008 =10.4
A= 1500X 0.012=18

Merrick's plan of piece rate system
Steps:

1. Level of Performance of workers= Actual output x 100
Standard output
2. Earnings of the workers = Unit produced x Normal piece rate

Differential slab
Below 83% = Nil
83% to 100% = 110%
Above 100% =120%

14. Calculate earnings of 3 workers A, B and C under the Merrick's plan of piece rate system given the following:
Standard production 120 units
Production of 'A' 90 units
Production of 'B' 100 units
Production of 'C' 130 units
Ordinary piece rate Re.0.10.

1. Level of performance= Actual output x 100
Standard output

A = 90 x 100
120
=75%

B = 100 x 100
120
=83.3%

C = 130 x 100
120
=108.3%

Earnings of the workers = Unit produced x Normal piece rate
A = 90 x 0.10 = 9
B = 100 x 0.10 x 110/100 = 11
C = 130 x 0.10 X120/100 = 15.6

15. On the basis of the following information, calculate the earnings of A, B, C and D under Merrick's differential piece rate system.
Standard production per hour: 12 units.
Normal rate per hour: Re. 0.60

In a 8 hour day:
A produced 64 units; B produced 96 units;
C produced 84 units; D produced 100 units.
Standard output = 8 X12 =96

1. Level of performance= $\frac{\text{Actual output}}{\text{Standard output}} \times 100$

A = $\frac{64}{96} \times 100$
=66.67%
B = $\frac{96}{96} \times 100$
=100%
C = $\frac{84}{96} \times 100$
=87.5%
C = $\frac{100}{96} \times 100$
=104.17%

Earnings of the workers = Unit produced x Normal piece rate
Normal rate per hour = 0.60
12 units = 0.60
1 units = ? 0.60/12 = 0.05
A = 64 x 0.05 = 3.2
B = 96 x 0.05 x 110/100 = 5.28
C = 84 x 0.05 X110/100 = 4.62
D = 100 x 0.05 x120/100=6

Gantt's task bonus plan
1. Level of performance of workers = $\frac{\text{Actual output}}{\text{High task output}} \times 100$

2. Earnings of workers
Under, wages are ascertained as follows:
a) When output is below standard (100%) - guaranteed time wage are paid
b) When output is at standard (100%) - time rate + 20% bonus
c) When output is above standard (100%) - High piece rate on whole output

16. From the information given below, calculate the earnings of three workers, X, Y and Z under gantt's task bonus plan:
(a) Time rate Rs. 15 per hour.
(b) High task per day of 8 hours – 80 units
(c) High piece rate Rs.2 per unit
(d) Day's output: X 70 units; Y 80 units; Z 90 units.

1. Level of performance of workers = Actual output x 100
High task output

X= 70 x 100 = =87.5%
80

Y= 80 x 100 = =100%
80

= 90 x 100 = =112.5%
80

2. Earnings of workers

When output is below standard - guaranteed time wage are paid

8 hours x 15 per hour = Rs. 120

b) When output is at standard - time rate + 20% bonus

120 + 20% (120 x20/100)

= 120 +24 =144

c) When output is above standard - High piece rate on whole output

= Unit produced x High piece rate

=90 X 2 = 180

Premium and Bonus plans

I. Halsey Premium plan

Total Earnings = T x R + 50 (S-T)R
100

T= Actual time or time taken

R= Rate per hour

S= Standard time

T x R + 50 %(S-T) R

3. A worker is paid at 25 paise per hour for completing a work within 8 hours. If he completes the work within 6 hours, calculate his wages under Halsey plan when the rate of premium is 50%. Also ascertain the effective hourly rate of earning by the worker.

Total Earnings = T x R + 50 (S-T) R
100

T= Actual time or time taken= 6 hours

R= Rate per hour =Re.0.25

S= Standard time = 8 hours

Earnings = 6 x 0.25 + 50/100 (8-6) 0.25

=1.5 + 0.5 (2)0.25

=1.5 + 0.5 (0.5)

=1.5 + 0.25 = Rs.1.75

Effective hourly rate of earning = Total Earnings = 1.75 = Re. 0.292
Actual time 6

Halsey-weir plan
Total Earnings = T x R + $\frac{30}{100}$ (S-T) R

4. Calculate the total earnings from the following data under Halsey plan and under Halsey-weir plan.
Standard time : 10 hours
Time taken : 8 hours
Time rate : Rs. 2.50 per hour.

Total Earnings = T x R + $\frac{50}{100}$ (S-T) R
= 8x 2.50 +50/100 (10-8) 2.50
= 20 + 0.5 (2)2.50
= 20+0.5(5)
= 20 + 2.5 = Rs.22.50
Halsey-weir plan
Total Earnings = T x R + $\frac{30}{100}$ (S-T) R
= 8x 2.50 +30/100 (10-8) 2.50
= 20 + 0.3 (2)2.50
= 20+0.3(5)
= 20 + 1.5 = Rs. 21.50
II. Barth's schemes

$$\text{Earnings} = \sqrt{\text{Rate per hour Standard time x Actual time}}$$

From the following details, calculate the earnings of a worker under Barth's variable sharing plan
Standard time 25 hours
Actual time 20 hours
Standard rate per hour: Rs. 12

Earnings under Barth's variable sharing plan

$$= \sqrt{\text{Rate per hour x Standard time x Actual time}}$$

$$= 12 \times \sqrt{25 \times 20}$$

= 12 x 22.36
= Rs. 268.33
5. Using the following information calculate labour cost per hour under
Halsey and Barth's schemes:
Time allowed =72 hours
Time taken = 60 hours
Rate per hour = Re. 1

Total Earnings under Halsey plan = T x R + $\frac{50}{100}$ (S-T) R

100
= 60x1+ 50/100(72-60)1
=60+0.5(12)1
=60 + 0.5x12
=60+6 =Rs 66

labour cost per hour= 66/60=1.1

Earnings under Barth's variable sharing plan

= Rate per hour x Standard time x Actual time
= 1x 72x60
=1 x 66
=Rs. 66

labour cost per hour= 66/60=1.1per hour

III. Rowan's plan

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

T= Actual time/ time taken/ Hours worked
R= Rate per hour
S= Standard time

6. Standard time 10 hours. Number of units to be completed 5. Hourly rate is Re. 0.25. Time taken 8 hours. Calculate a worker's total earnings under Rowans plan. Also determine the effective rate of earnings per hour.

