PAPER – 8

COST ACCOUNTING (CA)

CMA INTERMEDIATE

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What Our Students have to Say....

Aman Mahajan (CA AIR 19)

I really liked your classes, especially the practical linkages explained with amazing graphics. The full subject test serieshelped a lot in improving my writing speed and presentation skills.

Sundar Sri Renganathan B (AIR 33)

I took Accounting from IndigoLearn and the classes were really good. They emphasized on conceptual clarity over getting things done quickly, which is really vital to score good marks in practical papers. Other resources like Notes, Quizzes and Forum was beneficial too.

Dwarakesh

Thank you IndigoLearn team for the guidance and support throughout the past few months. I had great conceptual clarity in all the subjects and the revision classes by Suraj Sir were very helpful. Study planner and Free resources were very useful. Thank you Team IndigoLearn.

Yug Manoj Kumar Bhattad

I have cleared my CA Foundation examination with the total of 286. And this was not possible without the efforts and support of IndigoLearn. The way of teaching with utmost conceptual clarity is the best thing at Indigolearn.

Prakash Bhatt

Superb, one stop solution for All CA and Accountancy students they serve real Education at very very reasonable price

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Good experience, unlimited views helped a lot in last one month preparation. Looking forward for

Bhagyasree Chougule

It was only because of Indigolearn that my concepts became very clear, and I was able to crack the exam. I wasn't 100% prepared I needed more practice but luckily I got through. I'm definitely choosing IndigoLearn for group 2 preparation. A big thanks!

Mohd Thayyab

Theoretical subjects made easier through story based examples and charts. Concept clarity 100%. Fully exam+practical oriented classes will help not only to retain the concepts during exams but for the longer duration.

Lalit Chetan Sanpal

Indigolearn has been fantastic and brilliant. Helped me alot in my preparations. I cleared both the groups in first attempt with your brilliant classes and notes. Thanks to all the faculties, coordinators, forum admins and everyone at Indigolearn. Really grateful. Will go for CA Finals at Indigolearn For sure. Thank you so much Indigolearn.

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Abishek M

I'd like to thank IndigoLearn for all the support they've provided me with. Modules were great. They were time saving and straight to the point. I extensively used the materials provided before exams, they were so helpful. Also I'd appreciate them for providing unlimited views as I kept looking into the maths modules till the end.

Munnur Nandini Sree

Accounting classes I have taken from IndigoLearn. Now I feel that it's a great choice that I have made (after seeing my result) because only in Accounting I got exemption. Thank you IndigoLearn.

Harshita G

Thank u so much IndigoLearn for your guidance. This is only possible because of u people.... For my finals also my journey will continue with IndigoLearn.

Bharathsha PS

I purchased Economics, IT, FM, EIS and Audit from Indigolearn. All your classes are superb and anyone can easily crack the CA exams. What makes u special is your classes help us to understand the concepts very well.Special thanks to the FM faculty, I studied only 2 chapters in economics,and still managed to score excemption in the 8th paper.

Nayi Mihir kumar

This platform is very helpful in all activity like mcq practise, notes, teaching activities, revisions and the forum interaction with all students which I like the most. If anybody want to clear their exams in first attempt then IndigoLearn is the best platform for them. My all regards to IndigoLearn. Thank you so much.

Rajalaxmi
CA Inter

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Priyanka Udeshi

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Naveen Kumar T

It been a great journey with indigo learn team. Thanks to all the facilities and forum friends who support me a lot.

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INTRODUCTION TO COST AND MANAGEMENT ACCOUNTING

OVERVIEW

- ***Meaning and Objective of Cost Accounting***
- ***Importance of Cost Accounting***
- ***Elements of Cost Accounting***
- ***Scope of cost Accounting***
- ***Difference between Cost Accounting and Financial accounting and Management Accounting***
- ***Methods to separate Variable, Semi variable and Fixed costs.***
- ***What is Cost control and Cost reduction?***
- ***Methods and Techniques of Cost Accounting***
- ***Essentials of Good Cost Accounting system***
- ***Installation of Coding Systems***

INTRODUCTON

Financial accounting is mostly concerned to record the business transactions in books of accounts so that final accounts can be prepared. Cost accounting developed to help the internal management in decision making. The Information provided by Cost Accounting acts as a managerial tool so that business can utilize the available resources at optimum level. Management Accounting is an extension of management aspects of Cost Accounting. It provides the information to management so that planning, organizing, directing, and controlling of business operations can be done in an orderly manner. Therefore, the objective of the lesson is to enable the student to understand the meaning and purpose of cost and management accounting and its application in different manufacturing and service environment.

1. Meaning of Cost, Costing, Cost Accounting, Cost Management and Cost Accountancy

A. Cost

- In business and accounting, cost is the monetary value which a company has spent to produce something.
- Cost indicates the amount of money which a company spends on the creation or production of goods or services. It does not include the profit markup.

Cost v/s Value v/s Price

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BASIS	COST	VALUE	PRICE
Meaning	Expenditure incurred in producing a product or rendering a service	Relative worth of a commodity to an individual at a particular point of time	Amount paid by a consumer for a product or service
Viewpoint	Producer	User	Consumer
Inference	It is a fact	It is an opinion	It is a policy

B. Costing

- The Institute of Cost and Management Accountants (ICMA) defines costing as "the techniques and process of ascertaining costs ".

C. Cost Accounting

> *According to definition given by CIMA, London "Cost Accounting is the process of accounting for cost from the point at which expenditure is incurred to the establishment of its ultimate relationship with cost centres and cost units".*

- It includes the presentation of information derived there from for the managerial decision-making purpose.
- It is that branch of accounting which deals with the classification, recording, summarization, allocation, and reporting of current and prospective costs.

D. Cost Management

- To provide less expensive products or services to consumers cost management is done to reduce operating or production expenses.
- It is the process management uses to analyse its production and streamline its operations to manage expenses in the future by keeping the cost low.
- It is very much essential for a company to employ proper cost management, or else it will have difficulty consistently generating a profit.

1.1 Cost Unit

- It is a unit of product, service, or time (or combination of these) in relation to which costs may be ascertained or expressed.
- Cost units are usually the units of physical measurement like number, weight, area, volume, length, time, and value.

Product / Service	Cost Unit	Product / Service	Cost Unit

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Soaps	Number / Carton	Brickworks	Per 1000 brick
Wire / Cable	Meter / Kilometer	Building	Square foot
Dairy (Milk)	Liter / Bag	Cement	Ton
Goods transport	Ton kilometer	Power	Kilowatt hour
Passenger	Passenger Kilometer	Paper	Rim
transport	Cubic Feet (cft)	Textiles	Meters
Wood / Gas	Kg. / Quintal / Ton	Road contractors	Per mile / kilometer
Food grains	Per Ton	Bicycle	Number
Sugar	Per patient day	Pharmaceuticals	1000 tablets
Hospital	Per vehicle / Number	Steel	Ton
Automobile			

The following are examples in certain cases:

Brick Industries	Cost Unit per 1000 bricks.
Coal Mines	Cost Unit per quintal.
Cotton Mills	Cost Unit per meter.
Electric Company	Cost Unit per unit.
Transport Companies	Cost Unit per kilometre.
Steel Companies	Cost Unit per ton.
Water Supply	Cost Unit per 1000 litres
Furniture Industries	Cost Unit per number
Oil Companies	Cost Unit per litre.
Soap Factory	Cost Unit per dozen, per, kilogram or per tablet.

1.2 Cost Centres

- It is defined as a location, person, or an item of equipment (or group of these) for which cost may be ascertained and used for the purpose of Cost Control.
- Cost Centres are of two types,
    - **Personal Cost Centre:** It consists of a person or group of persons e.g., Mr. X, supervisor, foreman, accountant, engineer, process staffs, mining staffs, doctors etc.
    - **Impersonal Cost Centre**: It consists of a location or an item of equipment (or group of these) e.g., Ludhiana branch, boiler house, cooling tower, weighing machine, canteen, and generator set etc.
- **Cost Centers in a manufacturing concern:**

Two main types of Cost Centres are indicated as below:

- **Production Cost Centre:** It is a cost Centre where raw material is handled for conversion into finished product. Here both direct and indirect expenses are incurred. Machine shops, welding shops and assembly shops etc. are examples of production Cost Centres.
- **Service Cost Centre:** It is a cost Centre which serves as an ancillary unit to a production cost Centre. Payroll processing department, HRD, Powerhouse, gas production shop, material service Centres, plant maintenance Centres etc. are examples of service cost Centres.

- **Profit Centres and investment Centres**
    - A profit Centre is a Centre where the manager has the responsibility of generating and maximizing profits. In such Centres, the manager is responsible for revenue and cost.
    - Investment Centres are those Centres which are concerned with earning an adequate ROI. In such Centres, the manager is responsible for investment, revenue, and cost.

Types of Responsibility Centres:

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Particulars	Cost Centers	Revenue Centers	Profit Centers	Investment Centers
Meaning	A Center for which a standard amount of cost is pre-determined and used for control.	A Center devoted to raising revenue (no responsibility for production).	A Center whose performance is measured in terms of income earned and cost incurred (profit earning).	A Center responsible for earning profits and for asset utilization.
Primary responsibility	Cost reduction and cost control	Generation of sale revenue.	Profit earning.	Earning return on investments.
Performance evaluation	Standard cost *Less:* Actual cost	Budgeted revenue *Less*: Actual revenue	Budgeted profits *Less:* Actual profits	Budgeted ROI *Less:* Actual ROI
Other points	Control of cost is subject to – Time Location Product	Also responsible for some expenses related with marketing of products.	It may mean that one division sells its output to another division within the organization – i.e., inter-divisional transfer pricing.	Value of Investment in this responsibility Center needs to be carefully defined and return on investment to be defined as before tax or after tax, before interest or after interest etc.

1.3 Cost Object

A cost object is any item for which costs are being separately measured. It is one of the key concepts used in managing the costs of a business concern. Here are some types of cost objects.

- **Output:** The Company's products and services are the most common cost objects since it wants to know its output cost for analysis of profitability and price setting.
- **Operational:** Most of the times a cost object can be within a company, for example a department, machining operations, production line, or process. For example, you could be able to track the cost of designing a new product, or a customer service call, or of reworking a returned product.
- **Business relationship:** A cost object can be outside of a company - there may raise a need to accumulate costs for a customer or supplier, to determine the cost of dealing with that of the entity. Another variation we can say on the concept is the cost of renewing a license with a government agency.

Examples of Cost Object are:

• **Product**	Smart phone, Tablet computer, SUV car, Book etc
• **Services**	An Airline flight from Delhi to Mumbai, Concurrent Audit assignment, Utility bill payment facility etc.

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• **Project**	Metro Rail project of DMRC, Road Projects of NHAI etc.
• **Activity**	Quality inspection of materials, Placing of orders etc.
• **Process**	Refinement of crudes in oil refineries, melting of billets or ingots in rolling mills etc.
• **Department**	Production department, Finance & Accounts, Safety etc.

1.4 COST ACCOUNTING WITH THE USE OF INFORMATION TECHNOLOGY (IT)

With the expansion of e-commerce and increasing competitive business environment, information technology is becoming an integral part of each activity in an organisation including Cost and Management Accounting. Information technology has changed the Cost and Management Accounting functions dramatically with the introduction of Enterprise Resource Planning (ERP) system. Cost Accounting and Management Information System has become automated and improved. The new industrial revolution in the form of digital innovation which is popularly known as Industry 4.0, has more emphasis on digitisation and automation of business process to have a better control over cost to maintain market competitiveness. Cost Accounting System has seen lots of savings in terms of time, money and efforts. The impact of IT in Cost Accounting may include the following:

(i) After the introduction of ERPs, different functional activities get integrated and as a consequence, a single entry into the accounting system provides custom made reports for every purpose and saves an organisation from preparing different sets of documents. Reconciliation process of results of both cost and financial accounting systems becomes simpler and less cumbersome.

(ii) A move towards paperless environment can be seen where documents like Bill of Material, Material Requisition Note, Goods Received Note, labour utilisation report etc. are no longer required to be prepared in multiple copies, the related department can get e-copy from the system.

(iii) Information Technology with the help of internet (including intranet and extranet) are helping in resource procurement and mobilisation. For example, production department can get materials from the stores without issuing material requisition note physically. Similarly, purchase orders can be initiated to the suppliers with the help of extranet. This enables an entity to shift towards Just-in-Time (JIT) approach of inventory management and production.

(iv) Cost information for a cost centre or cost object is ascertained with accuracy in timely manner. Each cost centre a cost object is codified and all related costs are assigned to the cost objects or cost centres using assigned codes. This automates the cost accumulation and ascertainment process. The cost information can be customised as per the requirement. For example, when an entity manufactures or provides services, managers are able to receive information job-wise, batch-wise, process-wise, cost centre wise etc.

(v) Uniformity in preparation of report, budgets and standards can be achieved with the help of IT. ERP software plays an important role in bringing uniformity irrespective of location, currency, language and regulations.

(vi) Cost and revenue variance reports are generated in real time basis which enables the management to take control measures immediately.

(vii) IT enables an entity to monitor and analyse each process of manufacturing or service activity closely to eliminate non value-added activities.

The above are examples of few areas where Cost Accounting is done with the help of IT.

Digital Costing System

Like the conventional cost accounting system, Digital costing system too collects data, classify the data, account the data to get and process information to make decisions, but the difference is the method of collection,

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medium of storage, forms of analysis and reporting. Digital costing system links different business functions such as production, procurement, inventory management with the digital costing system of its suppliers, customers and the market through data sharing and network interaction.

Digital Costing System provides data to get the following information:

(i) Cost incurred on a cost object.

(ii) Data on time spent.

(iii) Data on resource consumption.

(iv) Data on current market price of final product and raw materials.

(v) Data on lead time and availability of materials.

(vi) Data on product demand and trend.

Benefits of Digital Costing System

With the help of Artificial Intelligence (AI) and Machine learnings (ML) which helps in analysis of the Big data and apprehend the consumption and demand pattern, the following benefits can be achieved:

(i) Ascertainment of cost with certainty on a cost object (the cost object is discussed in later paragraph). This helps to analyse the activities for cost allocation and apportionment.

(ii) Analysis of data on time spent on each activity to study and formulate incentive plans.

(iii) Helps in material requirement planning and scheduling the material procurement. Data on resource consumption can be analysed for resource optimisation and finding the possibilities for zero wastage and Just-in Time (JIT).

(iv) Helps to identify and eliminate the non-value-added activities.

(v) Data on resource consumption is helpful in setting the standards and measurement of variances on real time basis.

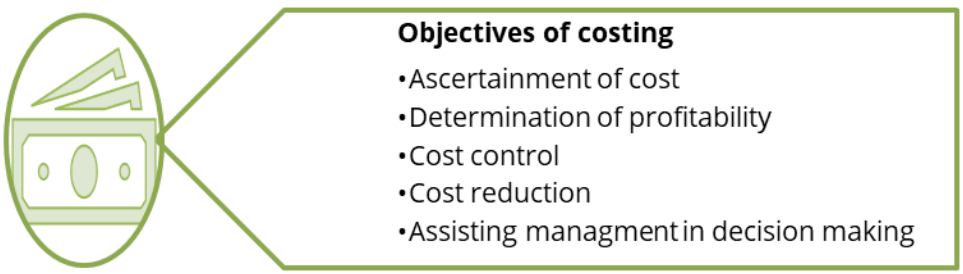
(vi) Data on current market prices of material and consumables helps to

estimate cost and setting standards on Marked to Market (M2M) basis.

(vii) Extrapolation of data on customer behaviour towards the products to predict the market demand. It is helpful is preparation of budgets and planning of production.

(viii) A better analysis of cost behaviour improves the cost benefit analysis and equipping the management in informed decision making.

2. Objectives of Cost Accounting



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- The main objective of the cost accounting is the ascertainment and accumulation of cost. Cost is accumulated, assigned, and ascertained for each individual cost object.
- The profit of any activity can be ascertained by matching cost with the revenue of that activity. The purpose under this step is to determine costing profit or loss of any activity on an objective basis.
- **Cost reduction** may be defined "as the achievement of real and permanent reduction in the unit cost of goods manufactured or services rendered without impairing their suitability for the use intended or diminution in the quality of the product."
- **Cost control**: Determine clearly the objective Measure the actual performance, investigate into the causes of failure and Institute corrective action should be observed to exercise cost control.
- The target cost and/ or targets of performance should be laid down in respect of each department or operation and these targets should be related to individuals who, by their action, control the actual and bring them into line with the targets.
- **Decision making** is defined as a process of selecting a course of action out of two or more alternative courses.

3. Scope of Cost Accounting

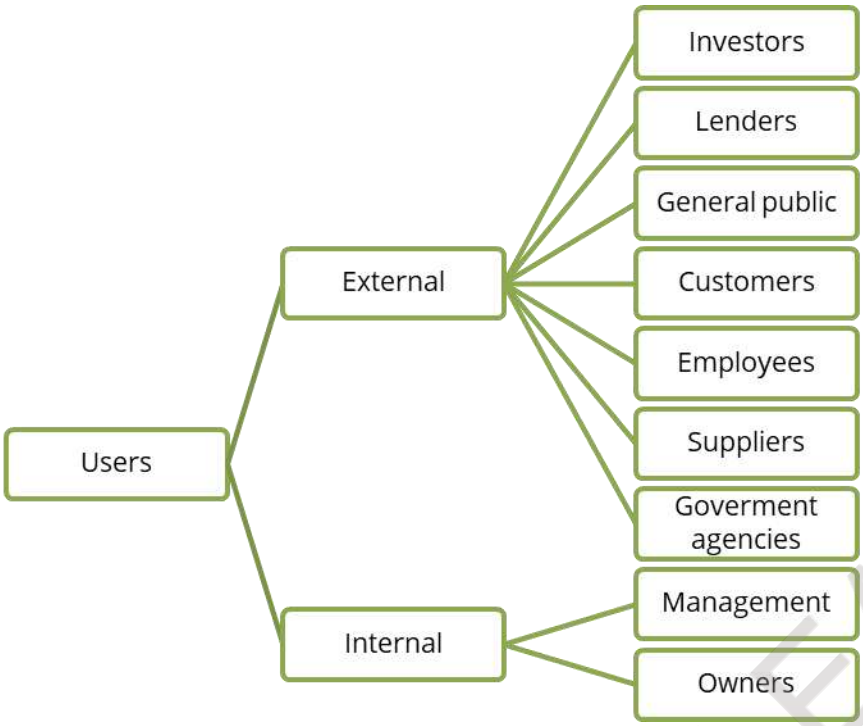
- **Cost Analysis**: Cost accounting determines the deviation of the actual cost by comparing it to the planned expense, and accordingly fixation of responsibility for cost differences.
- **Cost Audit**: cost audit is necessary to verify the cost sheets and to check whether efficient application of cost accounting principles in the industries, cost audits are done.
- **Cost Report**: Cost reports are prepared from the data which we have acquired through cost accounting to be analysed by the management for strategic decision making.
- **Cost Ascertainment**: To ascertain the price of a product or service, it is necessary to know the actual total cost involved in the generation of that product or service.
- **Cost Bookkeeping:** we prepare journal entries, ledger, balance sheet and profit and loss account in financial accounting. The same is prepared in cost accounting too. Here, the different cost incurred is debited, and product or service income is credited.
- **Cost System:** It provides for time-to-time monitoring and evaluation of the cost incurred in the production of goods and services for the generation cost reports for the management.
- **Cost Comparison:** It examines the other alternative product line or activities and the cost involved in it, to seek a better opportunity for generating high revenue.
- **Cost Control:** Sometimes, the actual cost of a product or service will be higher than its standard cost. To control the actual cost and eliminate the difference, cost accounting is required.
- **Cost Computation:** When the company is engaged in the production of bulk units of a particular product or commodity, the actual per-unit cost is derived through cost accounting.
- **Cost Reduction:** It acts as a tool in the management's hands to find out whether there is any scope to reduce the standard cost involved in the production of goods and services. Purpose of it is to obtain additional gain.



4. Users of Cost and Management Accounting

Accounting information of a business enterprise is used by many stakeholders. We can broadly divide the users of accounting information into two groups – internal users and external users.

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Internal users: Internal users use a mix of financial accounting and management information. Some of the internal users of accounting information and their basic needs are discussed below shortly:

A. Management:

- Accounting information are used by the management for evaluation and analyzation organization's financial performance and position, to take important decisions and appropriate actions for the improvement of the business performance in terms of profitability, financial position, and cash flows.

B. Owners

- Capital is invested by the owners to start and run business with the primary objective of earning profit.
- They need accurate financial information to know what they have earned or lost during a particular period.

External users: External users only use financial accounting information normally. Some of the external users of the accounting information and their needs are discussed below shortly:

C. Investors

- In corporate form of business, the management is often separated from the ownership.
- Normally capital is provided by the investors and the business operated by the management. The accounting information is used by both actual and potential investors.
- Actual investors use this information to know how their funds are used by the management and what is the performance of business we can expect in future in terms of profitability and growth.

D. Lenders

- Lenders are individuals or financial institutions which normally lend money to businesses and earn income by way of interest on it.
- Lenders need accounting information to assess the financial performance and position and they need accounting information to have a reasonable assurance that the business to whom they are going to lend money would be able to return the principal amount as well as the interest there on.

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E. Suppliers

- Suppliers are business individuals or organizations who sell merchandise or raw materials to other businesses on credit normally.
- Accounting information are used by them to have an idea about creditworthiness of the business in future and to decide whether to continue providing goods on credit.

F. Government agencies

- Government agencies generally use business's financial information for the purpose of imposing taxes and regulations.

G. General public

- Accounting information of business organizations are used by public also. For example, accounting information acts as:
- A good source of education for students of accounting and finance.
- A source of valuable data for those people researching on organizational impacts on individuals and economy.

H. Customers

- Customers are aware of current position of a business organization through the accounting information, and it helps to make a judgment about its future.
- Customers can be classified into three groups – manufactures or producers at various stages of production, wholesalers and retailers and end users or final consumers.

I. Employees

- External users (of accounting information) are those who do not have a hand in core management of the business.
- Those users are interested in financial information because their present and future is tied up with the success or failure of the business.
- Job security, better remuneration, job promotion and retirement benefits are ensured by the success and profitability of business.

5. Difference between Cost Control and Cost Reduction

Basis of Comparison	Cost Control	Cost Reduction
Meaning	A Technique used for maintaining the cost as per the set standards is known as Cost Control.	A Technique used to economize the unit cost without lowering the quality of the product is known as Cost Reduction.
Savings in	Total Cost	Cost per unit
Retention of Quality	Not guaranteed	Guaranteed
Nature	Temporary	Permanent
Emphasis on	Past and Present cost	Present and Future Cost
Ends when	The pre-determined target is achieved	No end
Type of Function	Preventive	Corrective

6.

Difference between Cost Accounting and Financial Accounting

Sr. No.	Particulars	Cost Accounting	Financial Accounting

1.	**Meaning**	It is the application of costing and cost accounting principles, methods & techniques to the science, art and practice of cost control and the ascertainment of profitability. It includes the presentation of information derived there from for the purpose of managerial decision making.	It is the art of recording, classifying, and summarizing in a significant manner and in terms of money, transactions and events which are, in part at least of a financial character and interpreting the results thereof.
2.	**Details Provided**	It provides financial analysis of the business affairs product wise, service wise, element wise, or activity wise.	It gives financial picture and the situation of a business in totality.
3.	**Users of Information**	It renders information for the guidance of management, proper planning, operation control and decision making.	It safeguards the interests of the business, its properties and other concerned like creditors, shareholders, tax authorities.
4.	**Main Objective**	The main object is to ascertain the correct cost of production / Services.	The main object is to ascertain correct profit / loss position and to give a true and fair view of the state of affair of business.
5.	**Time Period**	It is future oriented activity.	It is a post – mortem activity.
6.	**Usefulness**	It forms the basis for managerial decision making like make or buy, continue or shutdown, product mix, etc.	It forms the basis for fulfilling the legal requirements like Income-tax Act, Companies Act, Excise & Customs Act, etc.
7.	**Final Output**	The final output is in the form of a Cost-Sheet.	The final output is in the form of Profit and Loss A/c and Balance Sheet.
8.	**Objective**	Profit Maximization is the objective.	Profit / Loss Ascertainment is the objective.
9.	**Stock Valuation**	Stocks are valued generally at cost.	Stocks are valued at Cost or Net Realizable Value whichever is less.
10.	**Nature of costs**	It considers both historical costs and pre-determined costs and extends to plans and policies to improve future performance.	Generally historical costs are used for recording purposes. Projected financial statements may also be drawn for budgeting purposes.

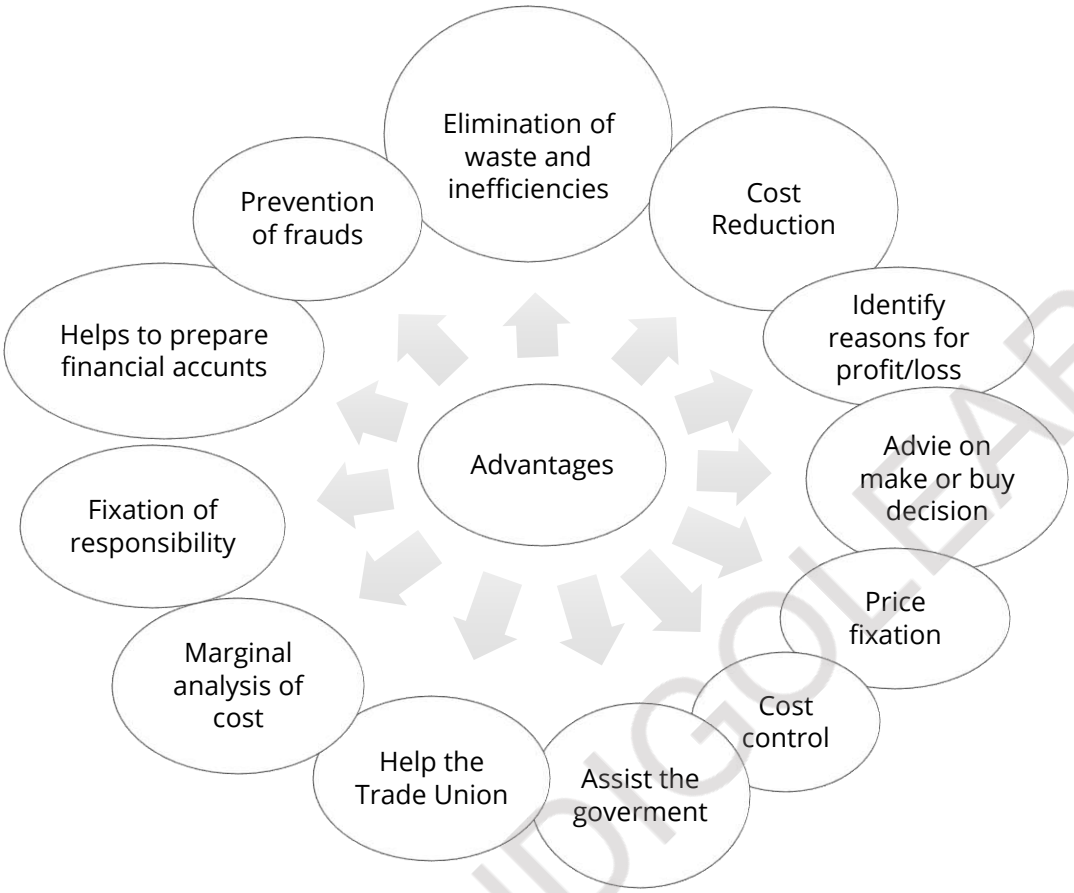
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Difference between Cost Accounting and Management Accounting

Basis	**Cost Accounting**	**Management accounting**
Nature	Records the quantitative aspect only.	Records both qualitative and quantitative aspect
Objective	Records the cost of producing a product and providing a service.	Provides information to management for planning and coordination.
Area	Deals with cost ascertainment only.	wider in scope as it includes financial accounting, budgeting, taxation, planning etc.
Recording of data	uses both past and present figures	Focused with the projection of figures for future.
Development	Related to industrial revolution.	Developed in accordance with the need of modern business world.
Rules and regulation	Follows certain principles and procedures for recording costs of different products.	does not follow any specific rules and regulations

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8. Advantages of Cost Accounting



The extent of advantages derived from the cost accounting is based on the type, adequacy, and efficiency of cost accounting system installation. Moreover, the management at the maximum should accept the advice given by the cost accounting system. If so, the following advantages may be available to an organization.

- **Elimination of Wastes, Losses, and Inefficiencies:** A good cost accounting system eliminates wastes, losses, and inefficiencies by fixing standard for everything.
- **Cost Reduction:** Under cost accounting system, new and improved methods of production are followed which leads to cost reduction.
- **Identify the reasons for Profit or Loss:** The reasons for increasing or decreasing profit will be identified by the good cost accounting system. If identified, then the management can take remedial action to maintain the concern's profitability. There is no possibility of shutting down of any product or process or department.
- **Advises on Make or Buy Decision:** The management can decide whether to make or buy a product in open market based on cost information. The management can be able to choose the best out of many alternatives rightly. Sometimes, even spare capacity can be used profitably.
- **Price Fixation:** Costing records provides the total cost of a product available which is highly useful for price fixation of a product.
- **Cost Control:** Under cost accounting system, Budgets are prepared, and standards are fixed. The expenses are not allowed to go beyond the budgeted amount. The actual performance is compared with standard to find the variation. If any variations are found, reasons will be found out and the management can exercise control.
- **Assist the Government:** Government can collect reasonable tax from the company and exercise price control.