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

T= 8 hours
R = 0.25
S =10 hours

=8 x 0.25 + $\frac{10-8}{10}$ x 8x 0.25
=2 +0.2 x2
= 2+0.4 = Rs. 2.4

Effective rate of earnings per hour= 2.4/8= 0.3per hour

7. Calculate the earnings of a worker under (A) Halsey plan and (B) Rowan Scheme

Time allowed =48 hours
Time taken = 40 hours
Rate per hour = Re. 1

Total Earnings under Halsey plan = $T \times R + \frac{50}{100} (S-T) R$

Total Earnings under Rowan's plan = $T \times R + \frac{S-T}{S} \times T \times R$

8. The two workers A an B produced 80 and 100 pieces of a product 'X' on a particular day. The time allowed for 10 units of product 'X' is 1 hour. The hourly rate is Rs. 4. Calculate the following:

(a) Earnings for the day.

(b) Effective rate of earnings per hour under

(i) Halsey premium bonus (50% sharing)

(ii) Rowan premium bonus

IV. Emerson's Efficiency plan

Step 1: Efficiency level of workers = $\frac{\text{Actual output}}{\text{Standard output}} \times 100$

Step 2: Earnings of workers

Below 66.67% efficiency	Only time wages. No bonus
66.67% to 100%	Bonus from 0.01% to 20%
Above 100%	20% of time wage + 1% bonus for every additional 1% efficiency

9. X Ltd., employs Emerson's efficiency plan in its factory. Standard output per day of 8 hours is fixed at 50 units. Normal time wage is Rs. 5 per hour.

Four workers M, N, O and P produced goods as follows on a specific day:

'M' 30 units. 'N' 45 units. 'O' 50 units. 'P' 58 units.

Ascertain the earnings of workers under Emerson's efficiency plan. You may assume 0.6% as bonus for every additional 1% efficiency between 66 .67 % and 100%.

Step 1: Efficiency level of workers = $\frac{\text{Actual output}}{\text{Standard output}} \times 100$

M = 30/50 x100 =60%

N = 45/50 x100 = 90%

O= 50/50 x100 = 100%

P= 58/50 x100 = 116%

Earning of workers

Below 66.67% efficiency	Only time wages. No bonus
66.67% to 100%	Bonus from 0.01% to 20%
Above 100%	20% of time wage + 1% bonus for every additional 1% efficiency

M = 8hours x Rs.5 per hour = 8x5 =40

N = $8x5 + 8x5\left(\frac{90-66.67 \times 0.6}{100}\right)$

= 40+40(23.33x0.6/100)

=40+40(0.14)

= 40 +5.6 = Rs. 45.6

O = 8x5 + 8x5 x20/100

= 40+ 40x20/100

= 40 +8 =Rs. 48

P = 8x5 +8x5x36/100 (20 +16)
40 +40x36/100
40+ 14.4 = Rs 54.4

10. From the following information, calculate the bonus and earnings under Emerson's efficiency bonus plan:

Standard output in 12 hours 192 units
Actual output in 12 hours 168 units
Time rate Re. 0.75 per hour.
Hint: at 87.5 % efficiency is 8% under Emerson's scheme
Step 1: Efficiency level of workers = Actual output x 100
Standard output
168/192x100 = 87.5%
Step : 2 Earnings = 12x 0.75 + 12x 0.75 x 8/100
= 9 +9 x8/100
= 9 + 0.72 = Rs.9.72

11. In a manufacturing concern the daily wages guaranteed for workers is Rs. 40. The standard output for the month is 1,000 articles, representing 100% efficiency. The rate of wages is paid without bonus to those workers who show up to 66.67 % efficiency. Beyond this, bonus is payable in a graded scale.

Efficiency	Bonus
90 %	10 %
100 %	20 %

Further increase of 1% of bonus for every 1% further rises in efficiency. Calculate the total earnings of A, B, C and D who have worked 26 days in a month and produced as follows:

A 500 units B 900 units C 1,000 units D 1,200 units.

Step 1: Efficiency level of workers = Actual output x 100
Standard output
A = 500/1,000 x 100 =50%
B = 900/1,000x100 = 90%
C = 1,000/1,000 x100 = 100%
D = 1,200/1,000 x 100 = 120%
Step :2 Earning of workers
A = 26 days x Rs. 40 per day= 1,040

B = 26x40+26x40x10/100

=1,040 + 1040x10/100
=1040+ 104 = Rs. 1,144

C = 26x40+26x40x20/100
=1040+ 1040 x20/100
=1040 + 208 = Rs. 1,248

D = 26 x 40 + 26 x40 x40/100 (20+20)
= 1040 + 1040 x40/100
= 1040+416= Rs. 1,456

12. Standard time allowed for a job Rs. 20 hours and the rate per houris Rs. 20 plus a Dearness allowance of Rs. 5 perhour worked. The actual time taken by a worker is 15 hours. Calculate the toatal earnings and hourly earnings under:
Tame wage system
Piece wage system
Hals4y plan
Rowan paln

Unit – 5

OVERHEAD DISTRIBUTION

MEANING OF OVERHEAD DISTRIBUTION

Overhead distribution is the most complex task in the cost accounting because there is no clear base is available to distribute the overheads. Overhead distribution means assigning the cost of indirect material, indirect labour and indirect expenses to a production department or service department. There are three stages involved in the distribution of overheads,

STAGES OF OVERHEAD DISTRIBUTION

1. Classification and Collection of Overheads: Classification and codification is the pre- requisite for collecting the overheads. After classifying overheads as factory, office and selling, items covered by each category will be grouped under suitable account headings. Collection of overheads can be done from the followingsources:
    a) For collecting the expenses of rent, insurance and other expenses invoice can be used.
    b) Journal entries are also a source of collecting theoverheads.
    c) Store requisitions are used to collect the indirectmaterials.
    d) Wage sheets are used to collect the indirectlabour.

Allotment of codes to individual heads of expense is termed as codification of overheads. Short description will be given to the lengthy heads. Codes are useful in the computerized system of accounting. Codification can be done with the help of followingmethods:

(i) Numerical Method (ii) Alphabetical Method (iii) Alphabetical-cum-numericmethod

2. Departmentalization of Overheads: it is the process of allocation and apportionment of different overheads to various departments or cost centers. Departments majorly are divided in two types namely production andservices.

Difference between Allocation and Apportionment

Allocation	Apportionment
Assignment of particular cost to a particular department or cost center is called as allocation.	These costs are common to various departments and cannot be charged toa particular department or cost center.
Allocation deals with whole items of costs.	Apportionment deals with proportions of items of costs.
No base is required for allocation of cost to a department, it is a direct process.	A equitable base is required for apportionmentofcosttotheproductionor services department.

3. Absorption of Overheads: it is the process of charging of overheads of a cost centre to different cost units in such a way that each cost unit bears an appropriate portion of its share of overheads. This is done by means of overheadrates.

APPORTIONMENT AND RE-APPOTIONMENT OF OVERHEADS

Production and Service Department

Departments which are involved in the manufacturing the goods from raw material are called as the production departments like; Spinning department, weaving department, Finishing etc. while services departments are involved in rendering services to the production departments like purchasing department, stores department, security department, etc.

Principles of Apportionment

Apportionment should be based on the following principles:

1. Potential benefit taken by thedepartment.
2. Ability to paymethod
3. Direct or specific criteriamethod
4. Surveymethod

Basis of Apportionment

Overhead Cost	Basis of Apportionment
Rent Lighting and heating Fire precaution service Air conditioning	Floor Area or Volume of the department
Fringe Benefits Labour welfare expenses Time keeping Personnel office Supervision	No. of Workers
Compensation to workers Holiday pay ESI and PF contribution	Direct Wages
Depreciation of plant and machinery Repairs and maintenance of plant Insurance of inventory	Capital value
Power/ steam consumption Managerial salaries	Technical advice by the experts
Electric power	Horse power of machine, or number of machine hours, or value of machines

Note: The above table of basis of apportionment is according to the prevalent practice in the industry. More than one basis also can be used for the apportionment of the overhead cost. It is based on the judgment of the authorities.

RE-APPORTIONMENT OF SERVICE DEPARTMENT COSTS (SECONDARY DISTRIBUTION)

Once overheads are allocated and apportioned to the production and service department then totaled overheads allocated to the service department should be allocated to the cost center or production department. Ultimately costs is to be charged to the production department only, this process of distributing overheads of services department in the production department is called Re-apportionment.

The method of re-apportionment of service department costs is similar to apportionment of overheads discussed earlier. Some of the important bases of apportionment of service department costs to production departments are as follows:

Service Department	Basis of Apportionment
Store keeping department	Number of material requisitions, or value/quantity of materials consumed in each department

Purchase department	Value of materials purchased for each department, or number of purchaseorders placed
Time-keeping department and payroll department	Number of employees, or total labour or machine hours
Canteen, welfare and recreation services	Number of employees, or total wages
Maintenance department	Number of hours worked in each department
Internal transport service	Value or weight of goods transported, or distance covered.
Inspection department	Direct labour hours or machine operating hours
Drawing office	No. of drawings made or man hours worked

Thus, the cost of service departments are apportioned on the basis of service rendered, the benefits received by the beneficiary departments.

Apportionment of Production DepartmentsOnly

In this case, cost of each service department is apportioned only to production departments without apportioning it to other servicedepartments.

Apportionment to Production as well as Service Departments

Apportionment of expenses of service departments only to production departments is not sufficient because in reality services departments also provide services to the other service departments. For example; electricity department provides power not only to the production departments but also to services department like canteen, maintenance department and to other non-production departments. Apportionment can be done on the reciprocal as well as non- reciprocal basis:

Apportionment on Non-reciprocal Basis

When a department is only providing services to the other departments but not receiving any kind of services from the service provider department or when services are notinter-dependent.

Apportionment on Reciprocal Basis

When a department is not only providing services to the other departments but also receiving services from the service provider department or when services are inter-dependent on each other

For apportionment on reciprocal basis three methods are available:

1. Simultaneous equationmethod
2. Repeated distributionmethod
3. Trial and errormethod

Simultaneous Equation Method: according to this method the amount of overhead of each production department is obtained by solving simultaneous equations.

Repeated Distribution Method: according to this method cost service department should be apportioned to other service departments, production as well as service, according to prefixed percentage. The process is repeated until the total costs of the service departments are exhausted or the figures become too small tomatter.

Trial and Error Method: this method is useful where two or three interlocked service cost centre involved. In case of this method the cost of one service cost centre is apportioned to another service cost centre. The cost of another service centre plus the share received from the first cost centre is again apportioned to the first cost centre. The process is repeated till the amount to be apportioned becomesnegligible.