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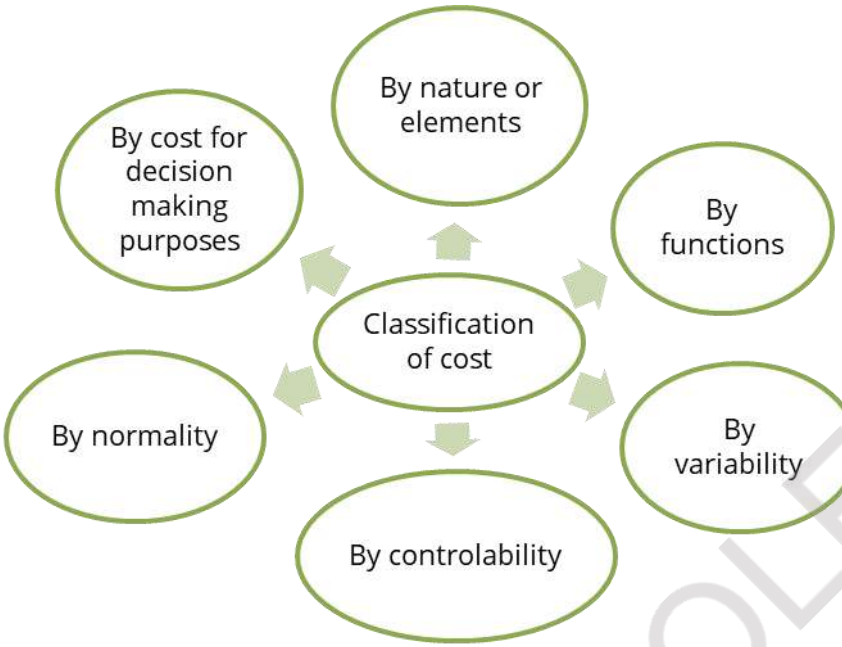
9. Limitations of Cost Accounting



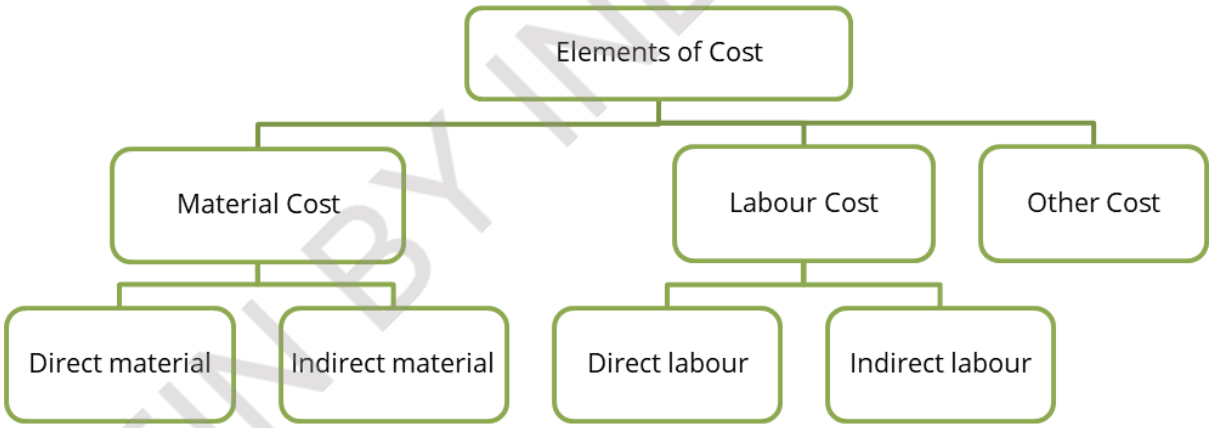
- **Lack of Uniformity:** Cost Accounting has a lack of a uniform procedure. Different results from the same data can be brought out. So, it means that Costing system itself does not control costs, but its usage does.
- **Costly**: It is expensive because analysis, allocation and absorption of overheads require considerable amount of additional work, and hence additional money.
- **Ignores Futuristic Situation:** Cost Accounting ignores the future situation of the product cost. It only records past cost records on the other hand management is taking future decision. Therefore, cost data are not very useful.
- **Uses Secondary Data:** Cost Accounting uses secondary data from financial statements for various calculations like standard cost. It does not include primary data or short-term data. That is why cost accounting does not provide effective results.
- **Only Bring out the Cost of Goods:** It is unable to find the financial status of the company in the cost accounting. It cannot determine the operational efficiency of a business and it can ascertain only the cost of goods. For assessment of the financial position, we must depend upon the financial accounting.
- **Unable to Determine Tax Liability:** Tax liability of the company cannot be found out in the cost accounting. So, it cannot be treated as a basis for calculating it. Therefore, financial accounting will be needed for finding out the tax liability.

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10. Classification of cost



10.1By Nature or Elements



A. Direct Material:

- Direct materials are the materials from which a product is produced or manufactured.
- The cost of direct material will vary according to the level of output derived.
- For example: Milk is the direct material of butter.

B. Indirect Material:

- Materials which do not normally form part of the finished product (cost object) are known as indirect materials.
- For example: Nails are used in furniture.
- The cost of indirect material will not vary according to the level of output derived.

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C. Direct Labour:

- It refers to the amount paid to the workers who are directly engaged in the production of goods.
- Cost object is called direct labour.

D. Indirect Labour:

- Indirect labour is the amount paid to the workers who are engaged in the production of goods indirectly.
- It does not vary directly with the output.

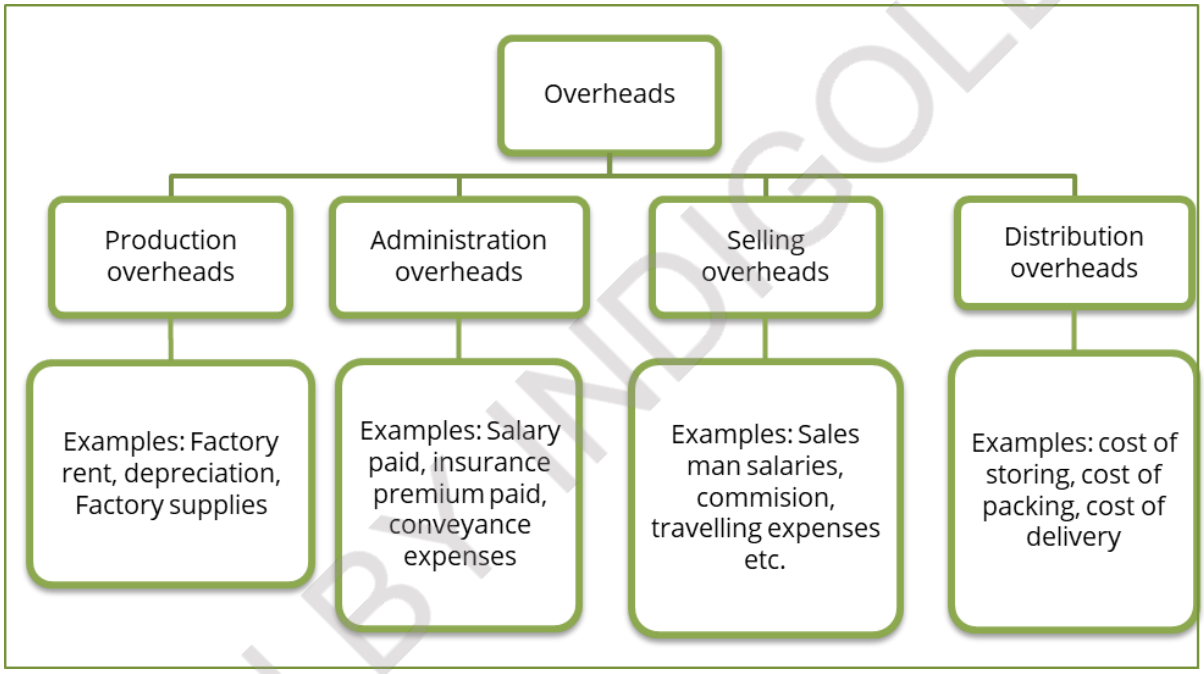
E. Direct expenses:

- It includes all expenses other than direct material or direct labour.
- Which are specially incurred for a particular cost object and can be identified in an economically feasible way.
- For example, hire charges for some special machinery, cost of defective work.

F. Indirect expenses:

- Expenses other than direct expenses are known as indirect expenses.
- Factory rent and rates, insurance of plant and machinery, power, light, heating, repairing, telephone etc., are some examples of indirect expenses.

G. Overheads:



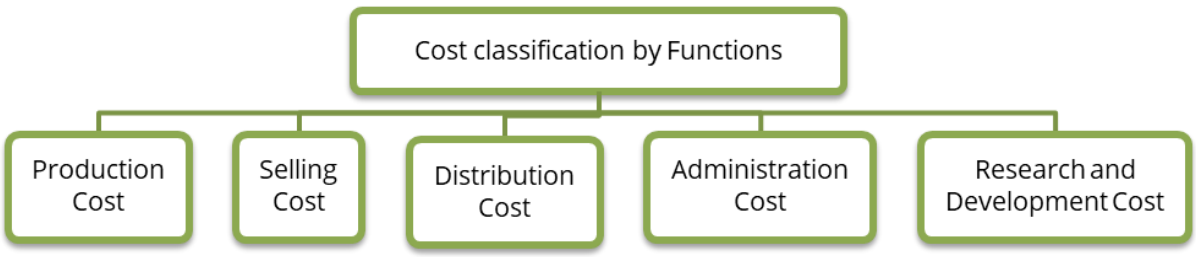
It is the aggregate of indirect material costs, indirect labour costs and indirect expenses.

- **Production Overheads:** It is otherwise known as manufacturing overhead, works overhead or factory overhead. All the indirect expenses, which are incurred in the factory and for the running of the factory, are treated as production overhead.
- **Administration Overheads:** The term administration refers to the formulation of policy, direction, and management of affairs. Indirect expenses related to management and administration of business come under administration overheads.
- **Selling Overhead:** The selling overhead refers to the cost of selling expenses i.e., indirect expenses incurred for marketing of a commodity E.g.: Advertisement expenses, commission to salespersons etc.
- **Distribution Overhead:** Indirect expenses incurred in dispatch of the goods are termed as distribution overheads.

E.g.: warehouse charges, packing and loading charges.

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10.1 By Functions



A. Production Cost:

- Production cost comprises of all the direct and indirect costs incurred in the production of goods and services.

B. Administration Cost:

- Cost of formulating policy, controlling the organization, costs not directly related to production. Ex - Salary of Office Staff. These are also known as administrative overheads.

C. Selling Cost:

- The indirect costs incurred which is related to the sales function of the goods and services or Cost for creating demand of the product produced like an advertisement; promotion, research, customer service, etc. are the selling costs.

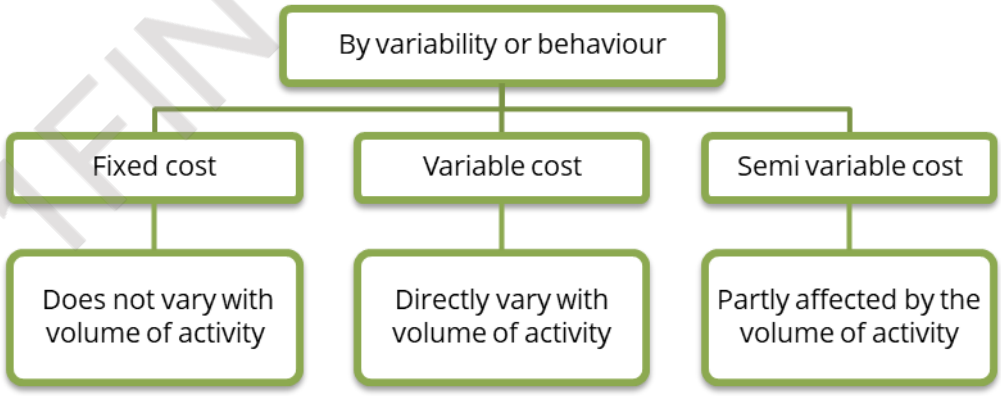
D. Distribution Cost:

- Costs starting from packing of the product till reconditioning of empty product. These are warehousing, delivery service, transportation, etc.

E. Research and Development Cost:

- Research is essential to develop a new product or modify an existing one. The cost relating to the research team, research implementation, findings, etc. comes under the research and development cost.

10.2 By Variability or Behaviour



A. Fixed Cost:

- Cost which does not vary with the change in the volume of activity in the short run is called fixed cost.
- These costs are not affected by temporary changes in activity of a business concern.

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- These are also known as period costs.
- Ex: Rent, Insurance of factory building etc.

B. Variable Cost

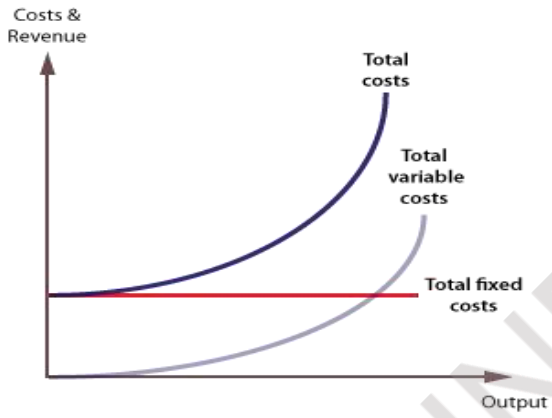
- Variable cost is the cost which directly varies with the volume of activity.
- Variable cost can be divided into – (a) Variable direct cost; and (b) Variable indirect costs.
- Variable indirect costs are known as variable overhead.
- Any increase in the activity results in increase in the Variable cost and vice versa. For example, cost of Direct Labour etc

C. Semi Variable Costs:

- Semi variable cost contains both fixed and variable cost.
- They are partially affected by changes in the level of activity.
- For example, telephone bills, gas, and electricity etc.

Methods of segregating Semi variable cost into fixed cost and variable cost

Segregation of Semi – variable cost in fixed cost and variable cost can be carried out by using following methods.



1. Graphic method

- Under this method, output in various levels and the semi-variable overhead of corresponding levels are considered.
- A scatter graph can be drawn with the help of these data. X-axis is taken as output and Y-axis is taken as semi-variable overhead in total.
- The costs at a various level of output are plotted on a graph.
- Then, a straight line should be drawn between the plotted points.
- Line of best fit touches the ordinate at one point. It indicates the fixed component of the total cost.
- The slope of the line indicates the degree of variability of costs.

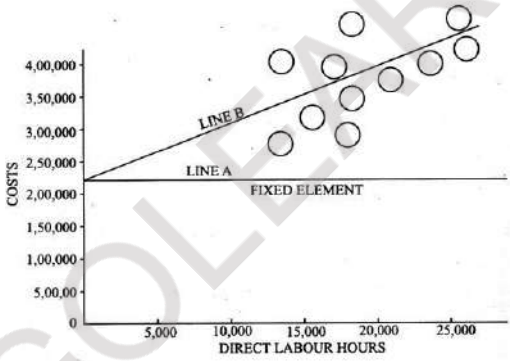
Following example illustrates the graphic method.

Month	Direct labour hrs	Cost (Rs)
January	17000	320000
February	15000	310000
March	17000	310000
April	19500	295000
May	21000	250000
June	16000	265000
July	13000	250000

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August	13000	250000
September	15500	265000
October	17500	275000
November	21500	290000
December	24000	340000
	210000	**3420000**

- Plot each of the observation on the graph paper
- Fit the regression line or trend line to the data.
- Plot line B by visual inspection
- Draw a line parallel to the base line from the point of intersection on the y axis which will be at Rs.220000.
- Line A represents fixed portion of the expenses.
- Triangle formed by the line A and B shows the increase in the expenses.



Fixed expenses per month = RS 220000

Fixed expenses per year= 220000 *12 = Rs 2640000

Variable portion = Total expenses – Fixed portion

Variable portion = 3420000-2640000 = 780000

Variable cost per hour = Rs 780000/210000 = Rs 3.7 per Hour.

2. High points and low points method

- This method is also called as Range Method. Under this method, two levels of expenses are considered.
- One level of expenses is high, and another level of expenses is low. Besides, output of these level periods is considered.
- Find the difference in output and expenses.
- Variable element is the reason for the difference in expenses.
- Moreover, it is assumed that the fixed element of semi-variable overhead is expected to remain fixed for two levels of expenses.
- In this way, both fixed and variable overheads are found out.

Example 1

Months	**Output (units)**	**Semi variable overheads**
January	100	210
February	90	190
March	140	290
April	150	310
May	100	220
June	180	370

Calculate the amount of fixed, variable, and total semi variable expenses for the month.

Solution

Months	**Production**	**Total semi variable expenses (Rs)**	**Fixed (Rs)**	**Variable (Rs)**

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February	90	190	10	180
June	180	370	10	360
Difference	90	180	20	520

Variable element is Rs 2, i.e., 180/90
Variable overhead for February = (90*2.00) Rs 180 and fixed overhead is Rs 10 (190-180)
Variable overhead for June = (180*2.00) Rs 360 and fixed overhead is Rs 10 (370-360).

3. Analytical method

- Under this method, for each item of semi variable overhead degree of variability is found out in percentage.
- Percentage of his/her experience and past data is determined by the cost accountant.
- With the help of the percentage information semi variable overheads are segregated into fixed and variable components.

4. Level of activity method

- In this method, we compare two level of production with the amount of expenses in these levels. Variable cost can be calculated with the help of the following method.

Variable cost = Change in semi variable cost / Change in production volume

Take the Example 1 and find out the Fixed, Variable and Total Semi-Variable overheads

Solution

Taking figures of February and April

Months	Production	Total semi variable expenses (Rs)	Fixed (Rs)	Variable (Rs)
February	90	180	10	160
April	150	320	10	300
Difference	60	120	20	460

- Variable element is Rs 2 i.e., 60/120 = Rs 2
- Variable overhead for February = 80*2.00 = Rs 160 and fixed overhead is Rs 20(180-160)
- And variable overhead for April – 150*2.00 = Rs 300 and fixed overhead is Rs 20(320-300)
- Total semi variable expenses = Rs 20+Rs 460 = Rs480

5. Least square method

- This method is also known as Simple Linear Regression Analysis Method.
- Under this method, prevailing relationship between volume of production and expenses is identified.
- It is a statistical method in which we use least square method for calculating a line of best fit.
- The regression line is based on regression equation.
  The regression equation is given below.

  $$Y = a + bx$$

  Where,
  Y = total cost
  a = fixed cost
  b = variable cost
  x = number of units
- By solving this equation mathematically, we can calculate variable cost (B) at different level of production.

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Taking the figures of January and February from the previous example, we can compute the fixed Cost as:

Y = a + bx

January = 210=100b + a

February = 190= 90b + c

20 = 10b

Subtracting b = 20/10 = Rs 2

Putting the value in (1)

210 =2*100+a

a = 10

Fixed cost in Rs 10 per unit

10.3 By Controllability

Cost here may be classified into controllable and uncontrollable cost.

A. Controllable Overhead:

- Overheads, which can be controlled by management typically by a cost, profit, or investment Centre manager, are called controllable overhead.

B. Uncontrollable Overhead:

- Overheads, which cannot be, controlled whatever the steps management takes are called uncontrollable overhead.

10.4 By Normality



A. Normal Cost:

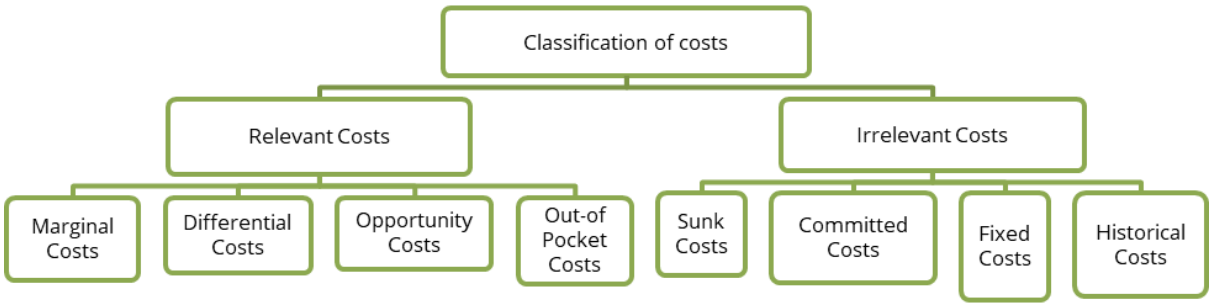
- The normal cost is normally incurred at a given level of output in the conditions in which that level of output is achieved.
- Normal cost includes those items of cost which occur in the normal situation of production process or in the normal environment of the business.

B. Abnormal Cost:

- It is an unusual cost whose occurrence is abnormal and irregular and due to some abnormal production situation.
- Abnormal cost arises due to idle time for some heavy break down or abnormal process loss.
- Therefore, they are not considered in the cost of production and directly charged to Profit and Loss Account.

10.5 By Cost for Managerial Decision Making

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A. Marginal Cost:

- The term 'marginal cost' is defined as the amount at any given volume of output by which aggregate costs are changed if the volume of output is increased or decreased by one unit.
- It is a variable cost of one unit of a product or a service i.e., a cost which can be avoided if the production of that unit is not made.

B. Differential Cost:

- It can also be known as 'incremental cost'.
- It is the difference in total cost which will arise from the selection of one alternative to the other.
- The increase or decrease in total cost or in specific elements of cost because of this decision will be known as incremental cost or decremental cost.

C. Opportunity Cost:

- It is also known as 'incremental cost'. It is the cost refers to the value of sacrifice made, or benefit of opportunity foregone in accepting an alternative course of action. It is an added cost of a change in the level of activity.
- It is the maximum amount that could be obtained at any specified time if a resource were sold or put to the most valuable alternative use that would be practicable.
- Opportunity cost can be defined as the benefit forgone from the next best alternative.
    - **Implicit costs are a specific type of opportunity cost:** The cost of resources which is already owned by the firm which could possibly have been put to some other use.
    - **Imputed Costs:** These costs are a notional cost which is also known as out-of-pocket cost and do not involve any cash outlay. Interest on capital, is an example of Imputed cost. These costs are similar to opportunity costs.

D. Estimated Cost:

- Kohler defines estimated cost as
- "The expected cost of manufacture, or acquisition, often in terms of a unit of product computed on the basis of information available in advance of actual production or purchase".
- Estimated costs are prospective costs since they refer to prediction of costs.

E. Sunk Cost:

- The expenditure which has taken place in the past is known as sunk cost. This cost is not affected by a particular decision under consideration.
- They play no role in decision making in the current period. This cannot change any decision in future.
- The sunk costs are those costs that have been invested in a project and which will not be recovered if the project is terminated.

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F. Committed Cost:

- Investment made by the business entity in the past and which cannot be recovered by any means is known as committed cost. And the business cannot get out of those obligations already made.
- The person concerned should be aware of which cost are committed cost and which is not, when reviewing company expenditure
- In committed cost there always be a long-term legal agreement associated with it
- If not, it is much easier to negotiate the termination of an expense.

G. Historical Cost:

- In the historical cost or historical costing concept the assets are valued on their purchase price or the money actually paid for the assets.
- The assets are to be reported on the balance sheet at historical cost according to the GAAP principle.
- Historical cost is the proven method for valuing assets, so it is preferred for the valuation of asset in the balance sheet.
- Historical cost values are standard; it does not change from time to time. So, the consistency concept is not violated.

H. Capitalized Costs:

- These are costs which are initially recorded as assets and subsequently treated as expenses.

I. Product Costs:

- These are the costs which are associated with the purchase and sale of goods (in the case of merchandise inventory).
- In the production scenario, such costs are associated with the acquisition and conversion of materials and all other manufacturing inputs into finished product for sale. Hence,
    - Under marginal costing -> variable manufacturing costs and
    - Under absorption costing -> total manufacturing costs (variable and fixed) constitute inventoriable or product costs.

J. Out-of-pocket Cost:

- It is that portion of total cost, which involves cash outflow.
- This cost concept is a short-run concept and is used in decisions relating to fixation of selling price in recession, make or buy, etc.
- Out–of–pocket costs can be avoided or saved if a particular proposal under consideration is not accepted.
- Explicit costs are out-of-pocket costs for a firm—for example, payments for wages and salaries, rent, or materials.

K. Pre-determined Cost:

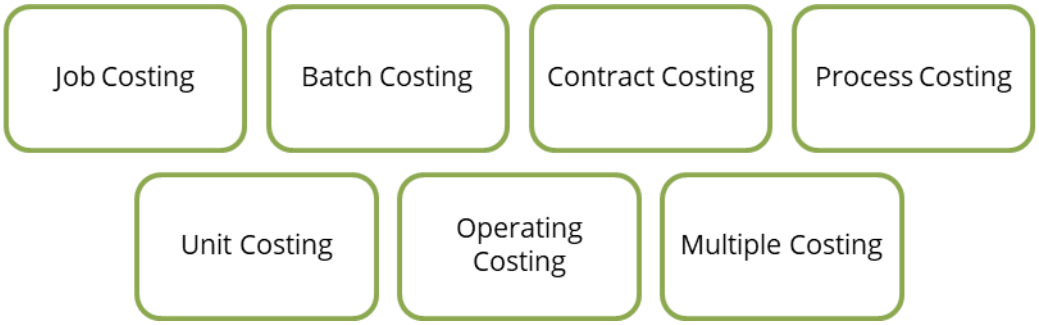
- A cost which is **computed in advance before production or operations start**, based on specification of all the factors affecting cost, is known as a pre-determined cost.

L. Standard Cost:

- A pre-determined cost, which is calculated from managements 'expected standard of efficient operation' and the relevant necessary expenditure.
- It may be used as a basis for price fixing and for cost control through variance analysis.

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11. Methods of Costing



Different industries follow different methods of costing because of the differences in the nature of their work. The various methods of costing are as follows:

A. Job Costing:

- It is otherwise called as specific order costing.
- Industries where there is no standard product and very job or work order is different from the others adopt job costing.
- The job is done according to the specifications given by the customer strictly and usually it takes only a short time for completion of the work.
- To ascertain the cost of each job separately is the ultimate purpose of job costing.

Job costing is used by printing presses, scooter servicing, motor repair shops, ship building, automobile garages, film studios, engineering industries etc.

B. Batch Costing:

- Batch costing is also a specific order costing, but it is the variation of job costing.
- There may be common products among the orders received from the different customers it divided among the batches and production order is issued to them, consisting of the pre-determined quantity of each type of product.
- By dividing the total cost of a batch by number of items produced in that batch cost per unit is ascertained.
- Batch costing sheet is prepared for that purpose.

Biscuit's manufacture, Garment's manufacture, Spare parts and Component manufacture, Pharmaceutical enterprises etc.

C. Contract Costing:

- Contract Costing is an accounting for a long-term contract work applicable on construction work usually.
- Contract costing is a big job. the work is not done inside the factory premises, it is usually done on the contractee's place or site.

Examples: building construction, bridge construction, road construction and other long-run engineering works which take long duration in completion, i.e., a year or more.

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D. Process Costing:

- This method is applied where different processes are involved in a sequence to manufacture a particular product.
- Cost for each such process is required to be calculated separately.

E.g., Sugar factories, paper industries, etc.

E. Operating Costing:

- Industries rendering services follow operating costing.
- Composite units like passenger kilometres and tone kilometres are used for ascertaining costs of services.
- For example, in the case of railways, operating costing indicates the cost of carrying a passenger per kilometre.

Operating costing is adopted by airways railways, road transport companies (goods as well as passengers) hotels, cinema halls, power houses etc.

F. Unit Costing:

- This method is also known as single or output costing.
- In the business concern whose production is continuous and units are identical, unit costing is applicable.
- The objective of this method is to ascertain the total cost as well as the cost per unit.

Unit costing is applicable in the case of mines, newspaper printing, scooter manufacturing, cement works, brick works and units manufacturing cycles, radios, washing machines etc.

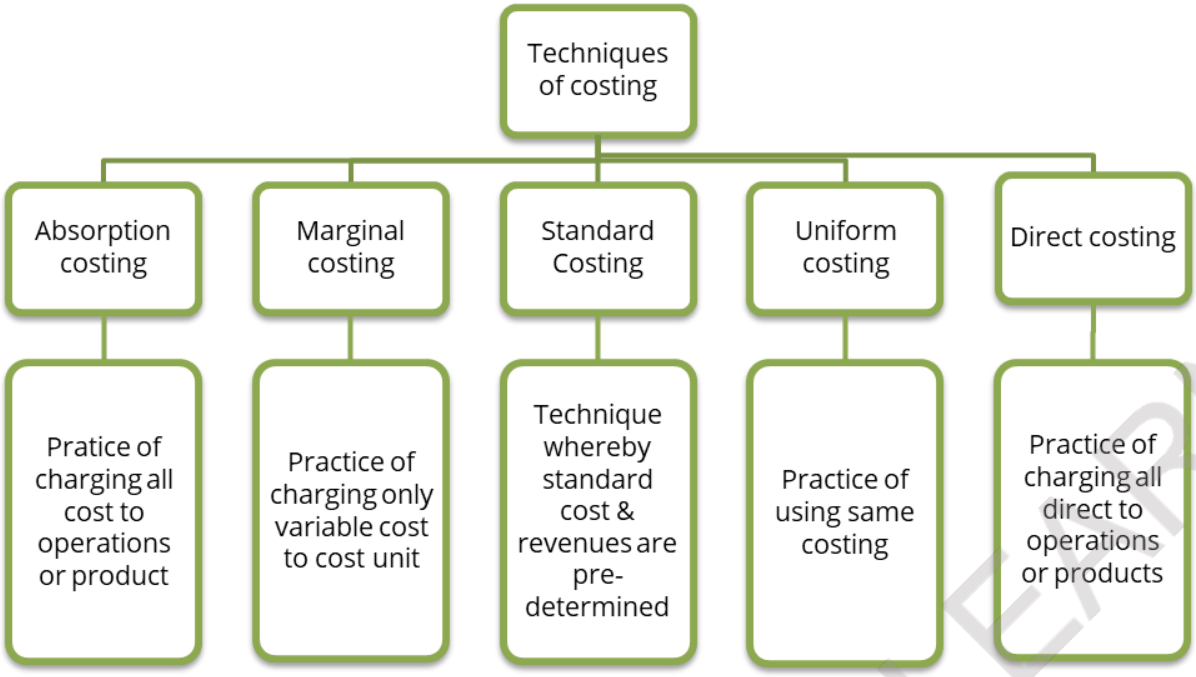
G. Multiple Costing:

- When the output is comprised of many components such as in ship building, television, motor Car or electronic gadgets, costs must be ascertained for each component as well as the finished product.
- Multiple costing means different methods of costing for different components as per the need and suitability of the organisation. As we see in the above examples, the product produced by them involves so many parts and components.
- Therefore, this type of costing is also called as composite costing or multiple costing.

EX: Ship building, television, motor Car or electronic gadgets

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12. Techniques of Costing



A. Absorption Costing:

- It is the practice of charging all costs both variable and fixed to operations, processes, or products.
- It is also referred to as total costing since the total costs are allotted to the cost units.
- It differs from marginal cost where fixed costs are excluded.

B. Marginal Costing:

- It is the practice of charging only the variable cost to cost units and the fixed costs attributable to the relevant period are written off in full against the contribution for that period.
- It is a valuable tool for decisions like product pricing, product mix, preparing budgets etc.

C. Standard Costing:

- It is a technique whereby; standard costs and revenues are pre-determined and later compared with actual costs and revenues.
- Standard costing is extremely helpful for cost control and is generally used along with budgetary control.