Primary Apportionment

1. There are five departments in A,B,C and D Ltd. A,B,C are manufacturing departments and department D provides the services. The actual costs for a period are as follows:

Cost	Rs.	Cost	Rs.
Repairs	2,400	Insurance of stock	1,500
Rent	4,000	Lighting	300
Depreciation	1,350	Power	2,700
Supervision	4,500		

The information available regarding various departments are as follows:

	Dept. A	Dept. B	Dept. C	Dept. D
Area (sq. ft)	300	220	180	100
No. of Workers	36	24	18	12
Value of Plant	Rs. 24,000	18,000	12,000	6,000
Value of Stock	Rs. 15,000	9,000	6,000	-

Apportion the cost to the various departments on the most equitable method

Solutions:

	Dept. A	Dept. B	Dept. C	Dept. D
Area (sq. ft)	300 30 15	220 22 11	180 18 9	100 10 5
No. of Workers	36 6	24 4	18 3	12 2
Value of Plant	Rs. 24,000 24 8 4	18,000 18 6 3	12,000 12 4 2	6,000 6 2 1

Value of Stock	Rs. 15,000 15 5	9,000 9 3	6,000 6 2	-

Primary over head distribution summary

Particulars	Basis of Apportionment	Total	Dept. A	Dept. B	Dept. C	Dept. D
Repairs	Value of plant 4:3:2:1	2,400	960 (2400x4/10)	720 (2400x3/10)	480 (2400x2/10)	240 (2400x1/10)
Rent	Area (sq. ft) 15:11:9:5	4,000	1,500 4000x15/40	1,100 4000x11/40	900 4000x9/40	500 4000x5/40
Depreciation	Value of plant 4:3:2:1	1,350	540	405	270	135
Supervision	No of workers 6:4:3:2	4,500	1800	1200	900	600
Insurance of stock	Value of stock 5:3:2	1,500	750	450	300	-
Lighting	Area (sq. ft) 15:11:9:5	300	112.5	82.5	67.5	37.5
Power	Value of plant 4:3:2:1	2,700	1080	810	540	270
		16,750	6742.5	4767.5	3457.5	1782.5

2. The modern Co., is divided into four departments A, B, C are production department and D is Service department. The actual costs for a period are as follows:

Rent	1,000
Repairs to plant	600
Depreciation on plant	450
Employer's liability for insurance	150
Supervision	1,000
Fire insurance in respect of stock	500
Power	900
Lighting	120

The following information are available in respect of the 4 departments

Particulars	Dept. A	Dept. B	Dept. C	Dept. D
Area (Sq. meters)	1,500	1,100	900	500
No. of employees	20	15	10	5
Total wages (Rs.)	6,000	4,000	3,000	2,000
Value of plant (Rs.)	24,000	18,000	12,000	6,000
Value of stock (Rs.)	15,000	9,000	6,000	-
H.P of Plant (kwh)	24	18	12	6

Apportion the cost of the various departments on the most equitable basis.

Answer:

Area (Sq. meters)	1500:1100:900:500 15:11:9:5	Value of plant (Rs.)	24000:18000:12000:6000 24:18:12:6 4:3:2:1
No. of employees	20:15:10:5 4:3:2:1	Value of stock (Rs.)	15,000:9000: 6000 15:9:6= 5:3:2
Total wages (Rs.)	6000:4000:3000:2000 6:4:3:2	H.P of Plant (kwh)	24:18:12:6 4:3:2:1

Primary over head distribution summary

Particulars	Basis of Apportionment	Total	Dept. A	Dept. B	Dept. C	Dept. D
Rent	Area 15:11:9:5	1,000	1000x15/40 375	1000x11/40 275	1000x9/40 225	1000x5/40 125
Repairs to plant	value of plant 4:3:2:1	600	240	180	120	60
Depreciation on plant	value of plant 4:3:2:1	450	180	135	90	45
Employer's liability for insurance	No. of employees 4:3:2:1	150	60	45	30	15
Supervision	No. of employees 4:3:2:1	1,000	400	300	200	100
Fire insurance in respect of stock	Value of stock 5:3:2	500	250	150	100	-
Power	H.P of Plant 4:3:2:1	900	360	270	180	90
Lighting	Area 15:11:9:5	120	45	33	27	15
Total wages allocation		2000				2000
		6,720	1910	1388	972	2450

NOTE: for service department wages are also included in overheads because service department don't produce anything and their wages and materials are also to be treated as overhead

3. The following data were obtained from the books of a company for the half year ended 30th June 1995.

Particulars	Production department			Service department	
	A	B	C	X	Y
Direct wages(Rs.) 7:6:5:1:1	7,000	6,000	5,000	1,000	1,000
Direct material (Rs.) 6:5:4:3:2	3,000	2,500	2,000	1,500	1,000
Employees No. 4:3:3:1:1	200	150	150	50	50
Electricity K.W.H 8:6:6:2:3	8,000	6,000	6,000	2,000	3,000

Light points No. 2:3:3:1:1	10	15	15	5	5
Assets value Rs. 5:3:2:1:1	50,000	30,000	20,000	10,000	10,000
Area occupied (SQ. M) 4:3:3:1:1	800	600	600	200	200

The expenses for six months were

Stores overhead Rs. 400; Motive power Rs. 1,500; Electric light Rs. 200; Labour welfare Rs. 3,000; Depreciation Rs. 6,000; Repairs and maintenance Rs. 1,200; General overhead Rs. 10,000; Rent and taxes Rs.600.

Prepare primary distribution table for the departments.

Primary over head distribution summary

Particulars	Basis of Apportionment	Total	Dept. A	Dept. B	Dept. C	Dept. X	Dept. Y
Stores O.H	Material 6:5:4:3:2	400	120	100	80	60	40
Motive power	Electricity 8:6:6:2:3	1,500	480	360	360	120	180
Electric light	Light 2:3:3:1:1	200	40	60	60	20	20
Labour welfare	No.of ee 4:3:3:1:1	3,000	1000	750	750	250	250
Depreciation	Asset 5:3:2:1:1	6,000	2500	1500	1000	500	500
Repairs	Asset 5:3:2:1:1	1,200	500	300	200	100	100
General O.H	D.Wages 7:6:5:1:1	10,000	3500	3000	2500	500	500
Rent& taxes	Area 4:3:3:1:1	600	200	150	150	50	50
D. Wages		2000				1000	1000
D. Material		2500				1500	1000
		27,400	8,340	6,220	5,100	4,100	3640

4. The modern company has three production department A,B and C and two service department D and E. the following are abstract from the records of the company for the month of march 2002:

Rent and rates	20,000	Indirect wages	6,000
Depreciation on machinery	40,000	Power	6,000
General lighting	2,400	Sundries	40,000

The following further details are available

Particulars	Total	A	B	C	D	E
Floor Space (sq.ft)	20,000	4,000	5,000	6,000	4,000	1,000
H.P. of machines	300	120	60	100	20	-
Light points	120	20	30	40	20	10
Direct wages (Rs)	20,000	6,000	4,000	6,000	3,000	1000
Value of machinery (Rs)	5,00,000	1,20,000	1,60,000	2,00,000	10,000	10,000

Apportion the expenses to the departments on suitable basis.

Secondary Apportionment

(a) Direct Reapportionment

5. Janak Ltd. has two production department M & N and two service department R and S. After primary distribution, the following were the departmental overheads for the month of March 2005:

Production department Rs.

M	50,000
N	40,000
Service department	
R	12,000
S	16,000

A detailed survey has revealed that the services of department 'R' are utilized by the production department in the ratio of 7:3. The services of 'S' were used by M & N equally.

Ascertain the total overhead of department M & N by preparing a secondary distribution summary.

Secondary overhead distribution summary

		Production dept.		Service dept.	
Particulars	Total	M	N	R	S
Over head as per primary distribution	1,18,000	50,000	40,000	12,000	16,000
Service dept. 'R' O.H 7:3 to M and N		8,400 (12,000x7/10)	3,600 (12,000x3/10)	(-12,000)	
Service dept. 'S' O.H 1:1 to M and N		8,000	8,000		(-16,000)
	1,18,000	66,400	51,600	-	-

6. A Manufacturing unit has three production departments and four service departments. The expenses for these three departments as per primary distribution summary were:

Production departments	Rs	
A	20,000	
B	18,000	
C	10,000	18,000
Service departments		
Stores	4,000	
Time keeping and accounts	3,000	
Power	1,600	
Canteen	1,000	9,600
		57,600

The following information are also available in respect of the production departments.

	A	B	C
Horse power of machines (kwh) 3:3;2	900	900	600
No of workers 4:3:3	60	45	45
Values of stores requisitioned (Rs) 5:3:2	7,500	4,500	3,000

Apportion the cost of the various service departments to the production departments.

Secondary Overhead Distribution summary

		Production	Service deparments

Particulars	Total	A	B	C	Stores	Time	Power	Canteen
Overheads	57,600	20,000	18,000	10,000	4,000	3,000	1,600	1,000
Service dept. stores OH (5:3:2)		2,000	1,200	800	(-4000)			
Service dept. time OH (4:3:3)		1,200	900	900		(-3000)		
Service dept. Power OH (3:3:2)		600	600	400			(-1600)	
Service dept. Canteen (4:3:3)		400	300	300				(-1000)
	57,600	24,200	21,000	12,400				

(b) Step Distribution (or) Step Ladder method

7. The following details are available for the month of may 2005 relating to two service departments A and B and production departments R and S.

	Amount	Apportionment basis		
	Rs.	B	R	S
A	20,000	25%	40%	35%
B	15,000		40%	60%
R	30,000			
S	32,000			

Prepare a summary of overhead distribution under the step ladder method.

Secondary overhead distribution

Department	Cost as per Primary distribution			Total
A	20,000	(-20,000)		-
B	15,000	5,000(20000x25/100)	(-20,000)	-
R	30,000	(20000x40/100) 8000	20000x40/100 8000	46,000
S	32,000	(20000x35/100) 7000	20000x60/100 12000	51,000
Total	97,000			97,000

8. A Manufacturing company has two production department P1 and P2 and three service department time booking, stores and maintenance. The following are the particulars for July 1998

Production department		
P1	16,000	
P2	10,000	26,000
Service department		
Stores	5,000	
Time booking	4,000	

Maintenance	3,000	12,000
		38,000

The other information relating to department are:

	P1	P2	Stores	Time booking	Maintenance
No. of Employees 20:15:10:8:5	40	30	20	16	10
No. of stores requisitions 12:10:3	24	20	-	-	6
Machine hours 3:2	2,400	1,600	-	-	-

Apportion the cost of service departments to production departments as per "Step method"

Secondary overhead distribution

Department	Cost as per Primary distribution				Total
Stores	5,000	(-5000)	-	-	-
Time booking	4,000	-	(-4000)20:15:5	-	-
Maintenance	3,000	600 (5000x3/25)	500(4000x5/40)	(-4,100) 3:2	-
P1	16,000	2,400(5000x12/25)	2000(4000x20/40)	2,460(4,100x3/5)	22,860
P2	10,000	2,000(5000x10/25)	1500(4000x15/40	1,640(4100x2/5)	15,140
Total	38,000				38,000

9. In a factory there are two service department, X and Y and three production department A, B and C. In April 1991, the departmental expenses were:

	Rs.		Rs.
A	800	X	234
B	700	Y	300
C	500		

The service department expenses are allocated on a percentage basis as follows:

Service department	A	B	C	X	Y
X	20%	40%	30%	-	10%
Y	40%	20%	20%	20%	-

Prepare Secondary distribution summary under simultaneous Equation method.