D. Uniform Costing:

- It is the practice of using the same costing system.
- i.e., the same basic methods, principles, and techniques, by several firms in an industry.
- This enables comparison of performance of different firms.

E. Direct Costing:

- It is the practice of charging all direct cost to operations, processes or products leaving all indirect cost to be written off against profits of the period in which they are arise.
- The difference between the direct costing and marginal costing is so insignificant that usually both the terms are used inter - changeably.

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13. Coding System

Code is defined as

- "a **system of symbols** designed to be applied to a classified set of items to give a brief account reference, facilitating entry collation and analysis".
- Hence cost classification forms the basis of any cost coding. It helps us understand the characteristic of any cost through a short, symbolized form.

Advantages:

Short and Simple	•Since the code is, most of the times, briefer than a description, it saves time when systems are worked upon manually and in case the system is computerised it reduces the data storage capacity.
Clarity	•A code helps in reducing ambiguity •In case two professionals understand the same item differently a code will help them objectively.
Computer friendly	•Unlike detailed descriptions, a code facilitates data processing in computerised systems

Requirements of an Efficient Coding system

Unique	•Every number used in the code should be unique and certain, i.e. it should be easily identified from the structure of the code.
Flexibility	•Elasticity and comprehensiveness is an absolute must for a well designed coding system.It should be possible to identify a code for every item and the coding system should be capable of expanding to accommodate new items.
Brief	•The code should be brief and meaningful
Centralised	•The maintenance of the coding system should be centrally controlled. It should not be possible for individuals to independently add new codes to the existing coding system.
Similarities	•Codification systems should be of the same length. The lawmakers envisage the needs for bringing out the new legislation for creation of the LLP to meet with the contemporary growth of the Indian economy.

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14. Essentials of Good Cost Accounting systems

The essential features, which a good Cost Accounting System should possess, are as follows:



A. Informative and Simple:

- Cost Accounting System should be tailor-made, practical, simple, and capable of meeting the requirements of a business concern.
- The system of costing should not sacrifice the utility by introducing meticulous and unnecessary details.

B. Accuracy:

- The data to be used by the Cost Accounting System should be accurate; otherwise, it may distort the output of the system and a wrong decision may be taken.

C. Support from Management and subordinates:

- Necessary cooperation and participation of executives from various departments of the concern is essential for developing a good system of Cost Accounting.

D. Cost-Benefit:

- The Cost of installing and operating the system should justify the results.

E. Procedure:

- A carefully phased programme should be prepared by using network analysis for the introduction of the system.

F. Trust:

- Management should have faith in the Costing System and should also provide a helping hand for its development and success.

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Chapter 2 : COST ASCERTAINMENT – ELEMENTS OF COST
Unit 1 : MATERIAL COST

OVERVIEW

- Meaning and need of material cost.
- Objectives of material Control
- Elements of Material Control
- Inventory control receipts and determination of various stock levels
- Valuation of material issues
- Normal and abnormal loss and its accounting treatment

INTRODUCTION

Most important element of cost in the business is material cost. In most of the manufacturing/production concerns, 50% to 70% of the total cost of a product is the cost of the material. The material cost has been defined by the Institute of Cost and Management Accountants, U.K. as "the cost of commodities supplied to an undertaking." Cost of cotton or cost of cotton yarn in case of textile mill, cost of cotton cloth in case of hosiery factory, cost of wood in case of furniture includes raw materials, factory supplies and consumable stores, spare parts components and packing material.

Types of materials

A. Direct material:

- Materials which can be identified with the cost centres or cost units and which can be directly relatable to cost centres or cost units are called direct material.
- Direct materials are the items which form part of the product e.g., cotton used for spinning cotton yarn, cotton yarn used in weaving cotton textile, wood used in making furniture, the leather used in making shoes and bricks and cement used in construction buildings.
- It is those materials which are purchased solely for a particular job, work order or contract.
- It will be finished products for the process and forms the raw material for the succeeding process.

B. Indirect materials:

- Materials which cannot be allocated but can be apportioned to or absorbed by cost centres or cost units e.g., cotton waste for cleaning the machinery, lubricants for oiling the machinery, diesel oil for generating power etc.
- Materials which are used in such a small quantity that it is not possible to ascertain their per unit cost exactly e.g., cost of thread and nails used in shoemaking.

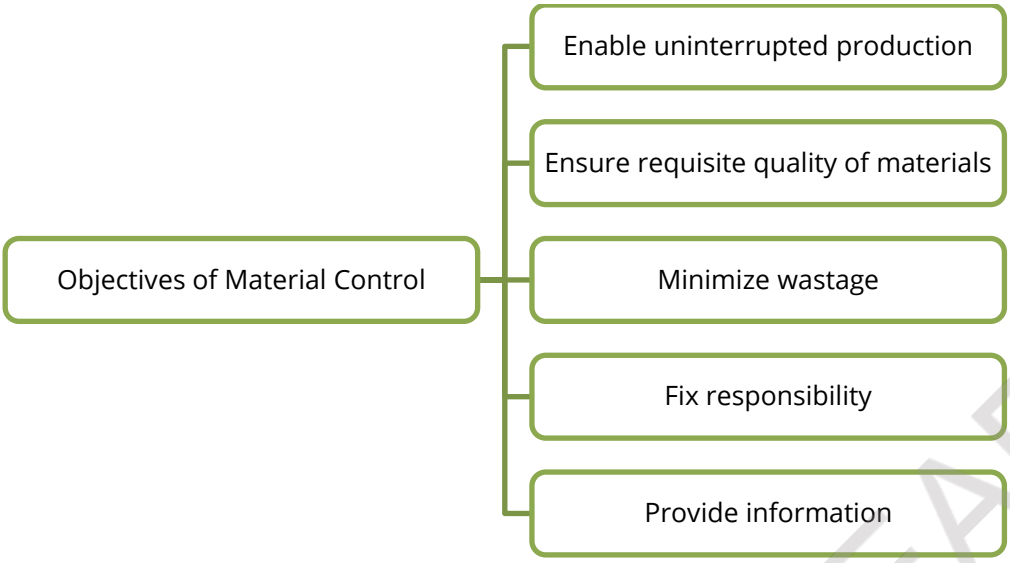
Direct Material vs Indirect Material:

- This grouping under direct and indirect is quite often based on materiality.
- Sometimes direct cost may be of such a small value that the cost of maintaining and collecting this data will be more than the cost of material itself.
- In such a case, the material may be conveniently classified as indirect material.

1. Objectives of Material Control:

The following are the main objectives of materials control:

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A. To enable uninterrupted production:

- Ensuring smooth and unrestricted production is the main objective of the material control. Production stoppages and production delays cause substantial loss to a concern.

B. To ensure requisite quality of materials:

- The quality of finished products depends mainly on the quality of raw materials used.
- End product will not be of desired quality, if the quality of raw materials is not up to desired standards which affect the sale of the product in the market.it results in the loss of goodwill of the concern as well the profits of it.
- It is of vital importance to exercise strict control and supervision over the purchases, storage, and handling of materials.

C. To minimize wastage:

- Rust, dust, dirt or moisture, bad handling of materials, poor packaging etc. are the main reasons for the loss of materials.
- Utmost effort should be made for the minimization of the wastage of raw materials and the causes for such losses must be brought into the notice.
- This is possible only by introducing an efficient materials control system.

D. To fix responsibility:

- A proper system of materials control also aims at fixing responsibility of operating units and individuals connected with the purchase, storage, and handling of materials.

E. To provide information:

- To provide accurate information relating to the material cost and inventory to the management whenever needed is the main objective of material control.

2. Requirements of Material Control

- There must be a proper coordination among all the departments which are involved in material purchasing, approving, testing, accounting, and distribution of funds.

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- Operation of system of internal check so that all transactions involving materials, supplies and equipment purchases are checked and approved by several properly authorized persons.
- Use of materials, supplies and equipment budgets may help to achieve economy in purchasing and use of materials.
- Properly written instructions regarding purchases and uses of materials should be accepted in standard forms.
- All materials and supplies stored in a designated location are properly safeguarded under effective supervision.
- It is possible to determine the amount and value of each kind of material in stock at every time when required by adopting a system of perpetual inventory.
- Determination of a minimum quantity below which stock should not be allowed to drop and a maximum quantity above which stock should not be carried.
- Adoption of a proper and effective system of stock control and issue ensures delivery of materials upon requisition to every department in the right time and in the right amount when they are needed.
- Development of a system of controlling accounts and subsidiary records which exhibit summary and detailed material cost at each stage of material receipt and consumption from the stock room to finished goods.

3. Elements of Material Control

Material control involves efficient functioning of the following operations:

- Purchasing of materials
- Receiving of materials
- Inspection of materials
- Storage of materials
- Issuing materials
- Maintenance of inventory records
- Stock audit

Purchasing of Material

Bill of Material:

- It is also known as Materials Specification List or Materials List.
- A bill of materials (BOM) is a comprehensive inventory of the raw materials, assemblies, subassemblies, parts, and components, as well as the quantities of each, needed to manufacture a product.
- In a nutshell, it is the complete list of all the items that are required to build a product.
- A BOM is sometimes also referred to as a product structure, assembly component list or production recipe (in process manufacturing industries).
- Typically, a BOM is hierarchical in nature, with the finished product at the top.
- It includes product codes, part descriptions, quantities, costs, and additional specifications.
- The materials specification list is prepared by the product development team commonly known as engineering or planning department in a standard form.
- Use of "Bill of Materials**"** by various departments in the following ways:
    - **To the Stores Department:**
        - To provide a basis for preparing materials purchase requisitions.
        - To act as authorization for issuing total material requirement.
        - To reduce paperwork and clerical activity in verification of each item of materials to be issued.
    - **To the Cost Accounts Department:**
        - To prepare budgets or estimates of materials cost for jobs / processes / products.
        - To compute materials cost variances, analyse reasons and hence control excess cost of material used.
    - **To the Production Control Department:**

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- To control usage of materials.
- To save time otherwise spent in preparing separate requisitions of material.

- **To the Engineering or Planning Department:**
  - For record, reference, and control purposes.

Specimen for Bill of Materials

BILL OF MATERIALS				
BAR	**NO.**	**SIZE**	**LENGTH (FT.)**	**SHAPE**
B	2	#5		
b_1	1	#4		
b_2	1	#4		
h	1	#5		
h_1	2	#4		
h_2	4	#4		
s	2	#4		
v		#4		
v_1	2	#5		
v_2	2	#5		
v_3	2	#5		
v_4	2	#5		
v_5	2	#5		
CONCRETE HEADWALLS			**CU YD**	
REINFORCEMENT BARS			**POUND**	
REINFORCEMENT BARS, EPOXY COATED			**POUND**	

TABLE FOR ONE (1) HEADWALL

Material requisition note:

- Material request, material requisition form are the other names for the material requisition. It is a document used by the production department to complete a manufacturing process by requesting the materials they need.
- An appropriate inventory can be stocked to keep production moving by using material request to authorize and keep a record of the components used.
- Information on the requisition is used to update the stores record card, also known as the bin card, and the stores ledger.
- To determine the direct materials used on various jobs or products, along with the indirect materials used by various cost centres material requisition note is used.
- A specimen form of material requisition is given below: -

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ABC Co. Ltd.
MATERIAL REQUISITION

Production Order No. :
Standing Order No. :
Bill of Material No. :

No. :
Date :
Department :

Particulars	Code No.	Quantity	Cost	
			Rate Rs.	Amount Rs.

Issued and Authorized by	Received by	Bin Card posted by	Stores ledger posted by	Priced by

Difference between Bill of Material and Material Requisition Note

Bill of Material	Material Requisition Note
Engineering and planning department prepare bill of material	Production or other consuming department prepare material requisition note.
It is complete schedule of component parts and raw materials required for a particular job or work order	It is a document authorizing storekeeper to issue materials to the consuming department
This provides information about required quantities and if there is any deviation from the standards, it can easily be detected.	It provides information on actual quantities of materials consumed by production departments.
It is prepared by the Engineering or Planning Department in a standard form.	It is useful in arriving historical cost only
It acts as a single authorization for the issue of all materials and stores items mentioned in it.	It authorizes storekeeper to issue the requisitioned materials and record the same in bin card.
It provides advance intimation to stores dept and reduces paperwork by serving as a work order to the production department	The purpose of materials requisition note is to draw material from the store by concerned departments.

Purchase Requisition

- A purchase requisition is a formal document which authorizes the purchase department to order for the materials specified in the note. On behalf of their organization.
- Purchasing department can start the process of purchasing the products or services requested as the purchase requisition document informs the decision to the department head or purchasing staff.
- The finance department will also use the purchase requisition to coordinate reporting with the accounting department.

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- This form is usually filled up by the storekeeper for regular materials and by the departmental head for special materials (not stocked as regular items).

Inviting Quotation/ Request for proposal (RFP)

- After receipt of duly authorized purchase requisition from the store department or other departments, role of purchase department comes into play.
- Materials purchase department must decide.
    - ***What to purchase?***
    - ***When to purchase?***
    - ***How much to purchase?***
    - ***From where to purchase?***
    - ***At what price to purchase?***
- To answer these questions, purchase department makes an enquiry into the market for the required material and send an RFP to the vendors and invites quotations from them.

The following are the few suggestive steps to answer to the questions:

(i) What to purchase?

Materials are purchased as per the requisition received from the stores or user departments. In case of materials used regularly, the materials are purchased as per the standard operating procedures (SOP).

(ii) **When to purchase**?

Materials are purchased considering the need for the materials for production and safety, however, the timing of placing the order is very important to get the materials replenished before the requirement arise and without affecting the production schedule. Supply of materials i.e., how easily the materials are available in the market, Lead time i.e., time required to get the order from supplier's place to production place, consumption pattern of materials are the important factors which affects the timing of purchase. Related to the question, later in this chapter Re-order Stock Level will be learnt.

Further the concept of just-in-time (JIT), which is briefly discussed in this chapter is also associated with the question 'when' to purchase.

(iii) How much to purchase?

The quantity of materials to be ordered depends on the factors like material consumption pattern, minimum order size as offered by the supplier, quantity discount, storage cost and capacity and working capital requirement etc. The concept of Economic Order Quantity (EOQ) will be discussed later in this chapter.

(iv) Where to purchase?

This is the process of selecting supplier of materials to be purchased. This is a very sensitive and crucial process, though for every organization but specifically for the organizations where public money is involved i.e., public sector undertakings (PSUs). Selection process of supplier could be a grey area which attracts special attention of regulators like CVC (Central Vigilance Commission), CAG (Comptroller and Auditor General of India), Auditors and others. The question is why this is so sensitive to attract attention of watchdogs. The answer to this question is in a line from Preamble of the Constitution of India, which reads as to secure to all its citizens: "Equality of status and of opportunity". This means the supplier selection process be such transparent and fair that all suppliers are treated equal to get opportunity in participation in Tender process.

The selection process starts with Enquiry/Request for Proposals (RFP)/ Notification Inviting Tender (NIT). The geographical area for an enquiry/ RFP or NIT can be local or global depending on the propriety, availability and government guidelines for materials to be purchased. The RFP or NIT can be floated offline i.e., manual process or online by publishing on website or designated electronic market places. One of the examples of electronic market place is GeM (Government e Marketplace).

Government e Marketplace (GeM): A dedicated e-market for different goods & services procured by Government Organisations / Departments / PSUs. It aims to enhance transparency, efficiency and speed in public procurement. It provides the tools of e-bidding, reverse e-auction and demand aggregation to facilitate the government users,

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achieve the best value for their money. The purchases through GeM by Government users have been authorised and made mandatory by Ministry of Finance.

(v) At what price to purchase?

The answer to the question is discussed in the following paragraph where the Lowest bidder (also called L1 bidder) for the material is selected.

Selection of Quotation/ Proposal

- After invitation of tender from the vendors, interested vendors who are fulfilling all the criteria mentioned in the tender notice send their price quotations/proposals to the purchase department.
- On the receipt of quotations, a comparative statement is prepared.
- For selecting material suppliers, the factors which the purchase department keeps in its mind are—
    - price,
    - quantity,
    - quality offered,
    - time of delivery,
    - mode of transportation,
    - terms of payment,
    - Reputation of supplier etc.

Preparation and execution of Purchase Orders

- Upon selection of the best quotation, the purchase manager or concerned officer proceeds to issue the formal purchase order.
- It is a written request to the supplier.
    - to supply specified materials
    - at specified rates and
    - Within a specified period.

Receipt and inspection of materials (Goods Received Note and Material Return Note)

- Upon receipt of materials along with relevant documents the Stores Department arranges for the inspection of the materials for its conformity with purchase order.
- After satisfactory inspection materials are received and Goods Received Note is issued.
- If some materials are not found in good condition or are not in conformity with the purchase order are returned to the vendor along with a Material Returned Note.

Checking and passing of bills for payment

- The invoice received from the supplier is sent to the accounts section to check authenticity and mathematical accuracy.
- The quantity and price are also checked with reference to goods received note and the purchase order, respectively.
- The accounts section after checking its accuracy finally certifies and passes the invoice for payment.

4. Valuation of Material Receipts

- Actual material cost is calculated after the procurement of materials from the supplier.
- Valuation of materials means ascertainment of cost of material purchased.
- Cost of material includes cost of purchase net of trade discounts, rebates, duty draw-back, input credit availed, etc. and other costs incurred in bringing the inventories to their present location and condition.
- The invoice of material purchased from the market sometime contain items such as trade discount, quantity discount, freight, duty, insurance, cost of containers, sales tax, excise duty, cash discount etc.
- Treatment of items associated with purchase of materials is tabulated as below.

Discounts and subsidy		
S.No	**Items**	**Treatment**

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1	Trade Discount	Trade discount is deducted from the purchase price if it is not shown as deduction in the invoice.
2	Quantity	Discount Like trade discount quantity discount is also shown as deduction from the invoice. It is deducted from the purchase price if not shown as deduction.
3	Cash Discount	Cash discount is not deducted from the purchase price. It is treated as interest and finance charges.
4	Subsidy/ Grant/ Incentives	Any subsidy/grant/incentive received from the Government or from other sources deducted from the cost of purchase
Duties and taxes		
S.No	**Items**	**Treatment**
5	Road Tax/ Toll Tax	Road tax/ Toll tax if paid by the buyer then it is included with the cost of purchase.
6	Goods and Service Tax (GST)	CGST/SGST is paid on intra-state supply and collected from the buyers. Similarly, IGST is paid on inter-state supply and collected from the buyers. GST is excluded from the cost of purchase if credit for the same is available. Unless mentioned specifically it should not form part of cost of purchase.
7	Basic custom duties	Basic custom duty is paid on import of goods from outside India. It is added with the purchase cost

Penalty and charges		
S.No	**Items**	**Treatment**
1	Demurrage	It refers to the penalty paid by a charter company for failing to load or unload a vessel within the time frame set out in its contract. It is included in the cost of purchase
2	Detention charges/ Fine	Detention charges/ Fine are imposed for non-compliance of rule or law by any statutory authority. It is an abnormal cost and not included with cost of purchase
3	Penalty	Penalty of any type not included in the cost of purchase

Other Expenditures		
S.No	**Items**	**Treatment**
1	Insurance charges	Insurance charges are paid for protecting goods during transit. It is added with the cost of purchase.
2	Commission and brokerage paid	Commission or brokerage paid is added with the cost of purchase.
3	Freight inwards	It is added with the cost of purchase as it is directly attributable to procurement of material
4	Cost of containers	Treatment of cost of containers are as follows: • **Non-returnable containers:** The cost of containers is added with the cost of purchase of materials. • **Returnable Containers:**

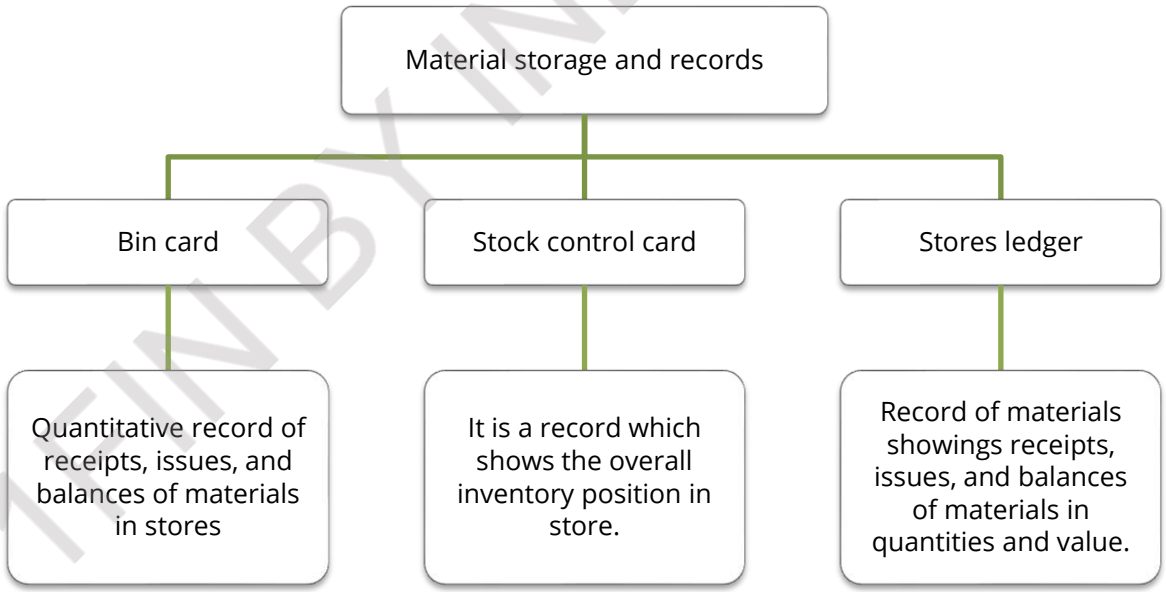
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		▪ If on return of containers cost of containers is returned, then in this case cost of containers is not added with the cost of purchase. ▪ If the amount of refund on returning the container is less than the amount paid, then only short fall is added with the cost of purchase.
5	Shortage	Shortage in materials is treated as follows: • **Shortage due to normal reasons:** Good units absorb the cost of shortage due to normal reasons. Losses due to breaking of bulk, evaporation, due to unavoidable conditions etc. are the reasons of normal loss. • **Shortage due to abnormal reasons:** shortage arises due to abnormal reasons such as material mishandling, pilferage, due to avoidable reasons are not absorbed by the good units. Losses due to abnormal reasons are debited to costing profit and loss account.

5. Material Storage and Records

Proper storing of materials is of primary importance. If the purchased material subsequently deteriorates in quality because of bad storage, the loss is even more than what might arise from purchase of bad quality of materials. Apart from preservation of quality, the storekeeper also must ensure safe custody of the material. It should be the function of storekeeper that the right quantity of materials always should be available in stock. The record of stores may be maintained in three forms:

- Bin Cards
- Stock Control Cards
- Store Ledger



A. Bin card

- Quantitative record of receipts, issues, and balances of materials is called a bin card.
- The bin card is attached to the bin or rack.
- Quantity of materials in hand is known with the help of bin card briefly.
- Bin card is maintained by the storekeeper.
- This card is used not only for recording receipts, issues of stores but also assists the storekeeper to control the stock.
- The storekeeper prepares purchase requisition by using a bin card to replenish the exhausted material.

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- Bin card helps in locating the discrepancy during physical stock verification and the balance is compared with bin card.

Benefits of a Bin Card

Bin card has following benefits.

- It gives up to date record of receipt and closing balances of stores items as it is the most important store record.
- It is helpful in placing requisitions for replenishment as when necessary.
- Bin card also make available the Re-ordering quantity.
- Bin cards reconcile physical stock with the balance shown in it and It makes Perpetual Inventory system meaningful.
- The storekeeper keeps the stocks within the prescribed limit so it helps to control material cost with minimum investment.
- It discloses the quantity balance of the stock to anyone in the stores briefly. Much information relating to store keeping is available from bin card, so it helps in a system of internal check.

Disadvantages of Bin Card

- Store records are dispersed over a wide area.
- The cards are liable to be smeared with dirt and grease.
- Clerical work involved in writing bin cards is not suitable for the people handling materials.

B. Store's ledger

- Record of materials showings receipts, issues, and balances of materials in quantities and value is called stores ledger.
- Costing Department maintain stores ledger and is outside the control of storekeeper. To ensure correct stores accounting this ledger is maintained.
- This ledger is usually of loose leaf or card type and each account represents an item of materials.
- To avoid the risk of removal/loss, the sheets are numbered serially and initiated by a responsible official. In some concern, to rule out the possibility of loss of folios, the stores ledger is maintained in bound volumes.

Bin card	Store's ledger
Particulars of materials only in quantities are recorded.	Particulars of materials both in terms of quantity and value are recorded in stores ledger.
It is maintained in the stores by the storekeeper.	It is maintained by the cost accounting department by the Accounts Clerk.
It is used for controlling materials and kept inside the stores.	It is normally kept outside the stores and it is used to determine the value of materials, i.e., pricing of materials issues.
Entries are posted before the transactions take place.	Entries are posted after the transactions take place.
Entries are posted individually.	Entries are posted periodically.
Based on quantity received or issue entries are made.	Entries are supported by material received note and material requisition note.

C. Stock Control Cards:

- It is also a quantitative record of inventory maintained by stores department for every item of material.
- In other words, it is a record which shows the overall inventory position in store.
- Recording includes receipt, issue, return, in hand and order given.

Advantages:

- Records are kept in a more compact manner so that reference to them is facilitated.
- Records can be kept in a neat and clean way by men solely engaged in clerical work so that a division of workers between record keeping and actual material handling is possible.
- As the records are at one place, it is possible to get an overall idea of the stock position without the necessity of going around the stores.

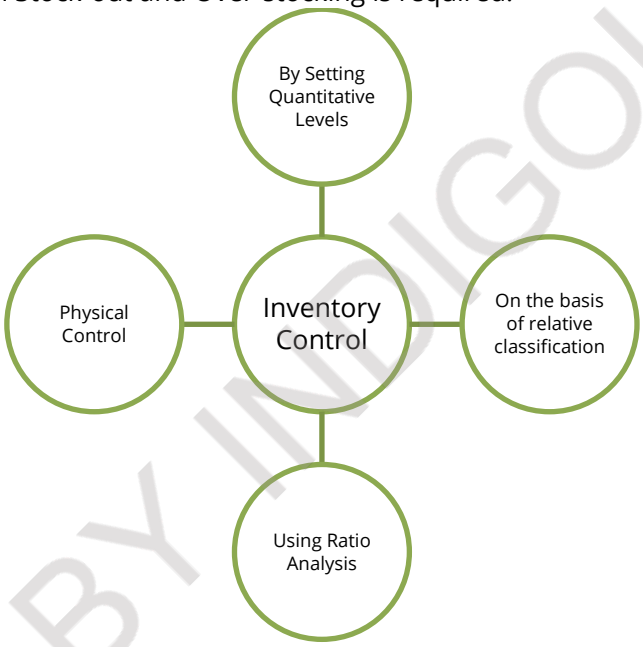
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Disadvantages

- On the spot comparison of the physical stock of an item with its book balance is not facilitated.
- Physical identification of materials in stock may not be as easy as in the case of bin cards, as the Stock Control Cards are housed in cabinets or trays.

6. Inventory Control

- The Chartered Institute of Management Accountants (CIMA) defines Inventory Control as "The function of ensuring that sufficient goods are retained in stock to meet all requirements without carrying unnecessarily large stocks."
- The objective of inventory control is to make a balance between sufficient stock and over-stock.
- The stock maintained should be sufficient to meet the production requirements so that uninterrupted production flow can be maintained. Insufficient stock not only pause the production but also cause a loss of revenue and goodwill.
- On the other hand, Inventory requires some funds for purchase, storage, maintenance of materials with a risk of obsolescence, pilferage etc.
- A trade-off between Stock-out and Over-stocking is required.



7. Inventory Control- By Setting Quantitative Levels

A. Re-order Stock Level (ROL)

- Reorder level of stock is the point at which stock of a particular material in store approaches, the storekeeper should initiate the purchase requisition for fresh supplies of that material.
- Difference of quantity of the material between the reorder level and the minimum level will be sufficient to meet the production requirements till the fresh supply of material is received. This level is fixed somewhere between maximum and minimum levels.

Re-ordering level can be calculated by applying the following formula.

Ordering Level = Minimum Level + Consumption during the time required to get the fresh delivery.

Alternatively

Re-ordering Level = Maximum Consumption x Maximum Re-order Period.

- Maximum period taken to get the material after it is initiated is called as reorder period.

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- Weldon has taken the maximum period and maximum consumption during that period so that factory may not stop in any case due to shortage of materials.

B. Re-Order Quantity

- Re-order quantity is the quantity of materials for which purchase requisition is made by the store department.
- While setting the quantity to be re-ordered, consideration is given to the maintenance of minimum level of stock, re-order level, minimum delivery time and the most important the cost.
- Hence, the quantity should be where, the total of carrying cost and ordering cost is at minimum.
- For this purpose, an economic order quantity should be calculated.
- The total costs of a material usually consist of:

C. Economic order quantity:

Total acquisition cost + Total ordering cost + Total carrying cost.

Total Acquisition Cost:

- Total Acquisition cost through buying is unaffected irrespective of the quantity of material ordered at a particular time unless quantity discounts are available.

Carrying Cost:

- It is the holding cost of the materials in the stores which includes Cost of storage space that could have been utilized for some other purposes, Cost of bins and racks that must be provided for the storage of materials, Cost of maintaining the materials to avoid deterioration, Amount of interest payable on the money locked up in the materials.

Ordering Cost:

- Ordering cost is the cost incurred for placing the order for the purchase of materials and includes Cost of staff posted in the purchasing department, inspection section and payment department, Cost of stationery, postage and telephone charges etc. cost of comparative evaluation of quotations, cost of floating tenders, paper works, and postage involved in placing order and making payments. In other words, the cost varies with the number of orders.