Answer

Let 'x' be the total overhead of department 'X' and 'y' be the total overhead of department 'Y'

Then x=234+20%y

Y=300+10%x

x=234+0.2y ---------- 1

y=300+0.1x ----------2

Multiplying both equations with 10 to eliminate decimals

10x=2,340+2y

10y=3,000+1x

10x=2340+2y

-1x=3000-10y

Multiplying equation 1 with 5 to equate y, rearranging the equation and adding them

50x=11700+10y

(+) -1x=3000-10Y

49x=14700

X=14700 = 300

49

Substituting 'x' value in equation 1 we get

10x300=2340+2y

3,000- 2340=2y

660=2y

Y =660/2= 330

Secondary overhead distribution

	Total	A	B	C
Over head as per Primary distribution	2000	800	700	500
Service dept 'X' O.H(300x90%= 270 in 20:40:30)	270	60	120	90
Service dept. 'Y'O.H (330x80%=264 in 40:20:20)	264	132	66	66
	2534	992	886	656

10. In a factory there are two service department, P and Q and three production department A, B and C. In April 1991, the departmental expenses were:

	Rs.		Rs.
A	65,000	P	12,000
B	60,000	Q	10,000
C	50,000		

The service department expenses are allocated on a percentage basis as follows:

Service department	A	B	C	P	Q
P	30%	40%	15%	-	15%
Q	40%	30%	25%	5%	-

Distribute the service department expenses over the production department under repeated distribution method.

Repeated secondary overhead distribution summary

	Production department			Service department	
Particulars	A	B	C	P	Q
O.H as per primary distribution	65,000	60,000	50,000	12,000	10,000
Dept. 'P' expenses apportioned in a ratio of 6:8:3:3	3,600	4,800	1,800	(-12,000)	1,800
Dept. 'Q' expenses apportioned in a ratio of 8:6:5:1	4,720	3,540	2,950	590	(-11,800)
Dept. 'P' expenses apportioned in a ratio of 6:8:3:3	177	236	89	(-590)	89
Dept. 'Q' expenses apportioned in a ratio of 8:6:5:1	37	28	23	-	(-89)
Total O.H	73,534	68,604	54,862	-	-

11. The following particulars relate to a manufacturing company which has three departments A, B, C and two service departments X and Y.

	Departments				
	A Rs.	B Rs.	C Rs.	X Rs.	Y Rs.
Total departmental overhead as per primary distribution	6,300	7,400	2,800	4,500	2,000

The company decided to charge the service department cost on the basis of the following percentages:

	Production department			Service department	
	A	B	C	X	Y
X	40%	30%	20%	-	10%
Y	30%	30%	20%	20%	-

Find the total overheads of production departments on the repeated distribution method.

12. You are supplied with the following information and required to prepare secondary distribution summary under Trial and error method.

Overhead as per primary distribution:

Production department:		Service department:	
A	9,500	X	12,000
B	15,000	Y	10,000
C	7,000		

The service department expenses are allocated as follows:

	A	B	C	X	Y
X	30%	20%	30%	-	20%
Y	40%	30%	20%	10%	-

Statement showing Total O.H of Service dept.

Particulars	X	Y
O.H as per Primary distribution	12,000	10,000
Share of Y in X O.H 12,000x20%		2,400
Share of X in Y O.H 12400X10%	1,240	
Share of Y in X O.H 1,240x20%		248
Share of X in Y O.H 248X10%	24.8	
Share of Y in X O.H 24.8x20%		4.96
	13265	12,653

Secondary O.H Distribution summary

Particulars	Total	A	B	C
O.H as per primary distribution	31,500	9,500	15,000	7,000
Service dept X O.H 13,265 x80% in 3:2:3 10,612	10,612	3,979.5 (10612x3/8)	2,653 (10612x2/8)	3,979.5 (10612x3/8)
Service dept. Y O.H 12,653 x90% in 4:3:2 11388	11,388	5,061 (11388x4/9)	3,796 (11388x3/9)	2531 (11388x2/9)
	53,500	18,540.5	21,449	13,510.5

13. Calculate the overheads allocable to production departments A and B. There are also two service departments X and Y.
X renders service worth Rs. 12,000 to 'Y' and the balance to A and B as 3:2.
Y renders services to A and B as 9:1.

Particulars	A	B	X	Y
Floor space (sq. ft) 5:4:1:2	5,000	4,000	1,000	2,000
Assets (Rs. In lakhs) 10:5:3:1	10	5	3	1
H.P of machines 10:5:4:1	1,000	500	400	100
No. of workers 2:10:10:5	10	50	50	25
Light and fan points 5:3:2:2	50	30	20	20

Expenses and charges are:

Depreciation	1, 90,000	Power	20,000
Rent, Rates & taxes	36,000	Canteen expenses	10,800
Insurance	15,200	Electricity	4,800

Primary distribution summary

Particulars	Basis of apportionment	Total	A	B	X	Y
Depreciation	Asset 10:5:3:1	1,90,000	1,00,000	50,000	30,000	10,000
Rent &rates	Floor 5:4:1:2	36,000	15,000	12,000	3,000	6,000

Insurance	Asset 10:5:3:1	15,200	8,000	4,000	2,400	800
Power	H.P of Machi 10:5:4:1	20,000	10,000	5,000	4,000	1,000
Can. expenses	No. ofworkers 2:10:10:5	10,800	800	4,000	4,000	2,000
Electricity	Light Points 5:3:2:2	4,800	2,000	1,200	800	800
O.H as per Primary distribution			1,35,800	76,200	44,200	20,600

Secondary O.H distribution summary

Particulars	A	B	X	Y
O.H as per primary distribution	1,35,800	76,200	44,200	20,600
Service dept X O.H to Y12,000 To A&B3:2 (32,200)	19,320 (32,200x3/5)	12,880 (32,200x2/5)	(-44200)	12,000
Service dept. Y O.H to A7 B 9:1 (32,600)	29,340 (32,600x9/10)	3,260 (32,600x1/10)		(-32,600)
Total Over head	1,84460	92,340		

14. From the following information work out the production hour rate of recovery of overhead in depts.. 'A', 'B' and 'C'.