  The formula for calculating EOQ,

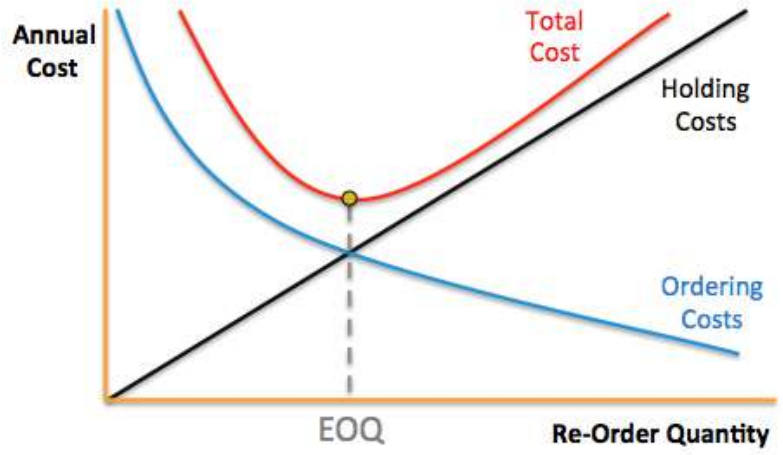
$$EOQ = \sqrt{\frac{2 \times \text{Annual Requirement (A)} \times \text{Cost per order (O)}}{\text{Carrying Cost per unit per annum (C)}}}$$

  - Annual Requirement (A)- It represents demand for Raw material or Input for a year.
  - Cost per Order (O) - It represents cost of placing an order for purchase.
  - Carrying Cost (C) – It represents cost of carrying average inventory on annual basis.

Assumptions underlying E.O.Q.:

- Ordering cost per order and carrying cost per unit per annum are known and they are fixed.
- Anticipated usage of material in units is known.
- Cost per unit of the material is constant and is known as well.
- The quantity of material ordered is received immediately i.e., the lead time is zero.

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D. Minimum (Cr Safety Stock) Level:

- Minimum quantity of the material which must be maintained in hand always is the safety stock level. Due to the shortage of material, production may be held up, so the quantity is fixed to avoid this.

Formula for the calculation of minimum level given by Wheldon is as follows:

Minimum Stock Level = Re-ordering Level – (Normal Consumption x Normal Re-order Period)

E. Maximum Level:

- It represents the maximum quantity of an item of material which can be held in stock at any time. Stock should not exceed this quantity. The quantity is fixed so that there may be no overstocking.

The formula for the calculation of maximum stock level given by Wheldon is as follows:

Maximum Stock Level = Reordering Level + Re-ordering Quantity – (Minimum Consumption x Minimum Re-ordering Period)

F. Danger Level:

- This means a level at which normal issues of the material are stopped and issues are made only under specific instructions.
- The purchase officer will make special arrangements to get the materials which reach at their danger levels so that the production may not stop due to shortage of materials.

Danger Level = Average consumption x Max. re-order period for emergency purchases

G. Average Stock Level:

This level is calculated by the following formula:

Average Stock Level = Minimum Stock Level + 1/2 of Re-order Quantity or 1/2 (Minimum Stock Level + Maximum Stock Level)

H. Buffer Stock

- Some quantity of stock may be kept for contingency to be used in case of sudden order; such stock is known as buffer stock.

I. Just in Time (JIT) Inventory Management

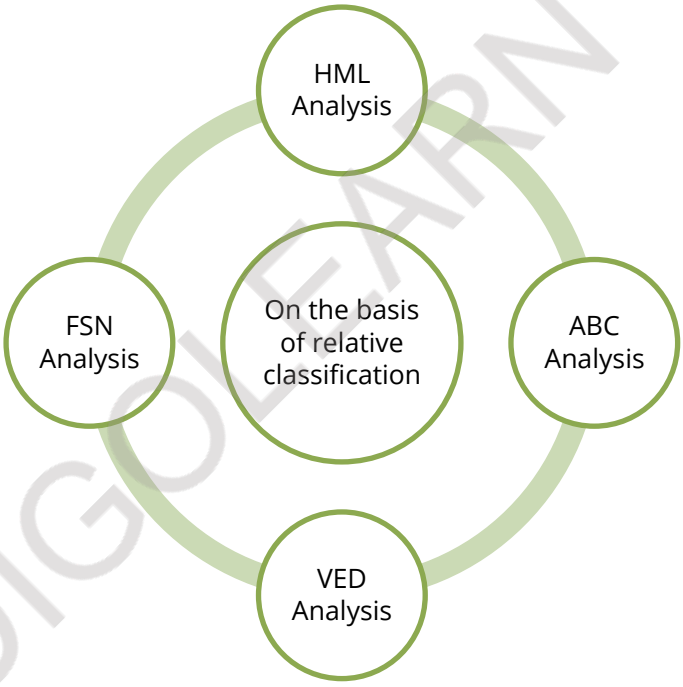
- JIT is a system of inventory management with an approach to have zero inventories in stores.
- According to this approach material should only be purchased when it is required for production.
- JIT is based on two principles.
    - Produce goods only when it is required and

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- the products should be delivered to customers at the time only when they want.
- It is also known as 'Demand pull' or 'Pull through' system of production.
- In this system, production process starts after the order for the products is received.
- Based on the demand, production process starts and the requirement for raw materials is sent to the purchase department for purchase.

8. Inventory Control-On the basis of Relative Classification

A. ABC Analysis



- Classifying a business's stock items into A, B, C categories based on their value of business is referred as ABC analysis.
- A represents the most important items as they bring value to the company whereas C represents least valuable items.
- ABC inventory analysis helps the managers to focus their time on most valuable products and it also helps managers to adapt their inventory control policies accordingly.
- Classification under this analysis can be based on annual sales revenue, annual sales volume or annual consumption value or average profit margin so there are many ways to define value.
- A classification items are very important and sometimes business critical. These typically have a high value or are sold in large volumes.
- Items classified in the B category are also important but not as much important as A category items. But it is more important than C items. These are typically middle range value.
- C classification items are marginally important. Typically, they have a low inventory value.

Advantages of ABC analysis:

The advantages of ABC analysis are the following:

- Continuity in production
- Lower cost
- Less attention required since attention need be paid only to some of the items rather than all the items as would be the case if the ABC system were not in operation.
- Systematic working

Disadvantages of ABC analysis

- Too simplistic
- Static
- Time consuming

B. VED Analysis

Classification of materials based on their importance to other materials is referred as VED analysis.

- **Vital (V)**: These are the materials need to be in stock every time or else production will be affected. Non availability of these items will put business operation in halt.
- **Essential (E)**: Items which is required in minimum amount to keep the production active come under this category.
- **Desirable (D)**: These are the materials which are not important, and the production will not be affected even when the materials are available or not.

C. FSN Analysis

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FSN analysis in inventory management deals with the classification of items based on usage, consumption rate, and quantity.

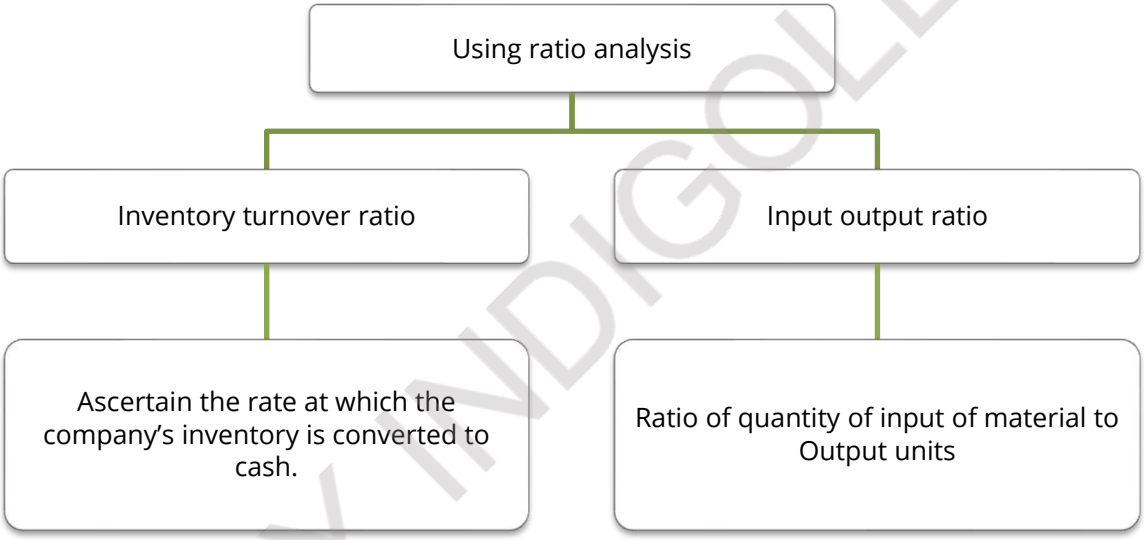
- **Fast Moving:** This category of items is placed nearer to store issue point and the stock is reviewed frequently for making of fresh order.
- **Slow Moving:** This category of items is given stored little far and stock is reviewed periodically for any obsolescence and may be shifted to Non-moving category.
- **Non-Moving:** This category of items is kept for disposal. This category of items is reported to the management and an appropriate provision for loss may be created.

D. HML Analysis

HML Analysis classifies inventory based on how much a product costs/its unit price. The classification is as follows:

- **High Cost (H) –** High unit value item
- **Medium Cost (M) –** Medium unit value item.
- **Low Cost (L) –** Low unit value item.

9. Using Ratio Analysis



A. Inventory turnover ratio

- Rate at which company's inventory is converted to cash is ascertained by using inventory turnover ratio.
- A company with higher inventory ratio is considered to have the effective sales strategy.
- Inventory turnover ratio is measured by dividing the cost of materials consumed and the cost of average stock.

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

$$\text{Average stock} = 1/2\ (\text{opening stock} + \text{closing stock})$$

$$\text{Average no. of days of Inventory holding} = \frac{360\ \text{days}/12\ \text{months}}{\text{Inventory Turnover Ratio}}$$

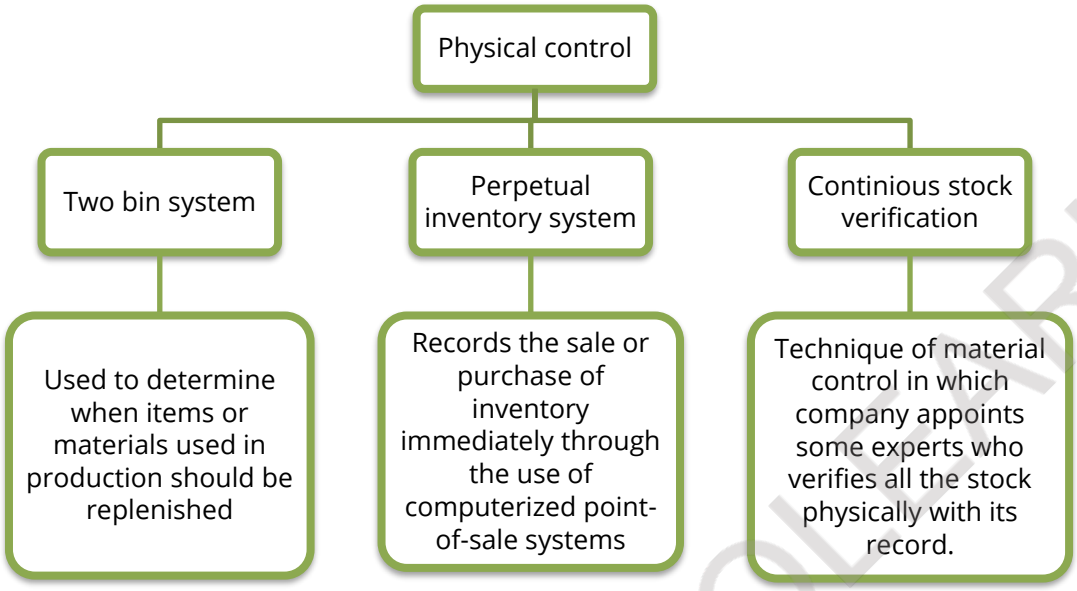
A high inventory turnover ratio indicates efficient management of inventory and goods are fast moving.

B. Input Output Ratio

- It is the ratio of quantity of input of material to Output units.
- This ratio enables comparison of actual consumption with standard consumption.

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10. Physical control



A. Two bin system

- When Items / materials used in production should be replenished, two bin inventory system is used to determine that.
- Order is placed to replace the items in the first bin which was depleted. During the wait, items from the second bin are used.
- Items of small or low value which can be easily purchased and stored in large amount can use Two bin inventory control.
- Bin cards and store ledger cards are used to record the inventory.
- The two-bin inventory control system ensures that companies reduce inventory risks and always have the right level of stock to meet demand.

Establishment of system of budgets

- To control investment in the inventories, the exact quantity of various types of inventories and the time when they would be required can be known based on which a requirement budget can be prepared.
- Such a budget will discourage the unnecessary investment in inventories.

B. Perpetual inventory system

- Method of recording the sale or purchase of inventory immediately with the help of the computerized point of sale system and enterprise asset management system is called perpetual inventory system.
- Providing detailed view on the changes in inventory along with the detailed report of amount of inventory in stock is one advantage of the perpetual inventory. It accurately provides the details of level of goods on hand.
- Within this system, no effort is needed by the company to keep a detailed record of inventories of products in hand. Because the purchases of goods are recorded inventory data base as a debit entry.
- Effectively, the cost of goods sold includes such elements as direct labour and materials costs and direct factory overhead costs.

Advantages of perpetual inventory

- Physical stocks can be counted, and book balances adjusted as and when desired without waiting for the entire stock-taking to be done.
- Discrepancies are easily located, and thus corrective action can be promptly taken to avoid their recurrence.
- A systematic review of the perpetual inventory reveals the existence of surplus, dormant, obsolete, and slow-moving materials, so that remedial measures may be taken in time.

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C. Continuous Stock Verification

- In continuous stock verification, Company appoints some experts to verify all the stock with its record physically. It is the technique of material control. It is just like internal audit of store.
- The appointed experts are independent, and they have the right to check stock at any time without even providing advance intimation to store staff.
- This surprise checking through continuous stock verification makes store staff more responsible for duty.
- Storekeeper will become more moral and sober to the duty. This is another advantage of continuous stock.
- He tries his best to reduce all the shortcomings as he knows that experts are also controlling the stores.
- All the discrepancies between the book record of stock and the actual stock are removed with the help of continuous stock verification. Experts can identify the mistake in this regard and can act against it.
- **Results of Stock Verification**

  following result can be found during stock verification.

  1. Natural losses
  2. Avoidable or unavoidable losses
  3. Stock loss due to theft
  4. Loss stock due to changing in temperature.
  5. Counting errors
  6. Careless handling or measurement losses
  7. Pilferage of goods.

11. Material issue procedure

A. Material Requisition Note

- It is also known as material requisition slip.
- It is a voucher of authority used to get materials issued from store.
- Generally, it is prepared by the production department.

B. Material Transfer Note

- Sometimes excess material remaining on one job is transferred to another job directly without returning the material to the stores.
- When such material is transferred, a Material Transfer Note is prepared indicating the job number to which the materials are transferred.
- This transaction does not affect the stores department and no entry is made in the store's ledgers.

Material Transfer Note

A.B. Co. Ltd.

From: Department ..... Job No.				Serial No. ..... To: Department ..... Date .....
Qty.	**Code No.**	**Description**	**Rate**	**Amount**
Issued by		Approved by		Received by .....

C. Material returns note.

- Generally, materials obtained for a particular job are not drawn more than requirements and it is not consumed fully. The excess quantity is returned to the stores with a Material Return Note.
- In the bin card there will be an 'in' or 'received' column. Materials kept by shop keeper should be entered there.

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Format of Material Return Note

Material Return Note
A.B. Co. Ltd.

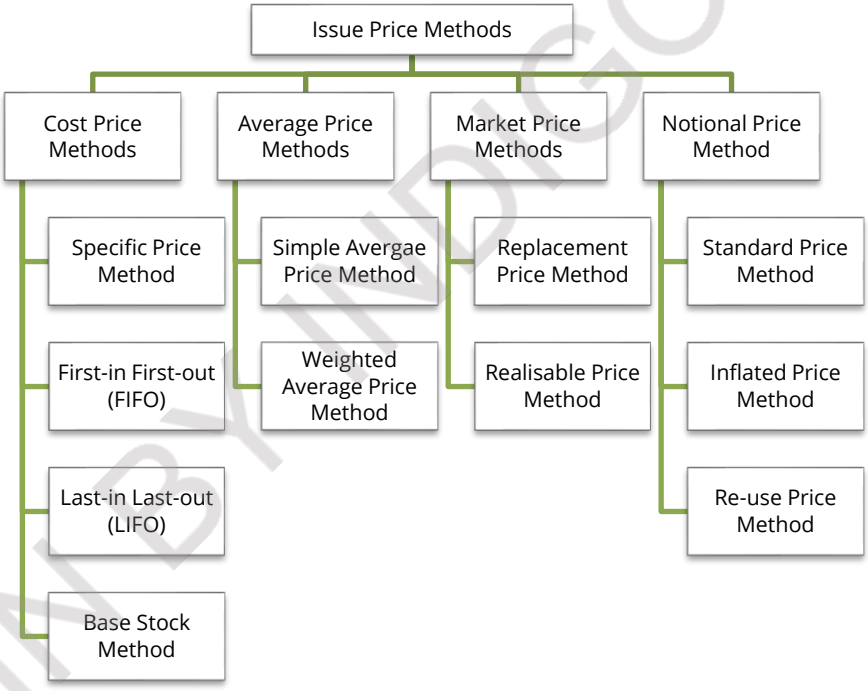
Department ..... Serial No. .....
Job No. ..... Date .....

Qty.	Code No.	Description	Rate	Amount

Signature of Store-keeper ..... Signature of Foreman .....

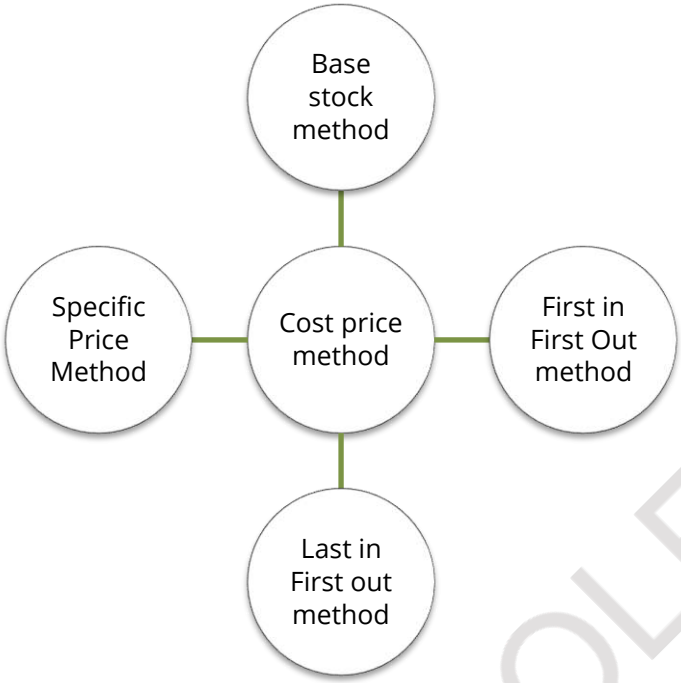
12. Valuation of material issued.

- Materials issued from stores should be priced at the value at which they are carried in stock.
- But there can be a situation where the material may have been purchased at different times and at different prices with varying discounts, taxes etc.
- Because of this the problem arises as to how the material issues to production are to be valued
- To find out the cost of materials issued from stores several methods are used. The choice of method should be based on the nature of material and the type of business.



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13. Cost price method



A. "First-In-First-Out" Method:

- First in first out method is called as original cost method. Goods received recorded at actual cost-plus other charges (taxes, insurance, freight etc..) in the stores record. In this system, the materials first received are issued first. Materials in the second lots are issued after the first lot materials are exhausted. The prices are charged at the cost at which that lot was purchased.

B. Specific Price Method

- Under this method, the specific price of materials issued to a particular job is charged to the job. This method is used where materials are purchased specifically for a job.

C. "Last-In-First-Out" Method:

- In Last in first out method, the material of the last lot of a particular item is first issued and hence the price of material issued is charged at the rate of material received in the last lot (the newest lot price). If the last lot is also emptied, then the price of the lost lot of the remaining materials is considered.

D. Base Stock Method:

- Minimum quantity of stock in materials should be maintained by the concerns all time. This minimum quantity is known as safety or base stock and it should be used only in emergency arise. The base stock is created out of the first lot of the material purchased and, therefore, it is always valued at the cost price of the first lot and is carried forward as a fixed asset. Issuing materials according to the current price is one of the objectives of the material purchased. This objective will be achieved only when the LIFO method is used together with the Base Stock Method.

14. Average price method

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A. Simple Average Price:

- C.I.M.A defines simple average price as "A price which is calculated by dividing the total of the prices of the materials in the stock from which the material to be priced could be drawn by the number of the prices used in that total".

  Standard average price=Total unit purchase prices of different lots in stock on the date of issue /number of prices used in calculation + quantity of different lots ignored.

- Quantity purchased in each lot is ignored so that this method may lead to under recovery or over recovery of cost of materials.

B. Weighted Average Price Method

- Unlike Simple Average Price method, this method gives due weightage to quantities also.
- Under this method, issue price is calculated dividing sum of products of price and quantity by total number quantities.
- This method is useful in case when quantity purchased under each lot is different and price fluctuates frequently.

15. Market Price Methods

A. Replacement Price Method

- Under this method, materials are issued at a price at which they are available in the market at the time of such issues.

B. Realizable Price Method

- Under this method, material issues are priced at a value which the material would realize if sold in the market.

16. Notional price method

A. Standard price method

- Valuing the receipts and issues at a predetermined price is termed as standard price method. Therefore, this price is neither the cost price nor the market price. Concerns following standard costing technique of accounting use standard price method.

B. Inflated price method

- In case material suffers loss in weight due to natural or climatic factors, e.g., evaporation, the issue price of the material is inflated to cover up the losses.

C. Reuse price method

- When materials are rejected and returned to the stores or a processed material is put to some other use, then for the purpose it is meant, then such materials are priced at a rate quite different from the price paid for them originally. There is no final procedure for valuing use of material.

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Treatment of various types of losses			
Type of loss	**Meaning**	**Treatment of normal loss**	**Treatment of abnormal loss**
Waste	The portion of raw material which is lost during storage or production and discarded. The waste may or may not have any value. Wastages might be invisible or visible. It is essential to take steps to control the material wastage. ,	This type of wastage is inherent in the production process. And it cannot be prevented. The normal wastage is generally estimated in advance and it is involved in the material cost. Alternatively, the good units should allow the cost of normal wastage.	The abnormal wastage is any wastage over and above the normal wastage. Particularly it is more than the standard wastage. The abnormal wastage's cost is not charged to the production; however, it is charged to the Costing Profit and Loss Account.
Scrap	Scrap is a residual material resultant from a manufacturing process. It comprises a recovery value and is measurable. The treatment of scrap in cost accounts is generally as per the following details.	Production of good units manage the cost of scrap. Any income arises on account of realizable value is deducted from the cost.	The cost of abnormal loss is transferred to Costing Profit and loss account (net of any sales realization from scrap).
Spoilage	Spoilage is the production that is not successful to meet quality or dimensional needs and very much damaged in manufacturing operations that they are not able of rectification and though must remove and sold off with no further processing. Rectification can be complete at a cost that may not be economic	The normal spoilage's cost is extended over to the good production via charging either to the production order or to the product overheads.	The cost of abnormal spoilage is charged to the Costing Profit and Loss Account.
Defective	Parts of production units that do not corroborate to the standards of quality is called as defectives, but it can be corrected	The cost of normal defectives is increase over the good units and the cost of extra processing is charged to a specific	Abnormal defective cost is charged to the Costing Profit and Loss Account.

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	by making extra application of materials, labour and finish it into saleable form	department/process if it is identifiable with similar. It is charged to factory overheads if it cannot be identified.	
Obsolescence	Obsolescence is defined as "the loss in the intrinsic value of an asset due to its supersession".	The value of the obsolete material held in stock is a total loss and immediate steps should be taken to dispose it off at the best available price.	The loss arising out of obsolete materials on abnormal loss does not form part of the cost of manufacture.

Illustrations

1. Illustration

At what price per unit would Part No. A 32 be entered in the Stores Ledger, if the following invoice was received from a supplier:

Invoice	Amount
200 units Part No. A 32@ Rs. 5	1,000
Less: 20% discount	(200)
	800
Add: SGST @ 12%	96
	896
Add: Packing charges (5 non-returnable boxes)	50
	946

(i) At 2% cash discount will be given if payment is made in 30 days

(ii) Documents substantiating payment of SGST is enclosed for claiming Input credit.

Solution: 1

Particulars	Amount (₹)
(i) Cost of 200 Units (Net)	800
Add: Packing charges (non-returnable)	50
Total Cost of material	850
(ii) Number of units	200
Cost per unit (850/200)	Rs. 4.25

Note:

1. Since input tax credit of SGST is available, the same will not form part of Cost of Material.
2. Cash discount will not be adjusted.

2. Illustration

An invoice in respect of a consignment of chemicals A and B provides the following information

Particulars	Amount (Rs.)
Chemical A: 10,000 kgs. at Rs.10 per kg.	1,00,000
Chemical B: 8,000 kgs. at Rs. 13 per kg.	1,04,000
Basic custom duty @ 10% (Credit is not allowed)	20,400
Railway freight	3,840
Total cost	**2,28,240**

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A shortage of 500 kgs. In chemical A and 320 kgs. In chemical B is noticed due to normal breakages. You are required to determine the rate per kg. of each chemical, assuming a provision of 2% for further deterioration.

Solution: 2

a. **Statement showing Computation of Effective quantity of each chemical available for use**.

Particulars	Chemical A (Kgs)	Chemical B (Kgs)
Quantity Purchased	10,000	8,000
Less: Shortage due to Normal Breakages	500	320
	9,500	7,680
Less: Provision for deterioration @2%	190 (9500 x 2%)	153.60 (7680 x 2%)
Effective Quantity available	**9310**	**7526.40**

b. **Statement showing computation of cost/rate per Kg of chemical**

Particulars	Chemical A (₹)	Chemical B (₹)
Purchase Price	1,00,000	1,04,000
Basic Customs Duty @10%	10,000	10,400
Railway Freight (in the Ratio of Quantity Purchased) i.e. (5;4)	2,133	1,707
Total Cost	**1,12,133**	**1,16,107**
Effective Quantity Available	9,310 Kgs	7,526.40 Kgs
Rate per Kg	₹12.04/Kg	₹15.43/Kg

3. Illustration

Compute E.O.Q. and the total variable cost for the following:

- Annual Demand = 5,000 units
- Unit price = Rs. 20.00
- Order cost = Rs. 16.00
- Storage rate = 2% per annum
- Interest rate = 12% per annum
- Obsolescence rate = 6% per annum

Determine the total cost that would result for the items if an incorrect price of Rs.12.80 is used.

Solution: 3

A = Annual Demand of RM in quantity	5000 Units
O = Ordering Cost	₹12.80
Unit Price	₹16.00
C = Carrying Cost per unit per Annum	20% x 12.8 = ₹2.56

$EOQ = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2\times5000\times16}{2.56}}$ = 250 units

No. of Orders = $\frac{5,000}{250}$ =20 orders

Statement Showing Computation of Total Material Cost (at normal unit price)

S.No	Particulars	Formula	Computation	Solution (If unit price - ₹ 20)
1	Material Cost	Annual Demand x Unit Price	5000 x 20	₹1,00,000
2	Total Ordering Cost	No. of Orders x ordering cost per Order	25 x 16	₹400
3	Total Carrying cost	Average stock x Carrying cost p.u.p.a. Average stock = (Ordering cost + EOQ) ÷ 2]	(200 ÷ 2) x 4	₹400

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4	Total Variable Material Cost	Material cost + Total Ordering Cost + Total Carrying cost	1,00,000 + 400 + 400	₹1,00,800

Statement Showing Computation of Total Material Cost (at incorrect unit price)

S.No	Particulars	Formula	Computation	Solution (If unit price - ₹ 12.80)
1	Material Cost	Annual Demand x Unit Price	5000 x 12.8	₹64,000
2	Total Ordering Cost	No. of Orders x ordering cost per Order	20 x 16	₹320
3	Total Carrying cost	Average stock x Carrying cost p.u.p.a Average stock = (Ordering cost + EOQ) ÷ 2]	(250÷2) x 2.56	₹320
4	Total Variable Material Cost	Material cost + Total Ordering Cost + Total Carrying cost	64,000 + 320 + 320	₹64,640

4. Illustration

Anil & Company buys its annual requirement of 36,000 units in 6 instalments. Each unit costs Re.1 and the ordering cost is Rs.25.

The inventory carrying cost is estimated at 20% of unit value. Find the total annual cost of the existing inventory policy.

How much money can be saved by Economic Order Quantity?

Solution: 4

A = Annual Demand of RM in quantity	36,000 Units
O = Ordering Cost	₹25
Unit Price	₹1
C = Carrying Cost	20%

EOQ = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2x36000x25}{0.20}}$ =3000 units

S.NO	Particulars	Formula	Existing Policy (6 orders)	EOQ (12 orders)
1	Material Cost	Annual Demand x Unit Price	36000 x 1 = ₹36,000	36000 x 1 = ₹36,000
2	Total Ordering Cost	No. of orders x Ordering cost per order	6 x 25 = ₹150	12 x 25 = ₹ 300
3	Total Carrying Cost	Average Stock x Carrying cost p.u p.a. [Average stock = (Ordering cost/EOQ ÷ 2)]	(6000 ÷ 2) x 0.20 = ₹ 600	(3000 ÷ 2) x 0.20 = ₹ 300
4	Total Variable Material Cost	Material cost + Total ordering Cost + Total Carrying Cost	₹36,750	₹36,600

5. Illustration

A Company manufactures a special product which requires a component 'Alpha'.

The following particulars are collected for the year 20X1:

(i) Annual demand of Alpha 8,000 units

(ii) Cost of placing an order Rs. 200 per order

(iii) Cost per unit of Alpha Rs. 400

(iv) Carrying cost p.a. 20%

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

Required:

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(i) Compute the economic order quantity
(ii) Advise whether the quantity discount offer can be accepted.

Solution: 5

A = Annual Demand of RM in quantity	8,000 Units
O = Ordering Cost	₹200
Unit Price	₹400
C = Carrying Cost per unit per Annum	₹80 (₹400 x 20%)

EOQ = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2x8,000x200}{80}}$ = 200 units

S.No	Particulars	Formula	Existing Policy (EOQ 200 UNITS)	Discount Policy (Order 4000 Units)
1	Material Cost	Annual Demand x Unit Price	8000 x 400 =₹32,00,000	8000 x 384 = ₹30,72,000
2	Total Ordering Cost	No. of orders x Ordering cost per order	40 x 200 = ₹8000	2 x 200 = ₹400
3	Total Carrying Cost	Average Stock x Carrying cost p.u. p.a. [Average stock = (Ordering cost + EOQ) ÷ 2]	(200 ÷ 2) x 80 = ₹8000	(4000 ÷ 2) x 76.8 = ₹1,53,600
4	Total Variable Material Cost	Material cost + Total ordering Cost + Total Carrying Cost	**₹32,16,000**	₹32,26,000

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

Notes:

At Discount 4%

Price per unit = 400 x 96% = ₹384

Carrying Cost per unit per Annum = 20% x 384 = ₹76.8

6. Illustration

The complete Gardener is deciding on the economic order quantity for two brands of lawn fertilizer. Super Grow and Nature's Own. The following information is collected:

	Super Grow	Nature's Own
Annual demand	2,000 bags	1,280 bags
Relevant ordering cost per purchase order	Rs.1,200	Rs. 1,400
Annual relevant carrying cost per bag	Rs. 480	Rs. 560

Required:

(i) Compute EOQ for Super Grow and Nature's own.

(ii) For the EOQ, what is the sum of the total annual relevant ordering costs and total annual relevant carrying costs for Super Grow and Nature's own?

(iii) For the EOQ, compute the number of deliveries per year for Super Grow and Nature's own.

Solution: 6

Particulars	Formula	Super Grow	Nature's Own
EOQ	$\sqrt{\frac{2AO}{C}}$	$\sqrt{\frac{2x2,000x1,200}{480}}$ = 100 bags	$\sqrt{\frac{2x1,280x1,400}{560}}$ = 80 bags
No. of Orders	Annual Demand ÷ EOQ	$\frac{2,000}{100}$ = 20 Orders	$\frac{1280}{80}$ = 16 Orders
Total Ordering Cost	No. of orders x Ordering cost per order	20 x ₹1,200 =₹ 24,000	16 x 1,400 = ₹ 22,400

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Total Carrying Cost	Average Stock x Carrying cost p.u p.a [Average stock = (Ordering cost+EOQ ÷ 2)]	(100 ÷ 2) x 480 = ₹ 24,000	(80 ÷ 2) x 560 = ₹ 22,400

7. Illustration

Two components, A and B are used as follows:

Normal usage	50 per week each
Maximum usage	75 per week each
Minimum usage	25 per week each
Re-order quantity	A: 300; B: 500
Re-order period	A: 4 to 6 weeks B: 2 to 4 weeks

Calculate for each component

(a) Re-ordering level,
(b) Minimum level,
(c) Maximum level,
(d) Average stock level

Solution: 7

Ordering Level

S.No	Level Name	Formula	Product A		Product B	
			Computation	Units	Computation	Units
i)	Re-order Level	Max. consumption x Max. lead time	75 x 6	450	75 x 4	300
ii)	Minimum Level	ROL – (Avg. Consumption rate x min. Lead time)	450 – (50 x 5)	200	300 – (50 x 3)	150
iii)	Maximum Level	ROL + EOQ – (Min. Consumption rate x Min. Lead Time)	450 + 300 – (25 x 4)	650	300 + 500 – (25 x 2)	750
iv)	Average stock Level **Alternatively** Average Stock	(Min. stock Level + Max. Stock Level) ÷ 2 (OR) Min. Stock Level + ½ EOQ	(200 + 650) ÷ 2 (200 + ½ x 300)	425 300	(150 + 750) ÷ 2 (150 + ½ x 500)	450 400

8. Illustration

From the details given below, calculate:

(i) Re-ordering level
(ii) Maximum level
(iii) Minimum level
(iv) Danger level.

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

Cost of placing a purchase order	Rs. 20
Number of units to be purchased during the year	5,000 units
Purchase price per unit (inclusive of transportation cost)	Rs. 50
Annual cost of storage per unit	Rs. 5

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Details of lead time	
Average	10 days
Maximum	15 days
Minimum	5 days
Emergency purchases	4 days
Rate of consumption	
Average	15 units per day 20
Maximum	units per day

Solution: 8

A = Annual Demand of RM in quantity	5,000 Units
O = Ordering Cost	₹20
Unit Price	₹50
C = Carrying Cost per unit per Annum	₹5

EOQ = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2x5,000x20}{5}}$ = 200 units

S. No	Stock Level	Formula	Computation	Units
I.	ROL	Max. consumption x Max. lead time	20 x 15	300
II.	Maximum Level	ROL + EOQ – (Min. Consumption rate* x Min. Lead Time)	300 + 200 – (10 x 5)	450
III.	Minimum Level	ROL – (Avg. Consumption rate x min. Lead time)	(300 – 15 x 10)	150
IV.	Danger Level	Avg. Consumption x Emergency lead time (OR)	15 x 4	60
		Min. Consumption x Lead time	10 x 4	40

***Minimum Consumption**

Avg. Consumption = $\frac{(Max+Min)}{2}$ => 15 = $\frac{(20+Min)}{2}$ Min = 30 – 20 =10

9. Illustration

A Company uses three raw materials A, B and C for a particular product for which the following data apply:

Raw Material	Usage per unit of Product (Kgs.)	Re- order quantity (Kgs.)	Price per Kg.	Delivery period (in weeks)			Re-order level (Kgs)	Minimum level (Kgs.)
				Minimum	Average	Maximum		
A	10	10,000	10	1	2	3	8,000	?
B	4	5000	30	3	4	5	4750	?
C	6	10000	15	2	3	4	?	2000

Weekly production varies from 175 to 225 units, averaging 200 units of the said product. What would be the following quantities?

(i) Minimum stock of A,
(ii) Maximum stock of B,
(iii) Re-order level of C,
(iv) Average stock level of A.

Solution: 9

Stock Level	Formula	Computation	Units
Minimum Level Of A	ROL – (Avg. Consumption rate x min. Lead time)	8,000 – [(200 x 10) x 2]	4,000 kgs

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Max. Stock of B	ROL + EOQ – (Min. Consumption rate x Min. Lead Time)	9,750 – [(175x4) x 3]	7,650 kgs
Re – Order level of C	i) Max. Consumption x Max. lead Time **(OR)** ii) Min. Stock Level + (Avg Consumption x Avg. Lead time)	i) (225 x 6) x 4 ii)2,000 + [(200 x 6) x 3	5,400 kgs 5,600 kgs
Avg. Stock of A	i) (Min. stock Level + Max. Stock Level) ÷ 2 (OR) ii) Min. Stock Level + ½ EOQ	(16250+4000) ÷2 (Ref. Working Note) 4,000 + (½ x 10,000)	10,125 kgs 9,000 kgs

Working Note:

Maximum Sock of A = ROL + EOQ – (Min. Consumption rate x Min. Lead Time)
= 8000 + 10,000 – [(175 x 10) x 1]
= 16,250 kgs

10. Illustration

M/s Tyrotubes trades in four-wheeler tyres and tubes. It stocks sufficient quantity of tyres of almost every vehicle. In year-end 2018-19, the report of sales manager revealed that M/s Tyrotubes experienced stock-out of tyres. The stock-out data is as follows:

Stock-out of Tyres	No. of times
100	2
80	5
50	10
20	20
10	30
0	33

M/s Tyrotubes loses Rs.150 per unit due to stock-out and spends Rs.50 per unit on carrying of inventory. Determine Optimum safest stock level.

Solution: 10

Computation of Stock-out and Inventory carrying cost

Safety stock Level (units) (1)	Stock – out (units) (2)	Probability (3)	Stock – out cost (₹) (4) = (2) x ₹150	Expected Stock – out Cost (₹) (5) = (3)x(4)	Inventory Carrying cost (₹) (6) = (1) x₹50	Total cost (₹) = (5)+(6)
100	0	0.00	0	0	5,000	5,000
80	20	0.02	3,000	60	4,000	4,060
50	50 30	0.02 0.05	7,500 4,500	150 225		
			12,000	375	2,500	2,875
20	80 60 30	0.02 0.10 0.05	12,000 9,000 4,500	240 450 450		
			25,500	1,140	1,000	2,140
10	90 70 40 10	0.02 0.05 0.10 0.20	13,500 10,500 6,000 1,500	270 525 600 300		

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			31,500	1,695	500	2,195
	100	0.02	15,000	300		2,700
	90	0.05	12,000	600		
	50	0.10	7,500	750		
	20	0.20	3,000	600		
	10	0.30	1,500	450		
			39,000	2,700	0	2,700

At safety stock level of 20 units, total cost is **least** i.e. Rs. 2140

Working Note:

Calculation of Probability of stock – out

Stock – 0ut of tyres	No. of Times	Cumulative Frequency	Probability
100	2	2	0.02
80	5	7	0.05
50	10	17	0.10
20	20	37	0.20
10	30	67	0.30
0	33	100	0.33
	100		**1**

11. Illustration

A factory uses 4,000 varieties of inventory. In terms of inventory holding and inventory usage, the following information is compiled:

Number of varieties of inventory	%	% value of inventory holding (average)	% of inventory usage (in end- product)
3,875	96.875	20	5
110	2.750	30	10
15	0.375	50	85
4,000	100.00	100	100

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

Solution: **11**

Number of varieties of Inventory	%	% Value of inventory holding (average)	% Of inventory usage (in end – product)	Category
3,875	96.875	20	5	**C**
110	2.750	30	10	**B**
15	0.375	50	85	**A**
4,000	100.00	100	100	**-**

12. Illustration

The following data are available in respect of material X for the year ended 31st March 2019

Opening stock	90,000
Purchases during the year	2,70,000
Closing stock	1,10,000

Calculate:

- Inventory turnover ratio, and
- The number of days for which the average inventory is held.

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Solution: **12**

i) Inventory Turnover Ratio = $\frac{\text{Cost of Material Consumed}}{\text{Cost of Average Inventory}}$

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

ii) Average holding period of the inventory = $\frac{365}{2.5}$ =146 days

Working Note:

a) Cost of material consumed during the period = Opening Stock + Purchases during the year- Closing stock

= 90,000 + 2,70,000 – 1,10,000

= 3,60,000 – 1,10,000

= 2,50,000

b) Cost of average inventory = $\frac{\text{Opening Inventory+Closing Inventory}}{2}$

= $\frac{90,000+1,10,000}{2}$ = 1,00,000

13. Illustration

From the following data for the year ended 31st December 2018, calculate the inventory turnover ratio of the two items and put forward your comments on them.

	Material A (Rs.)	**Material B (Rs.)**
Opening stock 1.1.2018	10,000	9,000
Purchase during the year	52,000	27,000
Closing stock 31.12.2018	6,000	11,000

Solution: 13

Particular	**Material A (₹)**	**Material B (₹)**
Opening Stock	10,000	9,000
Add: Purchases	52,000	27,000
Less: Closing Stock	(6,000)	(11,000)
Material Consumed	**56,000**	**25,000**
Average inventory: $\frac{(\text{Opening Inventory} + \text{Closing Inventory})}{2}$	8,000	10,000
Inventory Turnover Ratio: $\frac{\text{Cost of Material Consumed}}{\text{Cost of Average Inventory}}$	$\frac{56,000}{8.000}$ = 7 times Fast Moving Item	$\frac{25,000}{10,000}$ = 2.5 times Slow Moving Item
Average holding period	$\frac{365}{7}$ = 52 days (appx.)	$\frac{365}{2.5}$ = 146 days (appx.)

14. Illustration

Day of month	**In stock**				**Issues**	
	Details	**Units**	**Per unit**	**Amount (Rs.)**	**Issued to**	**Units**
1	Opening stock	1,000	10	10,000		
2					Job A	500
3	Purchase	1,500	8	12,000		
4					Job A	500
4					Job B	1000
5					Job C	200
6	Purchase	1,000	9	9,000		
	Total Purchases	**3,500**			**Total Issues**	**2,200**

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Compute the value of issues made to Job A, Job B, Job C respectively.
Also compute the value of Closing stock under
i) FIFO
ii) LIFO
iii) Weighted Average method

Solution: 14

i) Statement showing issue of material using FIFO

Date	Particulars	Receipts			Date	Particulars	Issues		
		Qty	Rate	Value			Qty	Rate	Value
1	Opening Stock	1,000	10	10,000	2	Job A	500	10	5,000
3	Purchase	1500	8	12,000	4	Job A	500	10	5,000
6	Purchase	1000	9	10,000		Job B	1,000	8	8,000
					5	Job C	200	8	1,600
						Closing Stock (Bal. Figure)	300 1000	8 9	2,400 9,000
		3,500		**31,000**			**3,500**		**31,000**

Value of material issued: Job A = 10,000; B = 8,000; C = 1,600

ii) Statement showing issue of material using **LIFO**

Date	Particulars	Receipts			Date	Particulars	Issues		
		Qty	Rate	Value			Qty	Rate	Value
1	Opening Stock	1,000	10	10,000	2	Job A	500	10	5,000
3	Purchase	1500	8	12,000	4	Job A	500	8	4,000
6	Purchase	1000	9	10,000		Job B	1,000	8	8,000
					5	Job C	200	10	2,000
						Closing Stock (Bal. Figure)	300 1,000	10 9	3,000 9,000
		3,500		**31,000**			**3,500**		**31,000**

Value of material issued: Job A = 9,000; B = 8,000; C = 2,000

iii) Value of material issue under **Weighted Average Cost Method**

Weighted Avg Cost = $\frac{\text{Qty} \times \text{Rate}}{\text{Total quantity}}$

$= \frac{(1,000 \times 10)+(1,500 \times 8)+(1,000 \times 9)}{(1,000+1,500+1,000)} = \frac{31,000}{3,500}$

= ₹8.86 p,u. (approx.)

Job A = 1,000 x 8.86 = 8,860
Job B = 1,000 x 8.86 = 8,860
Job C = 2,00 x 8.86 = 1,772
Closing Stock = 1,300 x 8.86 = 11,518

15. Illustration

'AT' Ltd. furnishes the following store transactions for September, 20X1:

Date	Particulars	Units	Amount
1-9-X1	Opening balance	25	162.5
4-9-X1	Issues Req. No. 85	8	-
6-9-X1	Receipts from B & Co. GRN No. 26	50	5.75
7-9-X1	Issues Req. No. 97	12	-
10-9-X1	Return to B & Co.	10	-

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12-9-X1	Issues Req. No. 108	15	-
13-9-X1	Issues Req. No. 110	20	-
15-9-X1	Receipts from M & Co. GRN. No. 33	25	6.10
17-9-X1	Issues Req. No. 121	10	-
19-9-X1	Received replacement from B & Co. GRN No. 38	10	-
20-9-X1	Returned from department, material of M & Co. MRR No. 4	5	-
22-9-X1	Transfer from Job 182 to Job 187 in the dept. MTR 6	5	-
26-9-X1	Issues Req. No. 146	10	-
29-9-X1	Transfer from Dept. "A" to Dept. "B" MTR 10	5	-
30-9-X1	Shortage in stock taking	2	-

Write up the priced stores ledger on FIFO method and discuss how would you treat the shortage in stock taking.

Solution: **15**

	RECEIPT				**ISSUE**				**BALANCE**		
Date	GRN No MRR No	Qty. Units	Rate (₹)	Amount (₹)	Requisition No	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Rate (₹)	Amount (₹)
1-9-X1	-	-	-	-	-	-	-	-	25	6.50	162.50
4-9-X1	-	-	-	-	85	8	6.50	52	17	6.50	110.50
6-9-X1	26	50	5.75	287.50	-	-	-	-	17 50	6.5 5.75	389.00
7-9-x1	-	-	-	-	97	12	6.50	78	5 50	6.50 5.75	320.00
10-9-X1	-	-	-	-	Return	10	5.75	57.50	5 40	6.50 5.75	262.50
12-9-X1	-	-	-	-	108	5 10	6.50 5.75	90	30	5.75	172.50
13-9	-	-	-	-	110	20	5.75	115	10	5.75	57.50
15-9-X1	33	25	6.10	152.50	-	-	-	-	10 25	5.75 6.10	210.00
17-9-	-	-	-	-	121	10	5.75	57.50	25	6.10	152.50
19-9-X1	38	10	5.75	57.50	-	-	-	-	25 10	6.10 5.75	210.00
20-9-X1	4	5	5.75	28.75	-	-	-	-	5 25 10	5.75 6.10 5.75	238.75
26-9-X1	-	-	-	-	146	5 5	6.75 6.10	59.25	20 10	6.10 5.75	179.50
30-9	-	-	-	-	**Shortage** (Costing P&L)	2	6.10	12.20	18 10	5.10 5.75	167.30

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UNIT: 2 EMPLOYEE COST AND DIRECT EXPENSES

OVERVIEW

- Meaning and need of employee cost in an organization.
- Attendance and payroll procedure
- Employee turnover-meaning, reasons, methods of measurement and cost impacts.
- Various methods of remuneration
- Incentive system in calculation of wages bonus etc.
- Efficiency rating procedures

INTRODUCTION

To manufacture a product or to make provision for service, the role of human exertion is inevitable. The term used for human resources may include workers, employees, labourers, staffs etc. The compensation paid, either in monetary terms or in kind and facility is known as wages. Cost of paying wages to workers is popularly known as labour cost as it relates to labour (exertion) they put for manufacturing of product or provision of services; hence, employee cost is also interchangeably known as labour cost. In a nutshell, employee cost is wider term which includes wages, salary, and bonus, incentives etc. paid to an employee and charged to a cost object as labour cost.

1. Employee (labour) cost

Employee (labour) cost refers to the amount of money paid to the people who are engaged in the production of goods. In manufacturing businesses, often management will break down labour cost into direct cost and indirect cost. Employee cost includes the following:

- Wages and salary
- Allowances and incentives
- Payment for overtimes
- Employer's contribution to Provident fund and other welfare funds
- Other benefits (leave with pay, free or subsidized food, leave travel concession etc.)

Classification of employee cost

A. Direct Employee (labour) cost:

These are the labour costs incurred on the employees who are engaged directly in making the products; their work can be identified clearly in the process of converting the raw materials into a finished product.

B. Indirect Employee (labour) cost:

These are the labour cost incurred on indirect employees who are not directly associated with the conversion process but assist in the process by way of supervision, maintenance, transportation of materials.

Sl. No	Direct Employee Cost	Indirect Employee Cost
1	It is the cost incurred in payment of employees who are directly engaged in the production process.	Cost incurred for payment of employee who are not directly engaged in the production process.
2	Direct employee cost can be easily identified and allocated to cost unit	indirect employee cost is apportioned on some appropriate basis Indirect employee cost is apportioned on some appropriate basis
3	Direct employee cost varies with the volume of production and has positive relationship with the volume	Indirect employee cost may not vary with the volume of production

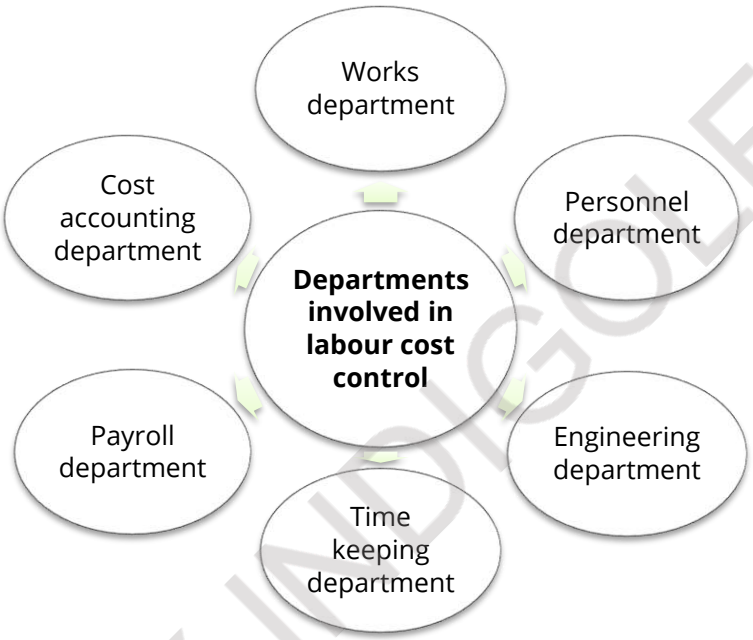
2. Employee labour cost control

- Employees of any organization, as its precious wealth and backbone, play an important role in its developmental and productive activities.

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- The development and progress of the organization, to a greater extent, are influenced by the effective and systematic utilization of available human resources.
- In the same analogy, if this resource is not utilized properly, it is sure that its manufacturing and marketing activities are bound to be retarded.
- It is these factors which necessitate lying emphasis on the labour related aspects such as recruitment, training, placement, payment of wages and incentives, etc.
- Labour cost is another important element of total cost of any organization, and it works out to 40 to 60% of total cost in most of the corporate undertakings.
- By keeping these labour costs at the minimum level, it is possible to lower the total labour cost, conversion cost, production cost and the cost of sales which enables the company to offer its products to the customers at comparatively lower prices which in turn ensures higher demand for the products.

Departments involved in labour cost control.



A. Personnel department

- Selection and recruitment of most needed workers for the organizations
- Maintain detailed and up to date records of the workers.
- Promotion transfers and discharge of workers after their evaluation
- Development of different forms for maintaining the records of the workers.
- Provide training and conduct seminar for the worker.

B. Engineering department

- Prepares plans and specifications for each job.
- Providing training and guidance to the employees.
- Supervises production activities.
- Conducts time and motion studies.
- Undertakes job analysis.
- Conducts job evaluation.

C. Work study department

- These studies help in determining the proper speed of work by eliminating unnecessary movements.
- They help in fixation suitable wage rates and introduction of suitable wage plans.
- Efficiency of worker get increased because they asked to follow correct procedures.
- They help in increase the output by a greater efficiency and less human fatigue.
- They help in assessing the correct labour requirements of an organization.
- They facilitate labour cost budgeting and labour cost control.

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D. Time keeping department.

- Concerned with the maintenance of attendance records i.e., time keeping.
- Time spent by an employee on various jobs i.e., time booking etc.
- It identifies the idle time of the workers to control and minimize it.
- It also keeps detailed record or employee arrival and departure time in workplace.

E. Payroll department

- To maintain the record of the job classification, department, and wages rate for each worker
- To verify and summarize the time of each workers as shown by the daily timecard.
- To calculate the amount of wages earned by each worker.
- To maintain permanent payroll records for each worker.
- To make the disbursement of wages and salaries to the workers.

F. Cost accounting department

- To collect all type of information about cost and reporting management with analysis
- To determine labour cost by using the timecard, job card and payroll.

Factors for the Control of Employee Cost

To exercise an effective control over the employee costs, the essential requisite is efficient utilisation of employee and allied factors. The main points which need consideration for controlling employee costs are the following.

- Assessment of manpower requirements.
- Control over timekeeping and time-booking.
- Time & Motion Study.
- Control over idle time and overtime.
- Control over employee turnover.
- Wage and Incentive systems.
- Job Evaluation and Merit Rating
- Employee productivity.

Collection of Employee Costs

The task of collecting employee costs is performed by the Cost Accounting Department which record separately wages paid to direct and indirect employee. It is the duty of this department to ascertain the effective wages per hour in each department and to analyses the total payment of wages of each department into

- The amount included in the direct cost of goods produced or jobs completed.
- The amount treated as indirect employee and thus included in overheads; and
- The amount treated as the cost of idle time and hence loss.
- The amount treated as abnormal loss/ gain and to be transferred to profit and loss account.
- Through this process costs of various jobs are ascertained. Naturally, in this the proper recording of time spent by the employees is essential.

3. Attendance and payroll procedures

Attendance Procedure / Timekeeping

It refers to correct recording of the employees' attendance time. Students may note the difference between "time keeping" and "time booking". The latter refers to break up of time on various jobs while the former implies a record of total time spent by the employees in a factory.

Objectives

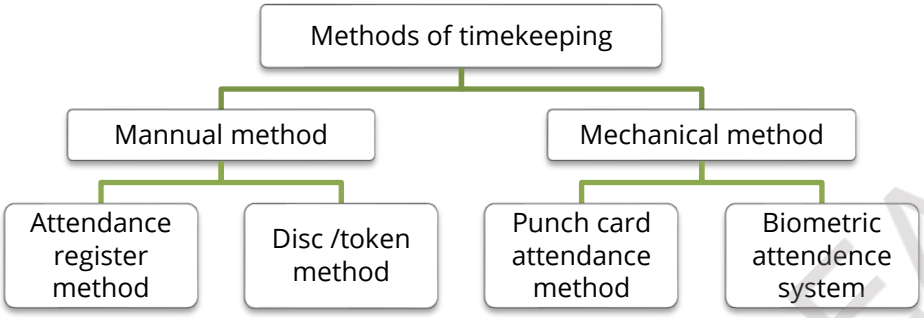
The various objectives of timekeeping or the purpose of timekeeping are to provide data for:

- Payroll preparation
- Calculating overtime
- Attendance record to meet statutory requirements.

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- Finding productivity and controlling cost
- The calculating overhead cost of a job product or service
- To maintain discipline in attendance
- Provide internet check against dummy workers for
- Overhead distribution for ascertaining the idle time.
- Distinguish between normal and overtime late and early leaving.

Methods of timekeeping



A. Manual method

Under this method the attendance time of employees are recorded either by the time keeping officer or by employees themselves.

a) Attendance registers method

- So, attendance register is kept at the entrance of the office where the employees must record their names and time in and out so that it records their attendance.
- The register is kept at the entrance to note the arrival and departure of the workers.
- This method is simple and cheap enough and it is easy to operate but it is suitable only for the small industries.
- Because of the collusion between workers and time record
- This method despite of all the disadvantages is fairly used with advantages in large no of commercial and industrial enterprises.

b) Disc/token method

- Under this method, the employee is located at a metal disc or a token with the hole bearing his identification number.
- As the workers enter the factory gate, they remove their disc or token and place them in the box.
- Immediately after the time for entering the factory box is removed and the latecomers will have to give their token to a timekeeper personally so that they can record the time it.

B. Mechanical method

a) Punch card attendance

- In this method each employer is given an identity card.
- A punch card contains data related with the employee in digital form.
- In punch card attendance system, an employee needs to either insert or wave his card to a card reader which then ensures whether the correct person is logging in and/or out.
- It prevents proxy attendance.
- Despite all the advantages there are still some disadvantages. It has the complex software and hardware and needs expensive machines for installation.

b) Biometric attendance system

- Based on the improved technology employees scan their fingerprint on the terminal.
- Recognizing an individual based on physical training includes identification based on fingerprint, DNA, eyes, voice.
- It provides added security. This can be incredibly beneficial when used in a work environment.

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- Organization can prevent time theft and attendance abuse.
- Biometric attendance system saves the precious time of the employers that are required to manage the attendance manually.

Requisites of a Good Time-keeping System

- Time of arrival as well as time of departure of employees is to be recorded so that total time of employees can be recorded, and wages can be calculated accordingly.
- System should be reviewed and maintained regularly at some interval to prevent errors.
- There should not be any allowance of proxies for the employees.
- Regular attendance and discipline should be maintained because it is necessary to maintain uniformity of flow of production.
- Time recording method should be mechanical so that chances of disputes may not arise.
- The system should be simple, quick, and smooth so that unnecessary queuing for marking attendance can be avoided.
- Late comers should be recorded as late arrivals. No relaxation should be provided by the timekeeper.

Time booking

Time booking refers to a method wherein each activity of an employee is recorded. This data recorded is further used for measuring the time spent on a particular job for costing, measurement of efficiency, fixation of responsibility etc.

The objects of time booking are:

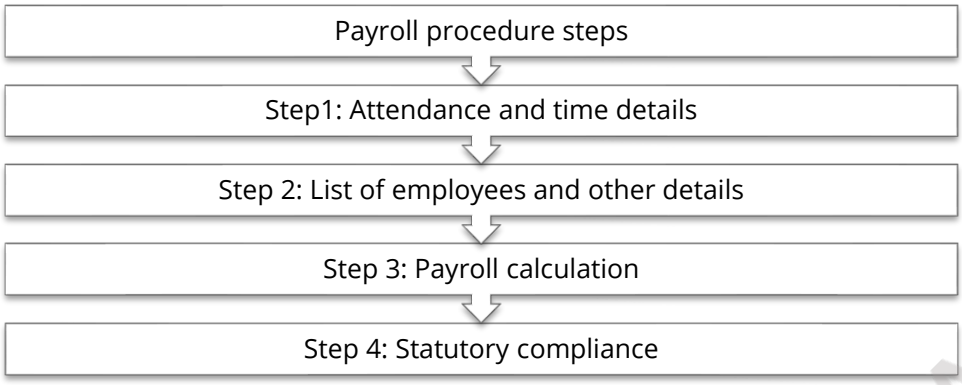
- To calculate the labour cost of jobs done
- To ascertain idle time for the purpose of control
- To calculate the bonus and wages provided the system of payment of wages depends on the time taken.
- To evaluate performance of labour.
- To make comparison of actual labour with the budgeted time.
- For absorbing overhead expenses under labour hour and machine hour determine overheads rates
- To know the efficiency of workers, it is necessary to make the comparison of actual time taken with time allowed for completing the task.

Payroll procedure



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Steps involved in payroll process.



A payroll officer needs to do careful planning. There are always ongoing tasks that need attention and a constant need to monitor changes to withholdings, contribution to social security funds, etc. The entire process can be split into three stages, pre-payroll, actual payroll, and post payroll activities.

STEP 1: Attendance and time details

- A detailed sheet of number of days or hours worked by each employee.
- Units or percentage of work (in case of piece rate) as reflected by the time keeping methods are sent to the payroll department by the time keeping department.
- Further, payroll department with the help of time booking records calculate any further incentives such as overtime payment, bonus to be paid to the employees.

STEP2: List of employees and other details

- A list of employees on roll and the rate at which they will be paid is sent by the personnel/ HR department.
- Once inputs are received, you need to check for validity of the data concerning adherence to company policy, authorization/approval matrix, right formats, etc.
- You also need to ensure that no active employee is missed out and that no inactive employee records are included for salary payment.

STEP 3: Payroll calculation

- At this stage, you can start processing your payroll calculation.
- To do this you have to calculate wages/salaries to be paid to the employees.
- Payroll department prepares pay slip for all employees authorized by the personnel department and forward the same to the cost/ accounting department for further deductions and payment.
- Cost/ accounting department deduct all statutory deduction such as employee's contribution to provident fund and employee state insurance (ESI) scheme, TDS on salary etc. After all deduction's wages/ salary is paid to the employees
- Once payroll process is over, it is always a good practice to reconcile the values and verify for accuracy to avoid any errors.

STEP 4: Statutory compliance

- All statutory deductions like TDS, EPF, etc are deducted from the gross salary/wages.
- All statutory deduction made from wages/ salary of the employees along with employer's contributions such as provident fund and employee state insurance scheme are paid to the respective statutory bodies.