Particulars	Total	A	B	C	D	E
Rent	1,000	200	400	150	150	100
Elctricity	200	50	80	30	20	20
Fire insurance	400	80	160	60	60	40
Plant depreciation	4,000	1,000	1,500	1,000	300	200
Transport	400	50	50	50	100	150
Estimated working hours		1,000	2,500	1,800		

Expenses of service department D & E are apportioned as under:

	A	B	C	D	E
D 3:4:2:1	30%	40%	20%	-	10%
E 1:2:5:2	10%	20%	50%	20%	-

Primary O.H distribution

Particulars	Total	A	B	C	D	E
Rent	1,000	200	400	150	150	100
Elctricity	200	50	80	30	20	20
Fire insurance	400	80	160	60	60	40
Plant depreciation	4,000	1,000	1,500	1,000	300	200
Transport	400	50	50	50	100	150
		1,380	2,190	1,290	630	510

Particulars	A	B	C	D	E
O.H as per Primary	1,380	2,190	1,290	630	510

distribution					
Service dept. 'D' O.H 3:4:2:1	189	252	126	(630)	63
Service dept. 'E' O.H 1:2:5:2	57.3	114.6	286.5	114.6	(573)
Service dept. 'D' O.H 3:4:2:1	35.38	45.84	22.96	(114.6)	11.46
Service dept. 'E' O.H 1:2:5:2	1.43	2.86	7.163	2.292	(11.46)
	1662.11	2605.3	1732.58		

Production of rate of recovery

A = $\frac{1662.11}{1,000}$ = 1.662 per hour

B = $\frac{2605.3}{2,500}$ = 1.042 per hour

C = $\frac{1732.58}{1,800}$ = 0.962 per hour

15. In a factory there are three production departments A,B and C two service departments X and Y. the department expenses for the month of January 1993 are given below:

Production departments		Labour hours
A	Rs. 1,65,000	3,000
B	Rs. 3,60,000	5,000
C	Rs. 2,50,000	8,000
Service department		
X	Rs. 12,000	
Y	Rs. 10,000	

The service department overheads are allotted as follows:

	A	B	C
X	4:	3:	3
Y	2:	3:	5

A job passes through departments A, B and C for 4 hours, 10 hours and 15 hours respectively. Direct material cost of the job Rs.100; Direct wages Rs. 200. Find out the cost of the job.

Secondary over head distribution distribution

Particulars	A	B	C	X	Y
O.H as per primary distribution	1,65,000	3,60,000	2,50,000	12,000	10,000
Service dept 'X' O.H 4:3:3	4,800	3,600	3,600	(-12,000)	-
Service dept 'Y' O.H 2:3:5	2,000	3,000	5,000	-	(-10,000)
	1,71,800	3,66,600	2,58,600		

Labour hour rate

A = $\frac{1,71,800}{}$ = 57.266

3,000
B = 3,66,600 = 73.32
5,000
C = 2,58,600 = 32.325
8,000

Work Overhead A =4 hours x 57.266 = 229.064
B = 10hours x 73.32 = 733.2
C = 15 hours x 32.325 = 485

Calculation of prime cost

Direct material	100
Direct wages	200
Prime cost	300

Cost of the job = 300+229.064+733.2+485 =Rs. 1,747

ABSORPTION OF OVERHEAD

16. The following details are furnished by a manufacturer of a product.

Direct materials	Rs. 75,000
Direct wages	Rs. 30,000
Works overhead	Rs. 15,000
Machine hours	20,000
Labour hours	50,000

Calculate the different overhead absorption rates

Direct material Percentage rate = Factory overhead x 100
Direct material
= 15,000 x100 = 20%
75,000

Direct Wages Percentage rate = Factory overhead x 100
Direct wages
= 15,000 x100 = 50%
30,000

Machine hour rate = Works overhead
Machine hour
= 15,000 = 0.75hr
20,000

Labour hour rate = Production overhead
Labour hour
= 15,000 = 0.3hr
50,000

Prime cost percentage rate

Works overhead rate = Works overhead x 100
Prime cost

= 15,000 x100 = 14.285%
1,05,000

Prime cost = Direct material + Direct wages + Direct expenses
= 75,000 +30,000 = 1,05,000

17. Calculate the overhead rates under (a) Material cost method, (b) Labour hour method, (c) Labour cost method and (d) Machine hour rate method from the following particulars:

Production overheads	Rs. 2,00,000
Direct material cost	Rs. 3,00,000
Direct wages	Rs. 1,00,000
Direct labour hour	5,000
Machine hour	4,000

Direct material Percentage rate = Factory overhead x 100
Direct material
= 2,00,000 x100 = 66.67%
3,00,000

Labour hour rate = Production overhead
Labour hour
= 2,00,000 = Rs.40per hr
5,000

Labour cost percentage rate = Factory overhead x 100
Direct wages
= 2,00,000 x100 = 200%
1,00,000

Machine hour rate = Works overhead
Machine hour
= 2,00,000 = Rs.50 per hr
4,000

18. The monthly budget of a department is as under:

Direct materials	Rs. 45,000
Direct wages	Rs. 60,00
Overheads	Rs. 90,000
Machine hours	15,000 hours
Labour hours	30,000 hours

Find out the overhead recovery rate based on: (a) Material cost method, (b) Labour hour method, (c) Labour cost method and (d) Machine hour rate method

UNDER OR OVER ABSORPTION OF OVERHEADS

19. The factory overhead cost of four production departments of a company engaged in executing job orders for an accounting year were as follows:
A- Rs. 19,300; B- Rs. 4,200; C- Rs. 4,000; D- Rs. 2,000
Overheads were absorbed as follows:
Dept. A Rs. 1.50 per machine hour for 14,000 hours.