4. Idle time

- If workers are paid based on time, some difference may arise between the time for which they are paid based on time and the actual time they spend on production.
- The difference is called Idle Time, i.e., the employer pays but, in return, derives no benefit.
- In short, it explains the time for which wages are paid but produce no output or workers remain idle.

Idle Time = Total Time spent by a worker – Actual Time spent on production.

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Some of the causes of normal idle time	Some of the causes of abnormal idle time
• Travelling time from one job or department to another, • The distance covered between the factory gate and actual place of work, • Elapse of time between finishing one job and starting another job, • Time spent to overcome fatigue, • Tea and lunch breaks, and • Machine or job setting-up time etc.	• Temporary lack of work, • Machine breakdown, • Power failures, • Shortage of raw materials, • Waiting for tools, • Waiting for jobs due to unplanned production, • Stoppage of work due to managerial policy decisions, • Strikes and lockouts, and • Floods, earthquakes, etc.

Treatment of idle time

Treatment of normal idle time	Treatment of abnormal idle time
The wages paid for the normal idle time is treated as production overhead and absorbed into cost of product by adopting an absorption rate. The normal idle time in tool setting etc. can be charged at inflated rate. Jobs are charged at inflated rate.	The wages paid for the abnormal idle time can be avoided by taking proper care and caution. It is not treated as part of cost and excluded from cost accounts and it is straight away debited to Costing Profit and Loss Account.

Overtime

- Work done beyond normal working hours is known as 'overtime work'.
- Overtime payment is the amount of wages paid for working beyond normal working hours.

The overtime wages consist of two elements:

- Normal wages for extra time, and
- Additional wages paid for the overtime worked.

Overtime premium

- Overtime premium is paid to the workers for the extra time worked than the normal working hours specified in the Factories Act, 1948 or work agreement with the union.
- The extra time is paid at a higher rate than the normal time rate.
- For example, if a worker works beyond 8 hours in a day or 48 hours in a week, he is paid with double the wages for the extra time worked.

Overtime payment Wages paid for overtime at normal rate + premium (extra) payment for overtime work

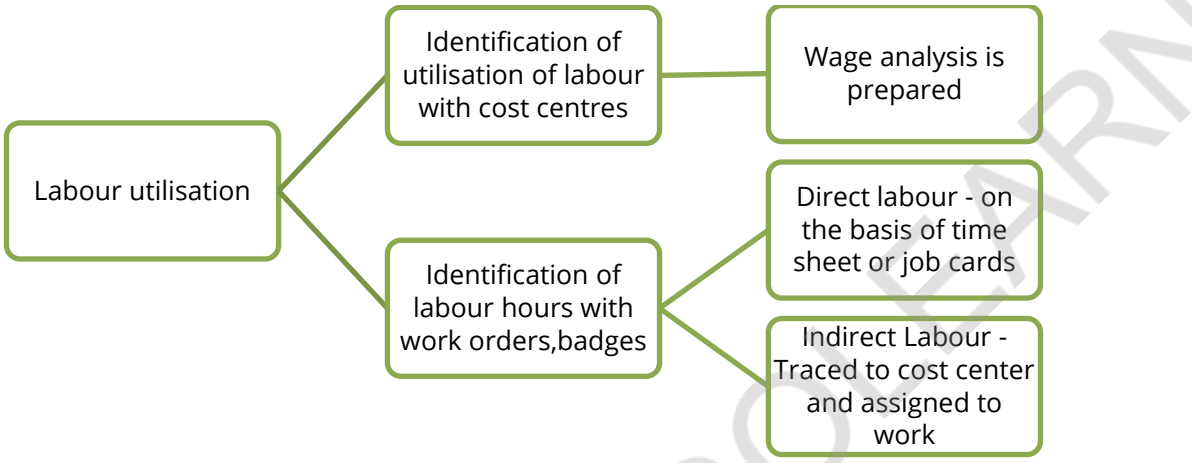
Causes of Overtime and Treatment of Overtime premium in cost accounting.

S.No	Causes	Treatment
1	The customer may agree to bear the entire charge of overtime because urgency of work.	If overtime is resorted to at the desire of the customer, then overtime premium may be charged to the job directly.
2	Overtime may be called for to make up any shortfall in production due to some unexpected development	If overtime is required to cope with general production programmes or for meeting urgent orders, the overtime premium should be treated as overhead cost of the department or cost centre which works overtime.
3	Overtime work may be necessary to make up a shortfall in production due to some fault of management	If overtime is worked in a department due to the fault of another department, the

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		overtime premium should be charged to the latter department
4	Overtime work may be resorted to, to secure an outturn more than the normal output to take advantage of an expanding market or of rising demand	Overtime worked on account of abnormal conditions such as flood, earthquake etc., should not be charged to cost, but to Costing Profit and Loss Account.

5. Labour utilization



- For identifying utilization of labour, a statement is prepared for each department/cost centre.
- This statement should show the actual time paid for, the standard time (including normal idle time) allowed for production and the abnormal idle time analysed for causes thereof.

A. Identification of utilization of labours with cost centres

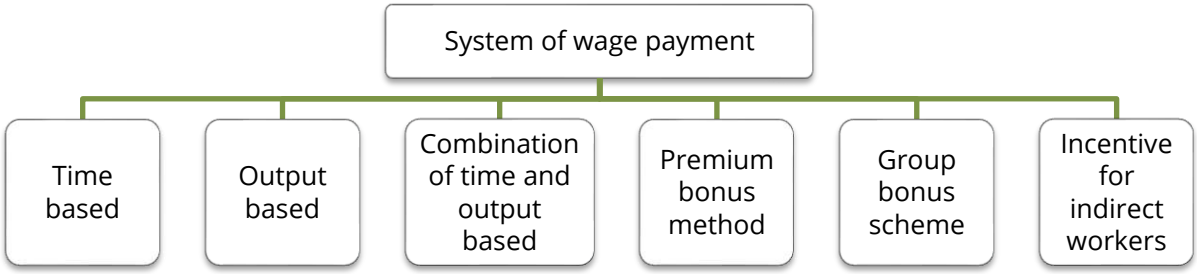
- For the identification of utilization of labour with the cost centre, a wage analysis is prepared.
- Wage analysis sheet is a statement in which total wages paid are analysed according to cost centre, jobs, work orders etc.
- The data for analysis is provided by wage sheet, timecard, piece work cards and job cards.

  The preparation of such sheet serves the following purposes.
  - It analyses the labour time into direct and indirect labour by cost centres, jobs, work orders.
  - It provides details of direct labour cost comprises of wages, overtime to be charged as production cost of cost centre, jobs, or work orders.
  - It provides information for treatment of indirect labour cost as overhead expenses.

B. Identification of labour hours with work order or batches or capital job

- For identification of labour hours with work order or batches or capital jobs or overhead work orders the following points are to be noted.
  - The direct labour hours can be identified with the work order or batches or capital job or overhead work orders based on details recorded on source document such as time sheet or job cards.
  - The indirect labour hours cannot be directly identified with the work order or batches or capital jobs or overhead work orders.
  - Therefore, they are traced to cost centre and then assigned to work order or batches or capital jobs or overhead work orders by using overhead absorption rate.

6. System of wage payment and incentives



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A. Time based system

- It is a system where wages are paid based on time spent by workers on the job. Time may be spent in hours, days, weeks, or month, that is, wages may be paid per hour, per day, per week or per month. Total wages are determined by multiplying wages per unit of time with total time spent on the job.

Wages = Rate per unit of time x Total units of time spent

- If wages are determined on hourly basis say Rs. 100/- per hour and a worker works for 8 hours a day, his total wages will be Rs. 800 (Rs. 100 x 8). If wages are determined on daily basis, say Rs. 500/-per day and a worker work for 20 days in a month, his total wages for the month will be Rs. 10,000 (Rs. 500 x 20).

B. Output based (Piece rate system)

- Piece rate system is a system in which wages are paid in accordance with the number of units of work produced.
- This is independent of time spent on the job. A fixed rate of wage is paid for each piece of unit produced.
- For example: If a worker produces 100 pieces per day and he is paid at the rate of Rs.1.2 per piece, the daily wage is 100 x 1.2 = Rs.120.

C. Combination of Time and Piece Rate System:

- In this system, both time and product are taken into consideration.
- The minimum weekly wages are fixed for every worker, which are to be paid irrespective of his output during the week, provided he has worked for full working hours required in a week.
- The wages for the period of his absence are deducted from the total amount of his wages.

D. Premium Bonus Plan:

- Under time rate system of wage payment all the gains contributed by the efficient workers benefit the employer while, under piece rate system, it is the workers who gain or lose. Under premium bonus system, the gains are shared by the employer and employees in agreed ratio.
- Apart from the minimum guaranteed wages, the efficient workers get bonus depending on the time saved.
- Under this system a standard time is fixed for performing a job.
- If a worker can perform the job within the time less than standard time, he is eligible to get bonus at his specific rate of wages for a percentage of time saved.
- Standard time in determined based on time and motion study.

The following are some of the important Premium Bonus Schemes:

a. Halsey premium plan

- This scheme was originated by F. A. Halsey in 1891. In this plan time rate is guaranteed. A standard time is fixed for the performance of a particular job. If a worker can complete the job before standard time, he is paid bonus for the time saved at a fixed percentage. The percentage varies from 30% to 70%. Generally, the worker is paid bonus @ 50% of standard time saved.

Total wages = Time taken x Rate +50/100 of Time saved x Rate per hour

Advantages

- Individual efficiency of workers is taken care of and rewarded.
- Benefit of time saved is equally shared by the employer and employee.
- Since worker is motivated in a better way, his earnings increase which leads to increased productivity.
- Fixed overhead cost per unit comes down because of increased production.

Disadvantages

- The plan is not scientific since it is difficult to fix standard time for a particular job.
- As the workers are attracted by higher income, they complete the job in hurry because of which quality may suffer.
- If the standard time cannot be properly fixed, the amount of bonus payable to workers may involve a large amount of money.
- As the workers do the work hastily to earn more, there are possibilities of more wastage and defective goods resulting in high labour cost per unit.

b. Rowan Plan:

- Games Rowan was the first to introduce the scheme in 1898.
- This scheme is similar to Halsey Plan. Under this scheme bonus is calculated as the proportion of time taken which the time saved bears to the time allowed.

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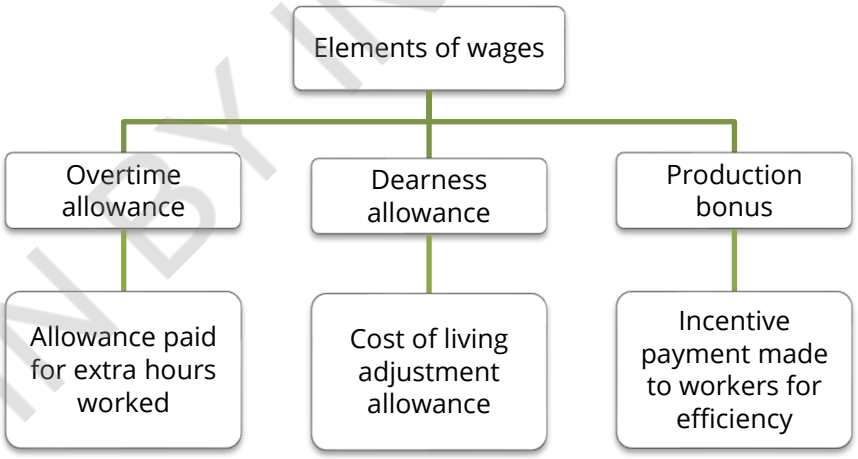
- The bonus is paid at time rates.
- The Rowan Scheme protects the employer from loose rate-fixing by reducing the bonus at high production levels.

$$\text{Bonus} = \frac{\text{Time taken}}{\text{Time allowed}} \times \text{time saved} \times \text{time rate or}$$
$$= \frac{\text{Time saved}}{\text{Standard Time}} \times \text{time taken} \times \text{rate per hour}$$

Advantages	Disadvantages
• It is claimed to be a fool-proof system in as much as a worker can never double his earnings even if there is bad rate setting. • It is admirably suitable for encouraging moderately efficient workers as it provides a better return for moderate efficiency than under the Halsey Plan. • The sharing principle appeals to the employer as being equitable	• The system is a bit complicated. • The incentive is weak at a high production level where the time saved is more than 50% of the time allowed. • The sharing principle is not generally welcomed by employees.

7. Absorption of wages

A. Elements of wages



- In common parlance, the term 'wages' represents monetary payment which an employee receives at regular intervals for the services rendered. Strictly speaking, however, from the point of view of the employer and the cost to the industry, wages should be taken to include also non-monetary benefits which an employee receives by virtue of employment. Such non-monetary benefits may include:
    - Medical facilities.
    - Educational and training facilities
    - Recreational and sports facilities.
    - Housing and social welfare; and
    - Cost of subsidized canteen and co-operative societies. Such benefits are generally given in an industrial establishment.

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- **Dearness Allowance** is cost of living adjustment allowance which the government pays to the employees of the public sector as well as pensioners of the same. DA component of the salary is applicable to both employees in India and Bangladesh. Dearness Allowance can be basically understood as a component of salary which is some fixed percentage of the basic salary, aimed at hedging the impact of inflation. Since, DA is directly related to the cost of living, the DA component is different for different employees based on their location. This means DA is different for employees in the urban sector, semi-urban sector, or the rural sector.
- **Overtime allowance** is an allowance paid for the extra hours worked at the rates laid down in the Factories Act. In certain industries, where special allowance for the working conditions, tool maintenance, etc., are paid they are also considered as part of wages.
- **Production Bonus** is an incentive payment made to workers for efficiency that results in production above the standard. There are different methods of computing incentives. Under the Payment of Bonus Act, a worker is entitled to compulsory bonus of 8.33% wages earned in the relevant year or Rs. 100 (whichever is greater). The bonus may be up to 20% of wages depending upon the quantum of profits calculated as per the Act.

B. Component of wages cost or wages for costing purposes

- In addition to wages (including allowances, such as D.A.) that are paid to workers, a firm may have to spend on many other items (such as premium to the ESI or provident fund or bonus).
- Further, the worker does not spend all the time for which he is paid on productive work.
- This is because he is entitled to weekly holiday and various type of leave. There is also a certain amount of unavoidable idle time. But in the case of direct workers, two alternatives are possible.
- The additional charges may be treated as overheads. Alternatively, the wage rates being charged to job may be computed by including such payments; automatically then, such payments will be charged to the work done along with wages of the worker (It should be remembered that such wage rate will be only for costing purposes and not for payment to workers).
- The total of wages and additional payment should be divided by effective hours of work to get such wage rates for costing purposes.

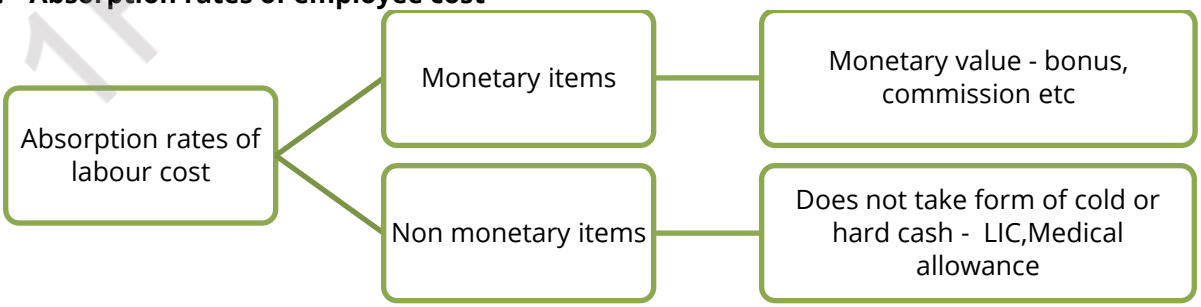
C. Holiday and leave wages.

- One alternative to account for wages paid on account of paid holiday and leave can be to include them as departmental overheads.
- In such a case, it is necessary to record such wages separately from "worked for wages".
- Such segregation can be made possible by providing a separate column in the payroll for holiday and leave wages in the same way as there are columns for dearness allowance, provident fund deductions, etc.
- If, however, a separate or additional column cannot be provided for this purpose it would be necessary to analyses the payroll periodically to ascertain how much of the total payment pertains to "worked for wages" and how much is attributed to leave and holiday wages.
- Another way could be to inflate the wage rate for costing purposes to include holiday and leave wages.
- This can be done only in the case of direct workers.

D. Night shift allowance

- Payment given the extra work done by the workers during nights is termed as night shift allowances. Since the extra payment is not for any job, therefore such a payment should be treated as part of overheads.

8. Absorption rates of employee cost



- Monetary incentive has an explicit monetary value; an employee knows exactly what one is worth. In addition to cold, hard cash, monetary rewards can take the form of:
    - Bonuses.
    - Commissions.

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- Merit pay.
- Profit sharing.
- Stock options.
- Vacation time (beyond an employee's normal paid time).

- A non-monetary incentive does not take the form of cold, hard cash, but this does not mean an employee cannot discern its monetary value. Some traditional favourites among employers include:
  - Healthcare benefits.
  - Life insurance.
  - Promotion.
  - Vehicle or vehicle allowance.
- Accounting of monetary and non-monetary benefits to indirect workers does not pose any problems because the total of monetary and non-monetary benefits is treated as overhead and absorbed based on rate per direct employee hour if overheads are predominantly employee oriented. For direct workers, the ideal method is to charge jobs or units produced by supplying per hour rate calculated as below:

Rate per hour
Total estimated monetary benefits and cost of non-monetary benefits /Budgeted direct employee hour – Normal idle time

9. Efficiency rating procedure

- Efficiency is the ability to act or produce effectively with a minimum of waste, expenditure, or unnecessary effort.
- The focus is on the resources and speed with which organisational goals are achieved.
- The effectiveness of your organisation is determined by how successfully employee assign resources to achieve organisational goals in the right way.

Efficiency in % = Time allowed as per standard / Time taken *100

For efficiency rating of employees, the following procedures may be followed.

A. Determining standard time/performance standards

- The first step is to determine the standard time taken by a worker for performing a particular job/task.
- The standard time can be determined by using Time & Motion study or Work study techniques.
- While determining the standard time for a job/task a heterogeneous group of workers is taken and contingency allowances are added for determining standard time

B. Measuring Actual Performance of workers

- The second step in determining the efficiency of the employee is to develop a procedure for recording of actual performance of the worker.
- The system undertaken should efficiency of each worker by taking in to account the output of each worker and the time taken by them.

C. Computation of efficiency rating

- The efficiency rating of each worker can be computed by using the above-mentioned formula.

D. Employee Productivity

- Employee productivity is a metric that is calculated based on the amount of output on a project versus the amount of time it takes.
- It can also be measured against a standard or "base" of productivity for a group of workers doing similar work. It is calculated as below.

Standard time for doing actual work / actual time taken

- Productivity of employees is not only a way to measure efficiency in a company. This is only its most obvious use.
- A lagging productivity number can also be a symptom in a diagnostic test for the business.
- If productivity is low, overall, this could spell worker disengagement, problems in collaboration, "cyber slacking" (i.e., online time-wasting), or even inefficient email communications.
- Oftentimes, employees are caught in the "administrative" or "small-ball" details of the job. Measuring workforce productivity can also be a significant portion of understanding ROI.

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Factors for increasing Employee productivity

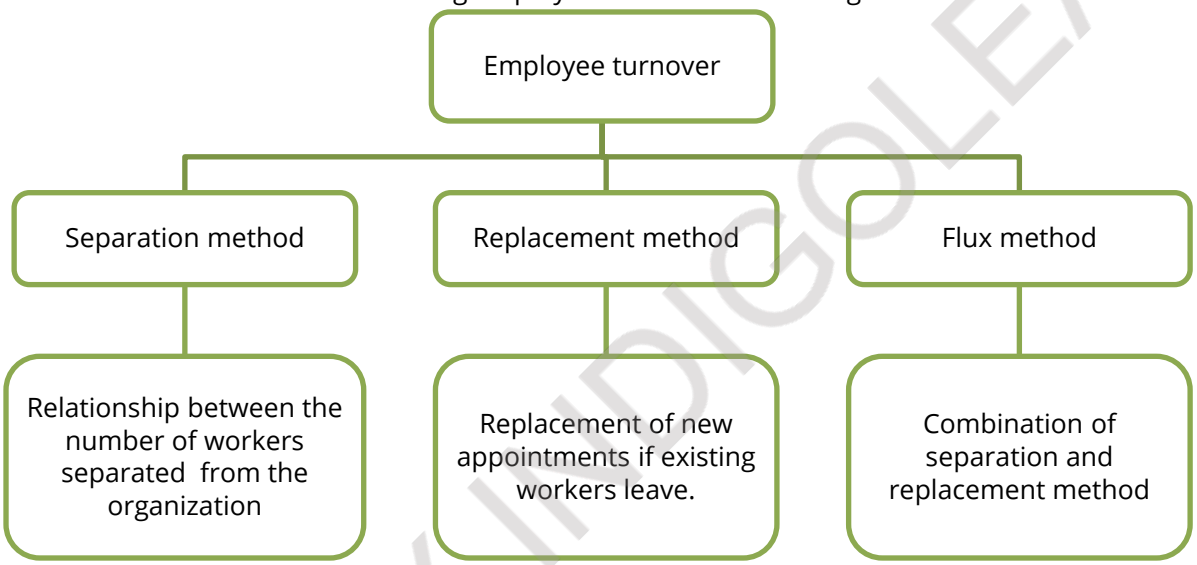
The important factors which must be taken into consideration for increasing employee productivity are as follows.

- Employing only those workers with right type of skills.
- Placement of right type of man at the right job.
- Training young and old workers by providing them the right types of opportunities.
- Taking appropriate measures to avoid the situation of excess or shortage of employees.
- Carrying out work study for fixation of wages and for the simplification and standardization of work.

10. Employee turnover

- Employee turnover refers to the number or percentage of workers who leave an organization and are replaced by new employees.
- Measuring employee turnover can be helpful to employers that want to examine reasons for turnover or estimate the cost-to-hire for budget purposes.
- Blanket references to turnover can be confusing; therefore, specific definitions and calculations for employee turnover may be useful to human resources practitioners.

There are three methods of calculating Employee turnover which are given below.



A. Separation method

- Under the Separation Method, the relationship between the number of workers separated or left from the organization and average number of workers of the organization in the period is expressed in terms of percentage.
- A worker may be left or separated from the organization due to surplus workers, poor working conditions and wages, less chance for promotion and the like.

The following formula is used to measure the labour turnover by Separation method.

$$\textbf{Labour Turnover} = \frac{\text{Number of workers left or separated during a period}}{\text{Average number of workers on role during that period}} \times 100$$

$$\textbf{Average No. of. Workers} = \frac{\text{No.of workers at beginning of the period} + \text{No.of workers at end of the period}}{2}$$

B. Replacement method

- There is no need of replacement if the surplus workers left from the organization. The workers whose services are required by the organization are to be replaced by new appointments if they leave.
- Hence, the relationship between the number of workers replaced and average number of workers of the organization in a period is expressed in terms of percentage under the replacement method.

The following formula is used to measure the labour turnover by replacement method.

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$$\textbf{Labour Turnover} = \frac{\text{Number of workers replaced during a period}}{\text{Average number of workers on role during that period}} \times 100$$

C. Flux method

- This is the combination of separation method and replacement method. Both separation and replacement are taken into consideration to calculate labour turnover in Flux method.
- Hence, the relationship between both separation and replacement of labour force of the organization in a period and average number of workers on roll during that period is expressed in terms of percentage.

The following formula is used to calculate labour turnover by flux method.

$$\textbf{Labour Turnover} = \frac{\text{No.of workers separated in a period + No.of workers replaced in the same period}}{\text{Average number of workers on role during that period}} \times 100$$

The total number of workers joining, including replacements, is called accessions.

When number of accessions is considered for measuring employee turnover, the employee turnover rate by Flux method may be computed by using any one of the following expressions.

$$\frac{\text{No.of separation + No.of replacements + No.of new joining}}{\text{Average no of employees during the period of roll}} \times 100$$

$$= \frac{\text{No.of separations + No.of accessions}}{\text{Average no of employees during the period of roll}} \times 100$$

Average number of employees during the period is calculated as follows.

$$\frac{\text{No. of employees at the beginning } + \text{ No. of employees at the end}}{2}$$

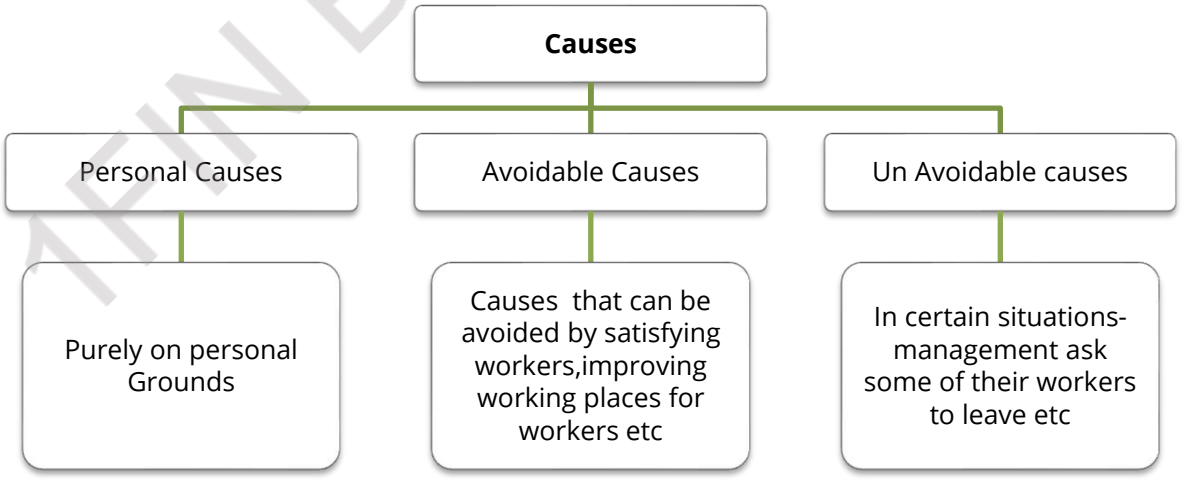
Equivalent Employee (Labour) Turnover rate

If in the above computations, the data given is for a period other than a year, the employee turnover rate so computed may be converted into equivalent annual employee turnover rate by using the following formula.

$$\frac{\text{Employee Turnover rate for the period}}{\text{ANumber of Days in the period}} \text{ X } 365$$

Causes of Labour Turnover:

The various causes of labour turnover can be classified under the following three heads.



A. Personal Causes:

Workers may leave the organisation purely on personal grounds, e.g.

- Domestic troubles and family responsibilities.
- Retirement due to old age.
- Accident making workers permanently incapable of doing work.

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- Women workers may leave after marriage to take up household duties.
- Dislike for the job or place.
- Death
- Workers finding better jobs at some other places.
- Workers may leave just because of their roving nature.
- Cases involving moral turpitude.
- In all such cases, labour turnover is unavoidable, and the employer can practically do nothing to reduce the labour turnover.

B. Unavoidable Causes:

- In certain circumstances it becomes necessary for the management to ask some of the workers to leave the organisation.
  These circumstances may be as follows:
  - Workers may be discharged due to insubordination or inefficiency.
  - Workers may be discharged due to continued or long absence.
  - Workers may be retrenched due to shortage of work.

C. Avoidable Causes:

- Low wages and allowances may induce workers to leave the factory and join other factories where higher wages and allowances are paid.
- Unsatisfactory working conditions e.g., bad environment, inadequate ventilation etc. leading to strained relations with the employer.
- Long hours of work.
- Lack of promotion opportunities
- Lack of proper training facilities.
- Unsympathetic attitude of the management may force the workers to leave.

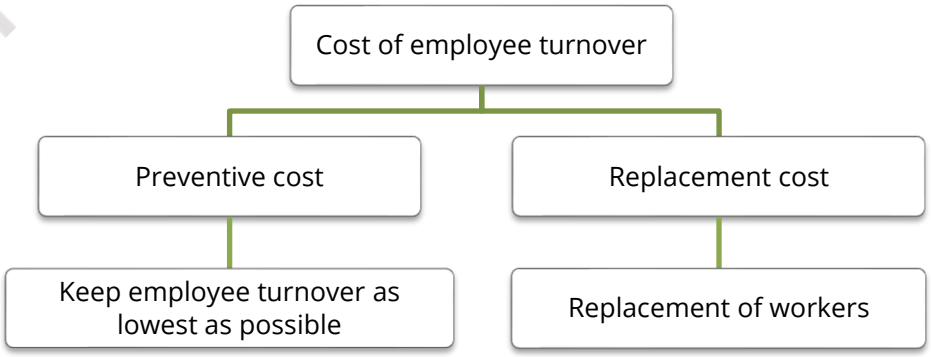
11. Effects of Employee (Labour) Turnover

High employee turnover increases the cost of production in the following ways:

- Frequent changes in the labour force give rise to interruption in the continuous flow of production with result that overall production is reduced.
- New workers being inexperienced workers are more prone to accidents. Consequently, all costs associated with accidents such as loss on account of output lost, compensation for the injured workers, damage of materials and equipment due to accidents etc. increase the cost of production.
- Selection and training costs of new workers recruited to replace the workers who have left increase the cost of production.
- New workers take time to become efficient. Hence lower efficiency of new workers increases the cost of production.
- New workers being unfamiliar with the work give more scrap, rejects and defective work which increase the cost of production.

Cost of Employees (Labour) Turnover

Two types of costs which are associated with employee turnover are.



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- **Preventive Costs**: The cost incurred to prevent employee turnover or keep it as lowest as possible.

Cost incurred for prevention of employee turnover includes the following:

  - Cost of medical benefit provided to the employees.
  - Cost incurred on employees' welfare like pension etc.
  - Cost on other benefits with an objective to retain employees.
- **Replacement Costs:** These costs are associated with replacement of workers and include:
  - Cost of recruitment of new workers.
  - Cost of training new workers.
  - Loss of production
  - Loss of profit due to loss of production.
  - Loss in fixed overhead cost because of less production on account of new inexperienced workers.
  - Wastage due to excessive spoilage
  - Cost of accidents because of new workers having more proneness to accidents.

12. DIRECT EXPENSES

12.1 Direct Expenses

Expenses other than direct material cost and direct employee cost, which are incurred to manufacture a product or for provision of service and can be directly traced in an economically feasible manner to a cost object. The following costs are examples for direct expenses:

(i) Royalty paid/ payable for production or provision of service;

(ii) Hire charges paid for hiring specific equipment;

(iii) Cost for product/ service specific design or drawing;

(iv) Cost of product/ service specific software;

(v) Other expenses which are directly related with the production of goods or provision of service.

The above list of expenses is not exhaustive, any other expenses which are directly attributable to the production or service are also included as direct expenses.

12.2 Measurement of Direct Expenses

The direct expenses are measured at invoice or agreed price net of rebate or discount but includes duties and taxes (for which input credit not available), commission and other directly attributable costs.

In case of sub-contracting, where goods are get manufactured by job workers independent of the principal entity, are measured at agreed price. Where the principal supplies some materials to the job workers, the value of such materials and other incidental expenses are added with the job charges paid to the job workers.

12.3 Treatment of Direct Expenses

Direct Expenses form part of the prime cost for the product or service to which it can be directly traceable and attributable. In case of lump-sum payment or one- time payment, the cost is amortised over the estimated production volume or benefit derived.

If the expenses incurred are of insignificant amount i.e. not material, it can be treated as part of overheads.

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Illustrations

1. Illustration

X an employee of ABC Co. gets the following emoluments and benefits:

(a)	Basic Pay	Rs.10,000 p.m.
(b)	Dearness Allowance	Rs.2,000 p.m.
(c)	Bonus	20% of salary and D.A.
(d)	Other Allowances	Rs.2,500 p.m.
(e)	Employer's Contribution to P.F.	10% of salary and D.A.

X' works for 2,400 hours per annum, out of which 400 hours are non-productive and treated as normal idle time. You are required to compute the effective hourly cost of employee 'X'.

Solution: 1

Statement Showing Computation of effective Hourly Cost

Particulars	Per month	Per Annum
Basic Pay	₹10,000	₹1,20,000
Bonus (20% of Basic + DA) (20% x 12,000)	₹2,400	₹28,800
Employee's Contribution to P.F (10% of Basic + DA) (10% x 12000)	₹1,200	₹14,400
Other Allowances	₹2,500	₹30,000
Total Wages	₹18,100	₹2,17,200
Effective Working Hours (2400 – 400)		2000 hours
Effective Hourly cost 2,17,200/2000 hours		**= ₹108.60**

If, 400 hours out of 2,400 hours worked were abnormal idle time:

Effective hourly rate = $\frac{2,17,200}{2,400}$ = ₹90.50

Employee Cost Charged to P&L = Abnormal hours x Effective rate = 400 x 90.50 = ₹3,620

2. Illustration

In a factory working six days in a week and eight hours each day, a worker is paidat the rate of Rs.100 per day basic plus D.A @ 120% of basic. He is allowed to take30 minutes off during his hours shift for meals-break and a 10 minutes recess for rest. During a week, his card showed that his time was chargeable to:

Job X	15 hrs.
Job Y	12 hrs.
Job Z	13 hrs.

The time not booked was wasted while waiting for a job. In Cost Accounting, howwould you allocate the wages of the workers for the week?

Solution: 2

	(₹)
Allocated to Job X: 15 hours × Rs. 30	450
Allocated to Job Y: 12 hours × Rs. 30	360
Allocated to Job Z: 13 hours × Rs. 30	390
Charged to Costing Profit & Loss A/c: 4 hours × Rs. 30	120

Workings:

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(i) Calculation of Abnormal Idle Time**:**

No. of hours for which payment has to be made (6 days x 8 hours)	48 hours
Less: Allowances for normal idle time $\frac{(30\ \text{min} + 10\ \text{min}) \times 6\ days}{60\ \text{min}/hour}$	(4 hours)
Effective Hourly Time Available	**44 hours**

(ii) Total wages for a week: (Rs. 100 + 120% of Rs. 100) × 6 days = ₹ 1,320
(iii) Wage rate per hour = 1320 ÷ 44 hours = ₹30
(iv) Time wasted waiting for job (Abnormal idle time): = 44 hrs. – (15 hrs. + 12 hrs. + 13 hrs.) = 4 hrs

3. Illustration

Calculate the earnings of A and B from the following particulars for a month and allocate the employee cost of each job X, Y and Z;

S. No	Particulars	Worker A	Worker B
(i)	Basic Wages (Rs.)	10,000	16,000
(ii)	Dearness Allowance	50%	50%
(iii)	Contribution to PF (on basic wages)	8%	8%
(iv)	Contribution to ESI (on basic wages)	2%	2%
(v)	Overtime (Hours)	10	--

The normal working hours for the month are 200. Overtime is paid at double the total of normal wages and dearness allowance. Employer's contribution to state insurance and Provident Fund are at equal rates with employee's contributions.

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

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

Overtime was done on job Y.

Solution : 3

Statement Showing Earnings of Workers A and B

	A (₹)	B (₹)
Basic Wages	10,000	16,000
Dearness Allowance (50% of Basic Wages)	5,000	8,000
Overtime wages (Refer to Working Note 1)	1,500	-
Gross wages earned	**16,500**	**24,000**
Less: Contribution to Provident fund	(800)	(1,280)
Less: Contribution to ESI	(200)	(320)
Net wages earned	**15,500**	**22,400**

Statement of Employee Cost (to Company)

	A (₹)	B (₹)
Gross Wages (excluding overtime)	15,000	24,000
Add: Employer's contribution to PF	800	1,280
Add: Employer's contribution to ESI	200	320
Gross wages earned	**16,000**	**25,600**
Normal working hours	200 hrs.	200 hrs.
Ordinary wages rate per hour	**80**	**128**

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Statement Showing Allocation of Wages to Jobs

	Total Wages (₹)	Jobs		
Worker A:		**X (₹)**	**Y (₹)**	**Z (₹)**
- Ordinary Wages (4: 3 : 3)	16,000	6,400	4,800	4,800
- Overtime	1,500	-	1,500	-
Worker B:				
- Ordinary Wages (5: 2: 3)	25,600	12,800	5,120	7,680
		43,100	**11,420**	**12,480**

Working Notes

Normal Wages are considered as basic wages

Over time = $\frac{2 \times (\text{Basic Wage+DA}) \times 10 \text{ hours}}{200}$ = 2 x ($\frac{₹15,000}{200}$) x 10 hours=₹150 × 10 hours = **₹1,500**

4. Illustration

It is seen from the job card for repair of the customer's equipment that a total of 154 labour hours have been put in as detailed below:

	Worker A	Worker B	Worker C
Wage per day of8hrs	Rs.200	Rs.100	Rs.300
No. of hoursworked			
Monday	10.5	8	10.5
Tuesday	8	8	8
Wednesday	10.5	8	10.5
Thursday	9.5	8	9.5
Friday	10.5	8	10.5
Saturday	-	8	8
Total	**49**	**48**	**57**

In terms of an award in an employee conciliation, the workers are to be paid dearness allowance on the basis of cost of living index figures relating to each month which works out @ Rs.968 for the relevant month.

The dearness allowance is payable to all workers irrespective of wages rate if they are present or are on leave with wages on all working days.

Sunday is a weekly holiday and each worker has to work for 8 hours on all weekdays and 4 hours on Saturday; the workers are however paid full wages on Saturday (8 hours for 4 hours worked).

Workers are paid overtime according to the Factories Act, 1948. Excluding holidays, the total number of hours works out to 176 in the relevant month. The company's contribution to Provident Fund and Employees' State Insurance Premium are absorbed into overheads.

Work out the wages payable to each worker

Solution: 4

Calculation of hours to be paid for worker A:

Day	Hours Worked	Normal	Extra	Overtime
Monday	10.5	8	1	1.5
Tuesday	8	8	-	-
Wednesday	10.5	8	1	1.5
Thursday	9.5	8	1	0.5
Friday	10.5	8	1	1.5

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Saturday	-	-	-	-
Total	49	40	4	5

Wage Payable:

Normal = 40 hours @ ₹30.50 = ₹1,220
Extra = 4 hours @ ₹30.50 = ₹122
Overtime = 5 hours @ ₹61 = ₹305
₹1,647

Calculation of hours to be paid for worker B:

Since B has not worked more than 9 hours any day or more than 48 hours during the week, no overtime payment has to be paid. Therefore, **wage payable** = 48 hours x ₹18 per hour = ₹864

Calculation of hours to be paid for worker C:

Day	Hours Worked	Normal	Extra	Overtime
Monday	10.5	8	1	1.5
Tuesday	8	8	-	-
Wednesday	10.5	8	1	1.5
Thursday	9.5	8	1	0.5
Friday	10.5	8	1	1.5
Saturday	8	4	-	4*
Total		**44**	**4**	**9**

(*Worker-C has worked more than 48 hours in the week)

Wage payable:

Normal = 44 hours x ₹43 = ₹1,892
Extra = 4 hours x 43 = ₹172
Overtime = ₹774
₹ 2,838

Working Note:

Computation of wage Rate

	A	B	C
Basic	25.00 (200/8hrs)	12.50 (100/8hrs.)	37.50 (300/8hrs.)
Dearness Allowance(₹968/176hrs)	5.50	5.50	5.50
Normal Pay	30.50	18.00	43.00
Overtime Payment (Double)	61.00	36.00	86.00

5. Illustration

In a factory, the basic wage rate is Rs.100 per hour and overtime rates are as follows:

Before and after normal working hours	175 % of basic wage rate
Sundays and holidays	225% of basic wage rate
During the previous year, the following hours were worked • Normal time • Overtime • before and after workinghours • Sundays & holidays	 1,00,000 hours 20,000 hours 5,000 hours
Total	**1,25,000 hours**

The following hours have been worked on job 'Z'

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• Normal time	1,000 hours
• Overtime • before and after workinghours • Sundays & holidays	 100 hours 25 hours
Total	**1,125, hours**

You are required to calculate the labour cost chargeable to job 'Z' and overhead in each of the following instances:

1) Where overtime is worked regularly throughout the year as a policy due to worker's shortage
2) Where overtime is worked irregularly to meet the requirements of production
3) Where overtime is worked at the request of the customer to expedite the job.

Solution: 5

(a) Where overtime is worked regularly as a policy due to workers' shortage:

The overtime premium is treated as a part of employee cost and job is charged at an inflated wage rate**.** Hence, employee cost chargeable to job Z = Total hours × Inflated wage rate = 1,125 hrs. × ₹ 117 ₹1,31,625

(b) Where overtime is worked irregularly to meet the requirements of production:

Basic wage rate is charged to the job and overtime premium is charged to factory overheads as under:

Employee cost chargeable to Job Z: 1,125 hours @ ₹100 per hour = ₹ 1,12,500

Factory overhead: {100 hrs. × ₹ (175 – 100)} + {25 hrs. × ₹ (225 – 100)} = (₹7,500 + ₹3,125} = ₹ **10,625**

(c) Where overtime is worked at the request of the customer, overtime premium is also charged to the job as under:

	₹
Job Z Employee cost 1,125 hrs. @ Rs. 100	1,12,500
Overtime premium 100 hrs. @ Rs. (175 – 100)	7,500
25 hrs. @ Rs. (225 – 100)	3,125
Total	**1,23,125**

Workings

Basic wage rate : ₹100 per hour

Overtime wage rate before and after working hours: ₹100 × 175% = ₹ 175 per hour

Overtime wage rate for Sundays and holidays: ₹100 × 225% =₹ 225 per hour

Computation of average inflated wage rate (including overtime premium):

Particulars	Amount (₹)
Annual wages for the previous year for normal time (1,00,000 hrs. × ₹100)	1,00,00,000
Wages for overtime before and after working hours (20,000 hrs. × ₹175)	35,00,000
Wages for overtime on Sundays and holidays (5,000 hrs. × ₹225)	11,25,000
Total wages for 1,25,000 hrs.	**1,46,25,000**

Average inflated wage rate = (₹14625000/ 125000 hours) = ₹117

Note: Illustrations 6 to 10 are removed as the related topics have been excluded from the syllabus

11. Illustration

From the following data, calculate the wages payable to the workers under:

(i) Halsey Premium scheme

(ii) Rowan Premium scheme

Time rate (per hour)	Rs. 60
Time allowed	8 hours

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Time taken	6 hours
Time saved	2 hours

Solution: 11

Halsey Premium Scheme	Rowan Premium Scheme
Guaranteed wages + Bonus Time taken × Time rate + 50% (Time Allowed – Time Taken) × Time rate = 6 hrs. × ₹60 + 1/2 × (2 hrs. × Rs.60) or ₹ 360 +₹ 60 = **₹420** **Of his total earnings, ₹360 is on account of the time worked and ₹60 is on account of his share of the premium bonus.**	**Guaranteed wages + Bonus** Time taken × Rate per hour + (Time saved / Time Allowed) x Time taken x Rate per hour = 6 hours × ₹60 + (2 hours / 8 hours) × 6 hours × ₹60 = ₹360 + ₹ 90 = **₹450**

12. Illustration

A skilled worker in XYZ Ltd. is paid a guaranteed wage rate of Rs. 30 per hour. The standard time per unit for a particular product is 4 hours. Mr. P, a machine man, has been paid wages under the Rowan Incentive Plan and he had earned an effective hourly rate of Rs. 37.50 on the manufacture of that particular product.

What could have been his total earnings and effective hourly rate, had he been put on Halsey Incentive Scheme (50%)?

Solution: 12

Total earnings (under Halsey Scheme) = Hours worked Rate per hour + ½ time saved Rate per hour = 3 hours × ₹30 + ½ × 1 hour × ₹30 = ₹105

Effective hourly rate = (Total earnings/ Hours taken) = (₹105 / 3 hours) = ₹35 per hour

Working Note:

Let T hours be the total time worked in hours by the skilled workers (machine man P), ₹30 is the rate per hour; standard time is 4 hours per unit and effective hourly earnings rate is ₹37.50 then

Earning (under Rowan Plan) = Hours worked × Rate per hour + $(\frac{\text{Time Saved}}{\text{Time Allowed}})$ x Time taken x Rate per hour

= 37.5 T = T x ₹30 + $\frac{(4-T)}{4}$ x T x ₹30

(both sides are divided by T)

₹37.5 = ₹30 + (4 – T) × ₹7.5

₹37.5 = ₹30 + ₹30 - 7.5T

or, ₹7.5 T =₹ 60 - ₹37.5

or, ₹ 7.5 T = ₹22.5

or, T = 3 hours

13. Illustration

The accountant of Y Ltd. has computed employee turnover rates for the quarterended 31st March, 20X8 as

Method	Rate
Flux Method	10%
Replacement Method	5%
Separation Method	35

If the number of workers replaced during that quarter is 30, find out the number ofworkers for the quarter

(i) Recruited and joined and

(ii) Left and discharged and

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(iii) Equivalent employee turnover rates for the year.

Solution: 13

(i) Number of Workers Recruited and Joined:

Employee turnover rate (flux method)

$= \frac{\text{No.of Seperations (S)+No.of Accessions(A)}}{\text{Average number of workers on roll}}$

Or,[$\frac{5}{100} = \frac{18+A}{600}$ Or, $A= \frac{6000}{100}$ - 80] 42

No. of workers recruited and joined 42.

(ii) Number of workers left and discharged:

Employee turnover rate (Separation method)

$= \frac{\text{No.of Seperations (S)}}{\text{Average number of workers on roll}}$ x 100 = $\frac{3}{100} = \frac{S}{600}$ or S = 18

Hence, number of workers discharged comes to 18.

(iii) Calculation of Equivalent employee turnover rates:

$= \frac{\text{Employee Turnover rate for the quarter(s)}}{\text{Number of quarter(s)}}$ x 4 quarters

Using Flux method $= \frac{10\%}{1}$ x 4 = 40%

Using Replacement Method $= \frac{5\%}{1}$ x 4% = 20%

Using separation Method $= \frac{3\%}{1}$ x 4% = 12%

Working Note:

Average number of workers on roll (for the quarter):

Employee Turnover using Replacement method

$= \frac{\text{No.of replacements}}{\text{Average number of workers on roll}}$ x 100

Or, $\frac{5}{100} = \frac{30}{\text{Average number of workers on roll}}$

Or, Average number of workers on roll = $\frac{30 \times 100}{5}$ = 600

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Unit : 3 - OVERHEADS – ABSORPTION COSTING METHOD

OVERVIEW

- Meaning of Overheads – Production, administration, selling and distribution.
- Accounting and control of manufacturing overheads
- Meaning and methods of allocation
- Appointment and absorption of overheads
- Meaning and treatment of under absorption and over absorption of overheads
- Various methods to calculate overhead rate.

INTRODUCTION

Overhead means ongoing business expenses which is not directly attributed to creating a product or service. It is important for budgeting purposes, but it is also important for determining how much a company must charge for its products or services to make a profit. In short, overhead is any expense which is incurred for supporting the business while not being directly related to a specific product or service.
They may be defined as the cost of indirect materials, indirect labour and such other expenses including services which cannot conveniently be charged to a specific unit (i.e., indirect expenses). Such expenses are incurred generally for a particular work order) –

- Over various products,
- Over various departments or cost centres, and
- Over various heads of account.

1. Objective of study of Overheads

The basic objectives of study of overheads costs are –

To Link Overheads to output

- Overheads are not directly related to the product.
- Hence, an indirect method of establishing a relationship or linking becomes necessary.
- This is done by linking overheads first to the cost centre (Department) and thereafter to the output produced.

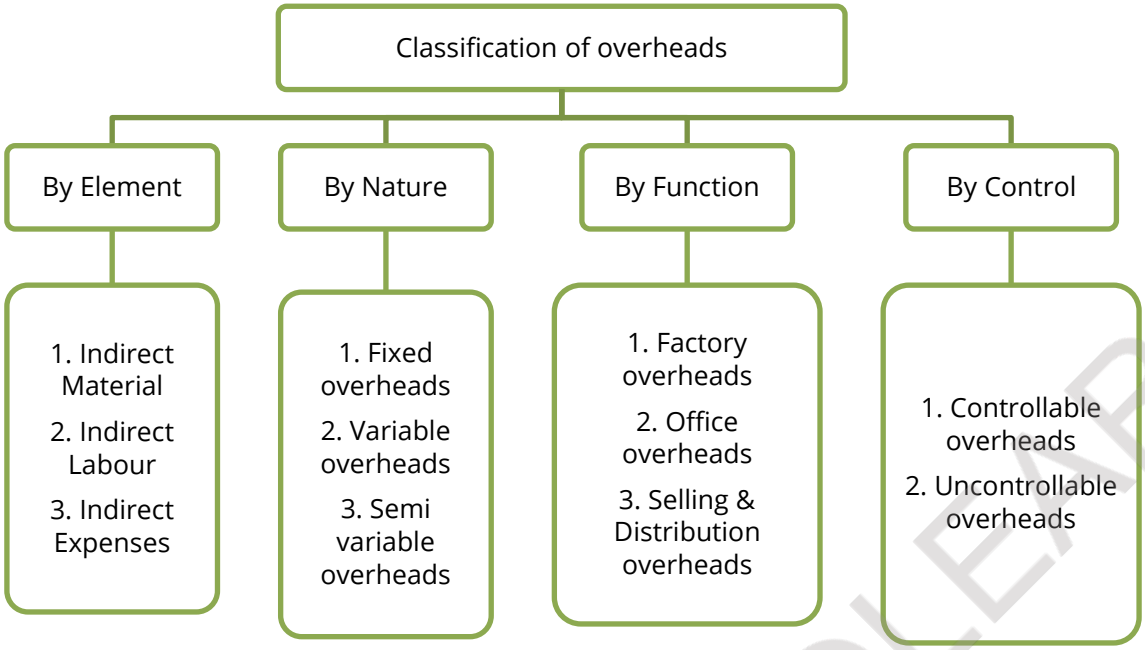
To Control Overheads

- The total overheads incurred must be kept within reasonable control limits to achieve savings in cost and increase in profits.

2. Classification of overheads

Overheads are classified in to

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By Element

- This method of classification follows the definition of overheads.
- In this method, overheads are divided into three elements, viz. indirect materials, indirect labour, and indirect expenses.

Indirect material

- Indirect materials are materials which cannot be linked to a specific product used in the production process.
- Alternatively, on a per product basis, they may be used in such insubstantial quantities which it is not worthwhile to track them as direct material.
- Thus, as a part of the production, they are consumed but are not integrated in substantial amounts into a product or job.

Ex: Stores used for maintaining machines and building (lubricants, cotton waste, bricks etc.), Stores used by service departments like powerhouse, boiler house, canteen etc.

Indirect employee cost

- Indirect labour cost means the cost of labour which is not directly related to the production of goods and the performance of services.
- It refers to the wages paid to workers whose duties make others to produce goods and perform services.

Ex: Salary paid to foreman and supervisor; Salary paid to administration staff etc.

Indirect expenses

- Indirect Expenses are those which cannot be assigned to any activity directly since these are completely incurred while operating a business or as a part of a business,

Ex: business permits, rent, office expenses, telephone bills, depreciation, audit, and legal fees.

By Control

A. Controllable Costs

- Controllable cost are those costs which can be controlled by implementing appropriate managerial influence and suitable policies.

Examples: Material Costs, Wages and salary, Power, and fuel etc.

B. Uncontrollable Costs

- Even after implementing appropriate managerial influence and suitable polices, cost which cannot be controlled by the management are known as uncontrollable costs.

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Examples: Rates and taxes, Depreciation, Interest on borrowings

By Nature

A. Fixed Overhead

- Fixed overheads are the costs which do not vary with the level of activity.
- Fixed overheads which do not tend to increase or decrease due to the changes in output.
- To operate a business, fixed cost is needed.

Examples: Salary paid to permanent employees, Depreciation of buildings and plant and equipment, Interest on capital, Insurance.

B. Variable Overhead

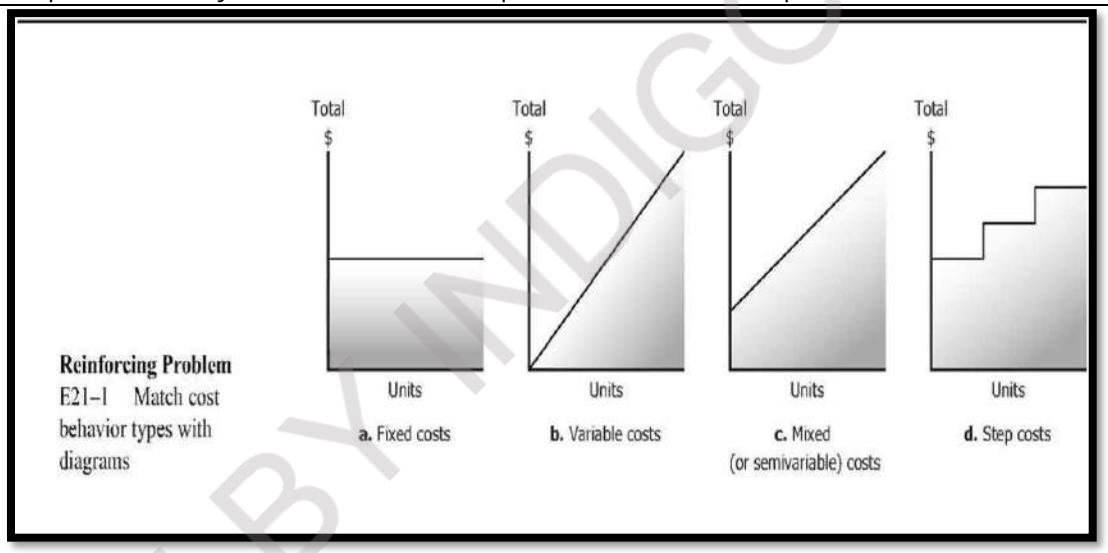
- Expenses which tend to vary with the activity levels of the business is known as Variable overheads.
- It tends to increase or decrease with different levels of business activity.

Examples: Indirect materials, Power and fuels, Lubricant Tools, and spares

C. Semi variable overhead

- Semi variable overheads are overheads that are partly fixed and partly variable overheads and are thus partly affected by fluctuations in the level of activity.

Examples: Electricity cost, Water cost, Telephone, and internet expenses etc.



By Function

A. Factory or Manufacturing Overhead

- In cost accounting, company has some percentage of manufacturing overheads in every unit produced of a factory or company, costs are added to each unit it produces.
- Manufacturing overhead is the indirect cost which is incurred for manufacturing or production activity in a factory.
- All expenditures incurred from the procurement of materials to the completion of finished product are included in the manufacturing overheads.

Examples: Stock keeping expenses, Repairs and maintenance of plant, Depreciation of factory building, indirect labour, Cost of primary packing etc.

B. Office or administration overheads

- An administration overhead refers to the formulation of policy, direction, control, and management of affairs.
- Administration overheads includes the general functional expenses.

Examples: Salary paid to office staff, Repairs and maintenance of office building, Depreciation of office building, Postage, and stationery etc.

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C. Selling and distribution overheads

Selling Overhead:

- Cost of selling function is called selling overhead. I.e., the cost of activities relating to create and stimulate demand for company products and to secure orders.

Distribution Overhead:

- Cost incurred on making product available for sale in the market.

Advantages of Classification of Overheads into Fixed and Variable

- The primary objective of segregating semi-variable expenses into fixed and variable in to ascertain marginal costs. Besides this, it has the following advantages also:

A. Controlling Expenses

- The classification of expenses into fixed and variable components helps in controlling expenses.
- Fixed costs are generally policy costs, which cannot be easily reduced.
- They are incurred irrespective of the output and hence are more or less non controllable.
- Variable expenses vary with the volume of activity and the responsibility for incurring such expenditure is determined in relation to the output.
- The management can control these costs by giving proper allowances in accordance with the output achieved.

B. Preparation of budget estimates

- Unless a distinction between fixed and variable expenses is made, it would not be possible to prepare a flexible budgeting a given period based on different levels of activity.

C. Decision Making

- The segregation of semi variable cost between fixed and variable overhead also helps the management to take many important decisions.

For example, decisions regarding the price to be charged during depression or recession or for export market. Likewise, decisions on make or buy, shut down or continue, etc., are also taken after separating fixed costs from variable costs.

3. Accounting and controlling of Overheads.

A. Estimation and collection of manufacturing overheads

- It has already been pointed out that the continuous costing is the proper system of ascertaining cost i.e., ascertaining the cost of production as and when the work is proceeding.
- This makes necessary the estimation of indirect expenses even before a period begins.
- Either based on actual figures (for examples September of a previous year) or the basis of preceding years (say June of the current year) an estimate can be prepared.
- However, those estimates should not be prepared blindly.
- The sources available for the collection of factory overheads may include.
  (a) Invoices,
  (b) Stores requisition,
  (c) Wage analysis book
  (d) Journal entries. Etc.

B. Departmentalization of overheads

Departmentalization of overheads refers to the process of determining overheads cost of each department involved in the production.

For this purpose, departments of the factory are classified in to two categories.

- Production department
- Service department

Departmentalization of overheads are done in two ways.

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Allocation of overheads

- Allocation of factory overheads means the process of charging the full amount of overhead costs to a specific cost centre.
- When the nature of expenses is such that it can be easily identified with a particular cost centre, allocation of overheads is feasible.
- For example: the salary paid to a foreman of a specific production department will be directly charges to the department because it can be directly recognized with that department.

Apportionment of overheads expenses

- When accurately the cost items cannot be allocated to a particular cost centre, then those items of cost are apportioned on prorated basis among the various cost objects on an equitable basis. This is known as cost apportionment.
- Distributing different cost items in proportions to the cost unit or cost centre on a suitable basis is apportionment of overheads.
- It is also known as primary distribution of overheads. Thus, apportionment implies "the allotment of proportions of items of cost-to-cost centres or departments".

Re-apportionment (Secondary Distribution of Overheads)

- The total cost of the service departments is distributed proportionately to different production departments based on services rendered by them to production departments.
- Here, total cost means direct materials direct labour plus total apportioned overheads of the service departments.

Recovery or absorption

- **Absorption:** Absorption of overheads is charging of overheads from the cost centre to products or services, by means of absorption rate of each cost centre.

  Overhead's absorption rate = Total Overheads of a cost centre / Total quantum of base.

  Base: The base is selected based on type of the cost centre and its contribution to the products or services, EX: machine hours, labour hours, quantity produced, etc
- **Absorbed overheads:**

  Overheads Absorbed = Overhead Absorption Rate * units of base in product or service

Distinction between allocation and absorption

Particulars	Allocation	Apportionment
Meaning	Assigning a whole item of cost directly to a cost centre	Distinction of overheads to more than one cost centre, on some equitable basis
Nature of expenses	Specific, identifiable, and direct	Unallocable, general and common
Number of departments	One	Many
Amount of overheads	Charged in full	Charged in parts or proportions

Treatment of over and under absorption of overheads

- After the year end the total amount of actual factory overheads is known.
- There is bound to be some difference between the actual amount of overheads and the absorbed amount of overheads due to various reasons, like price changes, volume changes etc.
- This difference is known as under / Over absorption of overheads.

Over absorption:

- Absorbed overheads is greater than actual overheads.
- Credit balance in overheads control A/C
- Over absorption represents savings in overheads expenditure

Treatment:

- **Write off:** small amounts may be credited to costing P&L account

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- **Deferral:** may be carried over to next year, by transfer to overheads reserve A/C or suspense A/C.
- **Cost reversal:** In case of large amounts cost, of jobs may be reduced / adjusted by passing reversal journal entries.

Under absorption:

- Absorbed overheads is less than actual overheads.
- Debit balance in overheads control A/C
- It represents increase in overheads expenditure.

Treatment:

- **Normal reasons:** e.g.: genuine planning errors, changes in assumptions etc. treated as increase in cost and apportioned to production,
- **Abnormal reasons:** e.g., Strike period wages, labour count award, obsolete stores, and penalties paid etc. Treated as loss and debited to costing P&L a/c.

4. Steps for the distribution of Overheads

The various steps for the distribution of overheads have been discussed in detail as below:

Collection

- This involves collection and accumulation of data relating to overheads based on past information and adjusted for known current trends and projected into the future.
- The information is collected from.
  - Invoices and Stores Requisitions (for Indirect Materials),
  - Wage Analysis Book (for Indirect Labour) and
  - Journal Entries (for Indirect Expenses)

Classification

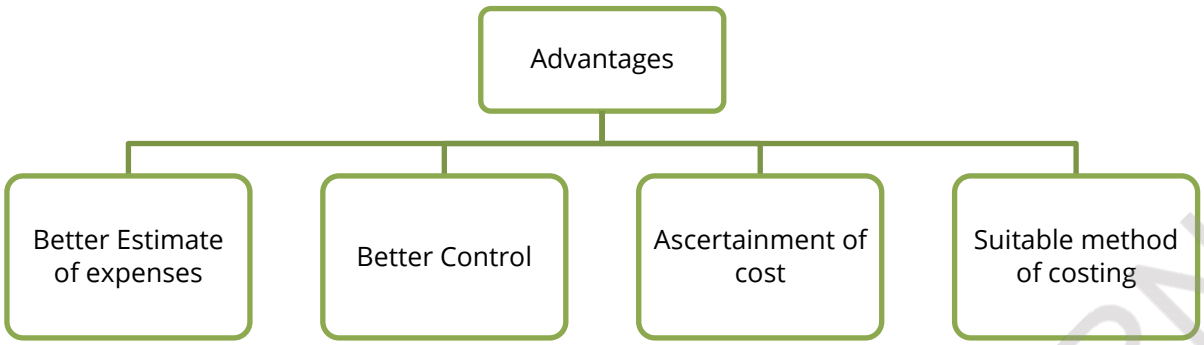
- Overheads are classified according to nature viz. fixed, variable, and semi-variable expenses. This facilities decision-making and proper budgeting.