Dept. B Rs. 1.30 per direct labour hour for 3,000 hours.
Dept. C 80% of direct labour cost of Rs. 6,000
Dept. D Rs. 2 per piece for 950 pieces.
Find out the under/over absorption of overheads in the four departments.

Overhead absorbed

Dept – A (14,000x 1.50)	21,000
Dept – B (3,000x 1.30)	3,900
Dept – C (6,000 x80/100)	4,800
Dept – D (950 x2)	1,900
	31,600

Statement of Under /Over absorption of overhead

Department	O/H Incurred	Absorbed	Under absorption	Over absorption
A	19,300	21,000	-	1,700
B	4,200	3,900	300	-
C	4,000	4,800	-	800
D	2,000	1,900	100	-

MACHINE HOUR RATE
20. Calculate the machine hour rate for Machine A from the following data:

Cost of machine	Rs.16,000
Estimated scrap value	Rs. 1,000
Effective working life	10,000 hours
Running time per 4 weekly period	160 hours
Average cost of repairs and maintenance Per 4 weekly period	Rs. 120
Standing charges allocated to machine As per 4 weekly period	Rs. 40
Power used by the machine	4 units per hour at a cost of 5 paise per unit.

Particulars	Amount	Amount
Standing charges	40/160	0.25
Machine expenses:		
Depreciation	16,000 – 1000 / 10,000 hours	1.5
Repairs and maintainenece	120/160	0.75
Power	4units x 0.05	0.2
Machine hour rate		2.7

4 weeks = 160hours
160 = 40
1 =?

21. From the data given below, compute machine hour rate :
Cost of the machine – Rs. 90,000
Installation charges – Rs. 10,000
Estimated scrap value – Nil
Estimated repair charges per year Rs. 1,000
Estimated working life of the machine 10,000 hours.
Standing charges allocated to the machine per year – Rs. 6,000
Estimated working hours per year 2,000 hours.
Power consumption of the machine is 20 units per hour and the rate of power per 100 units is Rs. 10.

Particulars	Amount	Amount
Standing charges	6,000/2,000	3
Machine Expenses:	1,00,000– Nil	
Depreciation	10,000 hours	10
Power	100 units= Rs10 20 units= ? 20X10/100 =	2
Machine hour rate		15

2000=6000
1h= ?

22. Calculate the machine hour rate for Machine A from the following data:

Cost of machine	Rs.19,200
Estimated scrap value	Rs. 1,200
Effective working life	10,000 hours
Running time per month	166 hours
Repair charges per month	Rs. 150
Standing charges allocated to machine per month	Rs. 50

Power used by the machine 5 units per hour at a cost of 19 paise per unit.

1 month = 166
166 =

Computation of Machine hour rate

Particulars	Amount	Amount
Standing charges	50/166	0.30
Machine Expenses:		
Depreciation	19,200– 1200 10,000 hours	1.80
Repair charges	150/166	0.90

Power	5 x 0.19	0.95
Machine hour rate		3.95

23. Calculate the machine hour rate for Machine A from the following data:
Cost of machine - Rs.4,20,000
Estimated scrap value - Rs. 20,000
Estimated working life – 10 years of 20,000 hours each
Running time for a week period - 1500 hours
Estimated repair for life - Rs. 10,000
Standing charges allocated to machine for a week - Rs. 3,000
Power consumed per hour – 5 units at Re.1 per unit.

Computation of Machine hour rate

Particulars	Amount	Amount
Standing charges 1500hrs =3000 1 hr = ?	3000/15000	2.00
Machine Expenses: Depreciation	4,20,000 – 20,000 2,00,000 hrs (20,000 x10)	2.00
Repair	10,000/2,00,000	0.05
Power	5unit x1Re	5.00
Machine hour rate		9.05

24. From the following information, compute machine hour rate :
Cost of machine – Rs. 90,000
Cost of installation – Rs. 10,000
Effective working life – 10 years Working hours – 2000 hours per annum
Repair expenses – 50% of depreciation
Power consumption – 10 units perhour @ 10 paise per unit
Lubricating oil – Rs. 2 per day of 8 hours
Consumable stores – Rs. 10 per day of 8 hours
Wages of operator – Rs. 4 per day of 8 hours

Particulars	Amount	Amount
Standing charges: Lubricant oil	2/8	0.25
Consumable stores	10/8	1.25
Machine Expenses: Depreciation	1,00,000 – Nil 20,000 hrs (2,000 x10)	5.00
Repair	5x50/100	2.50
Power	10x0.10	1.00
Machine hour rate		10.00

The following annual charges are incurred in respect of a machine in a shop where no manual labour and work done by 5 machines of same type.
(a) Rent and rates (proportional to floor space occupied) for shop 4,800
(b) Depreciation on each machine 500
(c) Repairs and maintenance for 5 machines 1,000
(d) Power (as per meter) at 5p per unit for shop 3,000
(e) Electric charges for light in shop 540
(f) Attendants: 2 for 5 machines and each paid Rs. 60 per month.
(g) For the 5 machines, there is 1 supervisor paid at Rs. 250 p.m
(h) Sundry supplies - lubricants, jute etc for the shop 450
(i) Hire purchase instalment payable for machine (including Rs. 300 as interest) 1,200 The machine uses 10 units of power per hour. Calculate machine hour rate.