Allocation of Cost

- Most of the manufacturing processes functionally are different and are performed by different departments in the factory.
- Where such a division of functions had been made, some of the departments should be engaged in actual production of goods, and others in providing services ancillary thereto.
- At this stage, the factory overheads which can be directly related to the various production or service departments are allocated in this manner i.e., whole items of overheads are allocated to production and service departments.
- It may, sometime, become necessary to sub-divide a manufacturing organisation into several cost centres, so that a closer distribution of expenses and a more detailed control is practicable.
- It is thus obvious that the principal object of setting up cost centres is to collect data, in of similar activities more conveniently.
- This avoids a great deal of cost analysis.
- When costs are collected by setting up cost centres, several items can be ascertained, and the element of estimation is reduced considerably.
- For example: the allowance of the normal idle time or the amount to be spent on consumable stores etc.
- There are two main types of cost centres - machine or personal - depending on whether the process of manufacture is carried on at a centre by man or machine.
- For the convenience of recording of expenditure, cost centres are sometimes allotted a code number.

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Advantages of Departmentalization



- **Better Estimation of Expenses:** Some expenses which relate to the departments will be estimated almost on an exact basis and to that extent, the accuracy of estimation of overheads will be higher.
- **Better Control:** For controlling expenses in a department, figures in relation to each department should be separately available.
- **Ascertainment of Cost for each department:** Expenses incurred in the department through which the job or the product has passed should be known. It is only then that the cost of the job or the product can be shared with the appropriate share of indirect expenses.
- **Suitable Method of Costing:** A suitable method of costing can be followed differently for each department Ex: batch costing when a part is manufactured but single or output costing when the product is assembled.

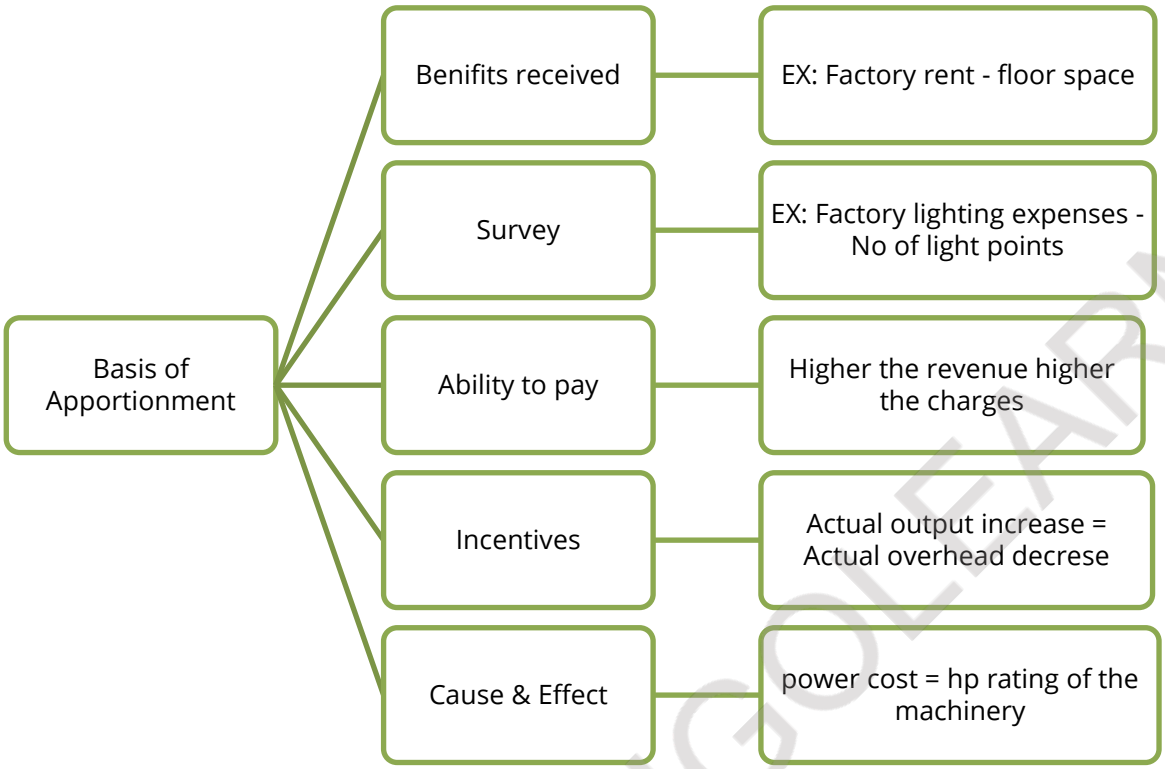
Apportionment of Overheads (Primary distribution of overheads)

- The overheads which cannot be directly allocated between the different departments are now apportioned on some suitable basis.
- For distributing these overheads over different departments, it is necessary at first to determine the proportion of benefit received by each department and then distribute the total expenditure proportionately on that basis.
- Some of the bases that may be adopted for the apportionment of expenses are stated below:

List of common expenses and the methods of apportioning the same.

Common expenses	Basis of apportionment
Rent or maintenance or insurance on building	Floor space
Factory lighting expenses	Number of light points or floor space
Sales assistance salary	Time devoted for various products
Advertisement sales commission etc	Sales (actual)
Personnel department expenses	Number of employees
General administration expenses	Work's cost
Material handling expenses	Value of material consumed
Indirect wages	Direct wages
Miscellaneous production expenses	Direct wages
Power of machines	Horsepower rating
Supervision	Time spent or no of employees or direct wages
Credit department expenses	Value of credit sales
Depreciation and insurance of asset	Value of asset

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A. Benefits received:

- Each department is given a proportionate charge of the total overhead by reference to the benefits obtained.
- The greater the amount of benefits received by the production department, the greater should be the share to be apportioned to that department.
- Ex: floor space utilization is the benefit received out of factory rent; hence factory rent is apportioned based on floor space.

B. Analysis or survey:

- When benefits received cannot be measured in specific terms the actual analysis of existing conditions will be useful.
- Therefore, overheads are apportioned based on analysis and survey of existing conditions.
- This basis of apportionment includes arbitrary elements.
- Ex: Number of light points forms the basis of apportionment of factory lighting expenses.

C. Ability to pay:

- This method presumes that higher the revenue of a production department, higher should be the proportionate charge for services.
- This method is simple to apply but it is generally considered inequitable because it penalizes the efficient and profitable units of a business to the advantage of the inefficient ones.
- For example, if a company is selling three different products in a territory, it may decide to distribute the expenses of the sales organization to the amount of sales of different articles in these territories.

D. Efficiency or incentives:

- Here, overheads are apportionment based on pre-determined levels of production or sales.
- If actual output exceeds the pre-determined level, the actual overheads cost per unit gets reduced, since the total overheads charged is fixed based on budgeted activity.
- If actual production or sales is more than budgeted, the profits of the department increase due to fixed apportionment charge.

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E. Cause and effect:

- Cause is the process or operation, or activity and effect is the incurrence of cost.
- Apportionment of overheads based on this criterion ensures better rationally as it is guided by the relationship between cost object and cost.
- Ex: power cost is apportionment based on hp rating of the machinery.

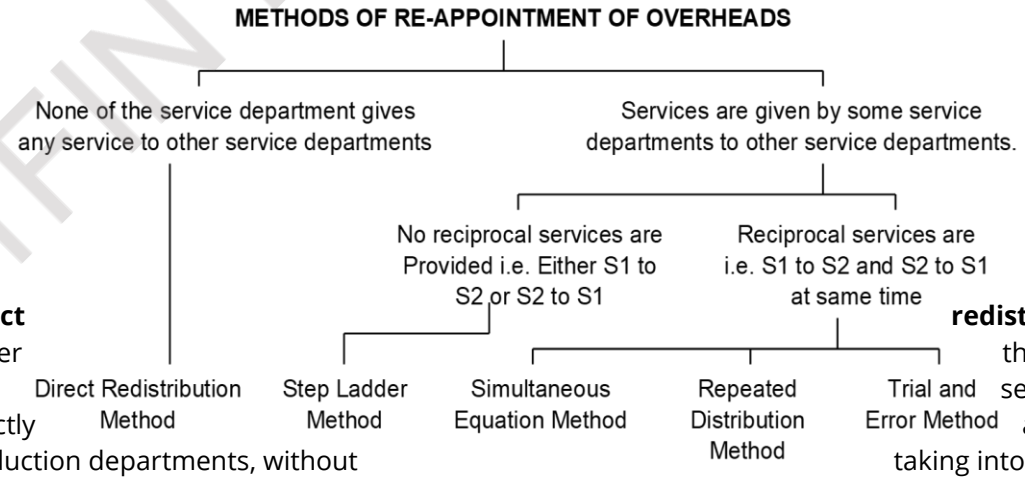
5. Re-apportioning service department overheads over production department

- The re-apportionment of the service department cost to the production department is known as secondary distribution.
- The suggestive bases that may be adopted for reapportionment are given below:

Service department costs	Basis of apportionment
Maintenance department	Hours worked for each department
Employment / personnel department	Rate of labour turnover or number of employees in each department
Payroll or time department	Direct labour hours number of employees
Stores keeping department	No of requisitions, quantity, or value of materials
Welfare department	No of employees in each department
Internal transport service	Truck hours, truck mileage or tonnage
Building service department	Relative area of each department
Powerhouse	Floor area, cubic contents
Transport department	Crane hours, Truck hours, Truck mileage, Truck tonnage, Truck ton- hours, Tonnage handled. No. of packages of Standard size
Fire protection	Capital Values
Inspection	Inspection hours

- Repairs included in repairs shop cost, building maintenance cost included in maintenance shop cost etc. should be apportioned based on capital values.
- Economy, practicability, equitability, and reliability are the matters of consideration for selection of the base.

6. Methods of Re apportionment



A. Direct redistribution method:

- Under this method, the cost-of-service department is directly apportioned to production departments, without taking into consideration any service from one service department to another service department.

B. Step Ladder Method or Nonreciprocal method

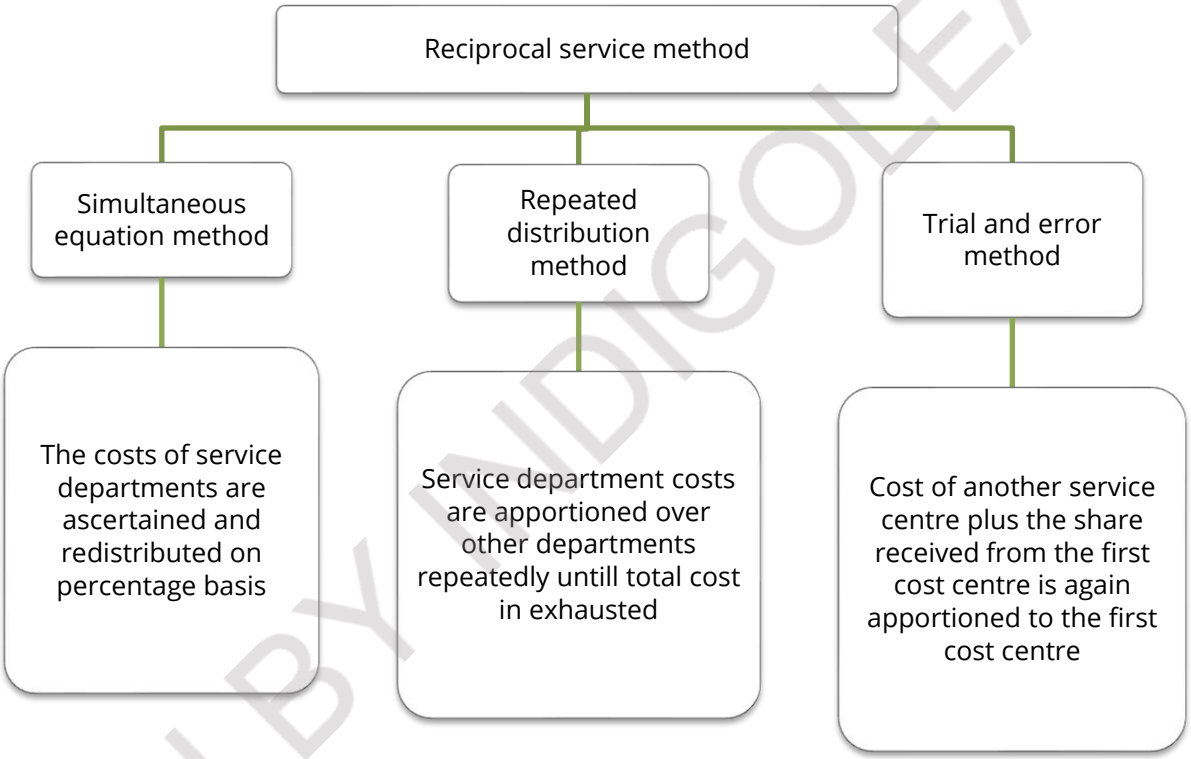
- This method gives cognizance to the services rendered by service department to another service department.

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- Therefore, as compared to previous method, this method is more complicated because a sequence of apportionments must be selected here sequence here begins with the department that renders maximum number of services to the other service department(s).
- In other words, the cost of the service department that serves the largest number of services to the other service department(s) and production department(s) is distributed first.
- After this, the cost-of-service department serving the next largest number of departments is apportioned.
- This process continues till the cost of last service department is apportioned.
- The cost of last service department is apportioned among production departments only.

C. Reciprocal service method:

- This method gives cognizance to the fact that where there are two or more service department, they may render service to each other and therefore these inter departmental services are to be given due weight in distributing the expenses of service departments.
- There are three methods available for dealing with inter service department transfer.



1. Simultaneous equation method

- According to this method firstly, the costs of service departments are ascertained.
- These costs are then re-distributed to production departments based on given percentages.

2. Repeated distribution method

- According to this method service department costs are apportioned over other departments, production as well as service according to the agreed percentages and this process is repeated until the total costs of the service departments are exhausted or the figures become too small to be considered for further apportionment.

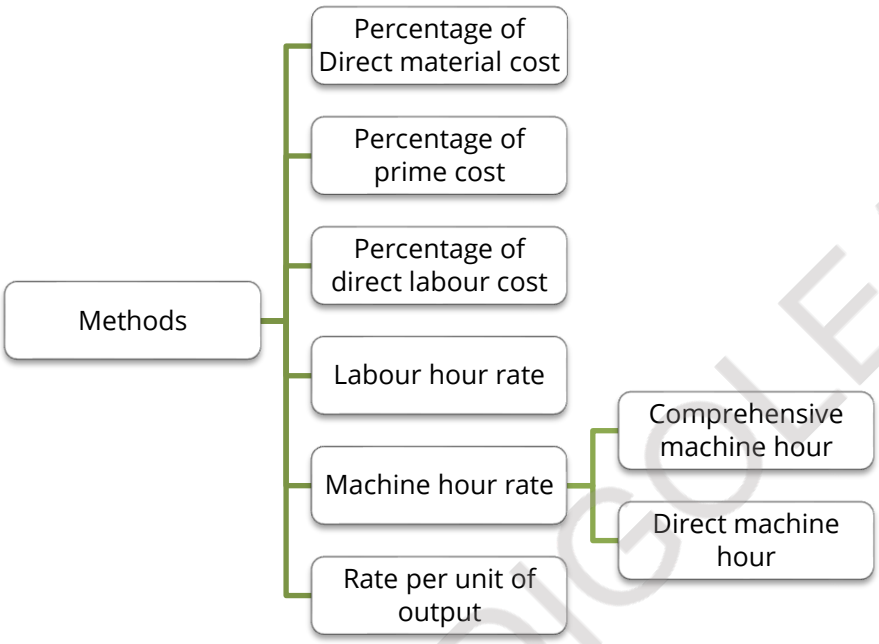
3. Trial and error method

- According to 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.

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- This process is repeated till the amount to be apportioned becomes negligible, that means repeated distribution method is followed to the extent of service departments only.
- All apportioned amounts for each service cost centre are added to get the total apportioned cost.
- These total service cost centre costs are redistributed to the production departments.

7. Methods of absorbing Overheads to various Products and Jobs



A. Percentage of Direct material cost

- Under this method, the cost of direct material consumed is the base for calculating the amount of overhead absorbed.
- This overhead rate is computed by the following formula.

$$\textbf{Overhead rate} = \frac{\textbf{production overhead of a department}}{\textbf{Direct labour cost}} \times \textbf{100}$$

B. Percentage of prime cost method

- An actual or pre-determined rate of overhead absorption is calculated by dividing the overheads to be absorbed by the prime cost incurred or expected to be incurred and expressing the result as a percentage.

This is calculated as follows.

$$\textbf{Prime cost percentage rate} = \frac{\textbf{Amount of factory overheads}}{\textbf{prime cost}} \times \textbf{100}$$

- This method has the advantage of simplicity and is applied because it considers both material and labour which give rise to overheads expenses.

C. Percentage of direct labour cost

- According to this method, the manufacturing overheads expenses are charged as a percentage of the direct wages incurred on jobs.
- The formula for computing the percentage rate for a period is as follows.

$$\textbf{Overhead rate} = \frac{\textbf{Manufacturing overhead expenses}}{\textbf{Direct wages or labour cost}} \times \textbf{100}$$

D. Labour Hour Rate

- This method is an improvement on the percentage of direct wage basis, as it fully recognizes the significance of the element of time in the incurring and absorption of manufacturing overhead expenses.
- This method is admirably suited to operations which do not involve any large use of machinery.

$$\textbf{Direct labour hour rate} = \frac{\textbf{Total Production overheads of a department}}{\textbf{Direct labour hours}}$$

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E. Machine hour rate:

- By the machine hour rate method, manufacturing overhead expenses are changed to production based on a number of hours a machine or machines are used on jobs or work orders.
- There is a basic similarity between the machine hour and the direct labour rate methods, in so far as both are based on the time factor.

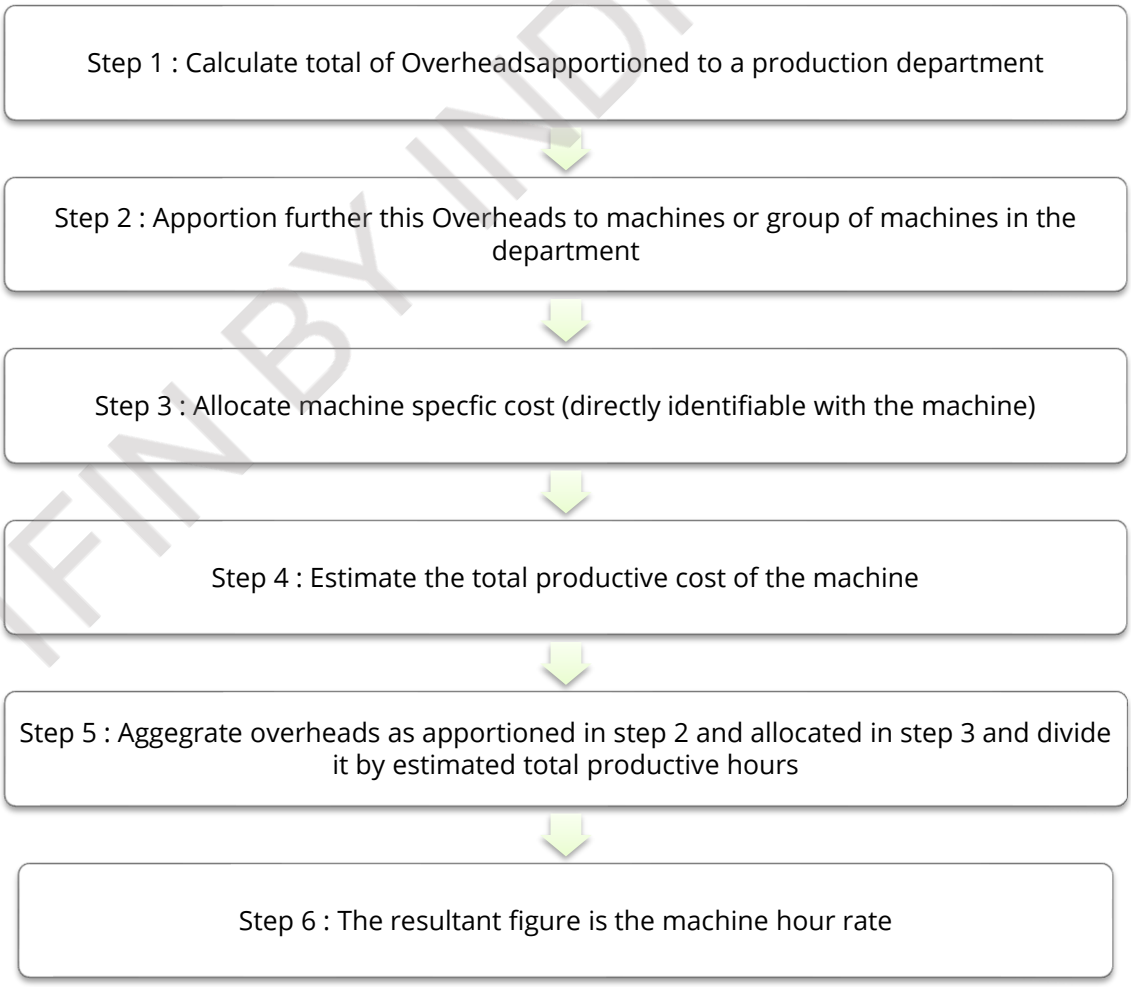
a) Direct Machine hour rate

- According to the first method, only the expenses directly or immediately connected with the operation of the machine are considered.
- e.g., power, depreciation, repairs and maintenance, insurance, etc.

b) The rate is calculated by dividing the estimated total of these expenses for a period by the estimated number of operational hours of the machines during the period.

c) Comprehensive Machine hour rate

- It will be obvious, however, that in addition to the expenses stated above there may still be other manufacturing expenses such as supervision charges, shop cleaning and lighting, consumable stores, and shop supplies, shop general labour, rent and rates, etc. incurred for the department as a whole and, hence, not charged to any machine or group of machines.
- To see that such expenses are not left out of production costs, one should include a portion of such expenses to compute the machine hour rate.
- Alternatively, the overheads not directly related to machines may be absorbed based on Productive Labour Hour Rate Method or any other suitable method.
- Steps involved in using machine hour rate is as follows.



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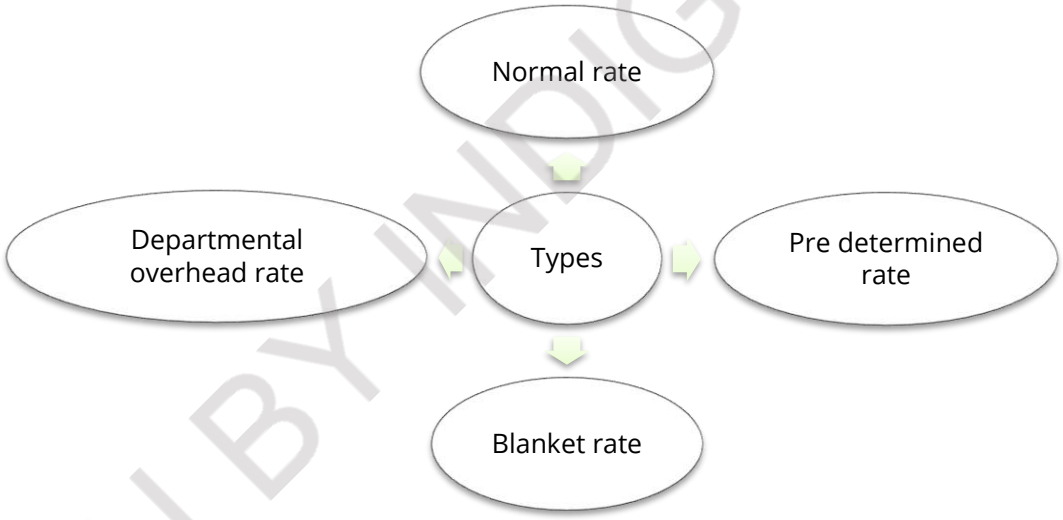
Advantages	Disadvantages
1. Where machinery is the main factor in production, it is usually the best method of charging machine operating expenses to production. 2. The under absorption of machine overheads would indicate the extent the machines have been idle. 3. It is particularly advantageous where one operator uses several machines or where several operators are engaged in one machine. 4. It is logical method and takes into consideration the time factor completely.	1. Additional data concerning the operating necessary, must be recorded and maintained. 2. As general data concerning rates for all the machines in a department may be suitable, the computation of a separate machine hour rate for each machine or group of machines would mean additional work. 3. It gives accurate result if hand labour is equally important.

F. Rate per unit of output

- This is the simplest of all the methods. In this method overhead rate is determined by the following formula

$$\textbf{Overhead rate} = \frac{\textbf{Amount of Overhead}}{\textbf{No. of Units}}$$

8. Types of Overhead Rates



A. Normal Rate

- This rate is calculated by dividing the actual overheads by actual base. It is also known as actual rate.

$$\textbf{Normal Overhead Rate} = \frac{\textbf{Actual amount of Overhead}}{\textbf{Actual base}}$$

B. Pre-determined rate

- This rate is determined in advance by estimating the amount of the overhead for the period in which it is to be used.

$$\textbf{Pre-determined rate} = \frac{\textbf{Budgeted amount of Overhead}}{\textbf{Budgeted base}}$$

C. Blanket Overhead

- It involves computation of one single overhead absorption rate for the whole factory as under

$$\textbf{Blanket overhead rate} = \frac{\textbf{Overhead cost for entire factory}}{\textbf{Total number of units of base for the factory}}$$

- A blanket rate should be applied in the following cases:
    - Where only one major product is being produced.
    - Where several products are produced, but

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- All products pass through all departments; and
- All products are processed for the same length of time in each department.

D. Departmental Overhead Rate

- It involves computation of separate rates of each department, cost centre or each product, for both fixed and variable overheads. It may be computed as follows.

$$\textbf{Multiple overheads rates} = \frac{\textbf{Overhead of department or cost centre}}{\textbf{Corresponding base}}$$

9. Accounting of under and over absorbed Overheads

- There are three methods to deal with the under or over recovery / absorption of overheads.

A. Use of Supplementary Rate

- When the amount of under recovery or over recovery of overheads is sizeable (big), then the supplementary rates are used to account for under and over recovery of overheads.

B. Write off to Costing Profit and Loss Account

- If the amount of under recovery or over recovery is negligible or small, then it is transferred to costing Profit and Loss Account.

C. Carry Forward of Overheads

- Sometimes management carries forward the amount of under recovery or over recovery of overheads in 'Overheads Suspense A/c' or 'Overheads Reserve A/c' to be set - off against the under or over recovery of the subsequent years' overheads.

10. Methods of Accounting of Administrative Overheads

A. Apportioning Administrative Overheads between Production and Sales Departments

- Under this method administrative overhead is divided between the production and sales departments on the equitable basis.
- It is assumed that for both production and selling distribution administrative overheads are incurred.
- Therefore, each department should be charged with the proportionate share of the same.

B. Charging to Profit and Loss Account

- Under this method administrative overhead are transferred to costing profit and loss account.
- It is made by treating them as fixed cost incurred in relation to formulation of policy and control of undertaking.
- It is difficult to determine a suitable basis for apportioning administrative overheads over production and sales departments so administrative overheads should be charged to Profit and Loss Account.

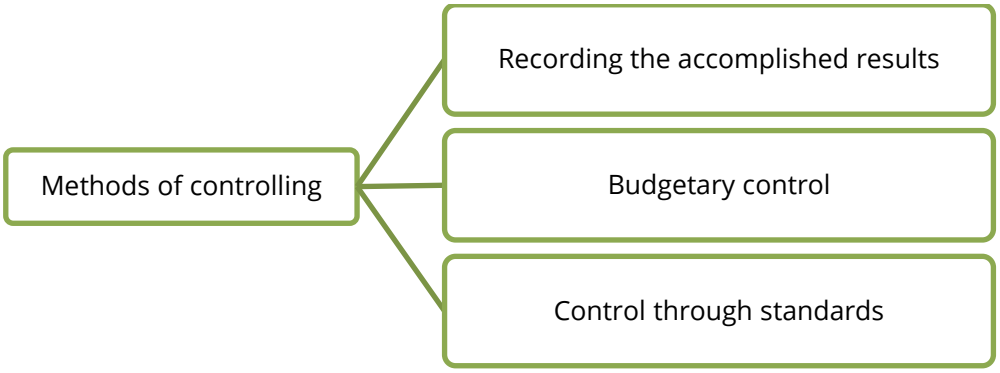
C. Treating Administrative Overheads as a separate addition to Cost of Production/Sales

- This method considers administrative overheads as separate and identifiable operation of the organization needed to carry on its activity.
- Under this method administrative overheads are recovered on equitable basis, which will also form part of cost of production.
- The basis which are generally used for apportionment are:
  - Works' cost
  - Sales value or quantity
  - Gross profit on sales
  - Quantity produced.
  - Conversion cost, etc.

11. Control of Administrative Overheads

- Mostly administrative overheads are of fixed nature, and they arise because of management policies.
- These fixed overheads are generally non-controllable. But at the same time these overheads should not be allowed to grow disproportionately.
- Some degree of control must be exercised over them.
- The methods usually adopted for controlling administrative overheads are as follows:

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A. Recording the accomplished results

- Administrative overheads can be controlled by recording the accomplished result of various departments.
- Administration can be divided into public relations, rapport with government departments and other services.
- A complete list of expenses incurred in these department and accomplishments are maintained.
- A periodical report should be sent to the higher officials for evaluation and regulated in this manner.

B. Control through budgets

- Separate budget for the administration overhead is prepared specifically just like the other budgets.
- The higher officials decide the size of administration overhead through the budget prepared in this regard.
- By doing this amount earmarked for administration overhead is known well in advance.
- This is the maximum limit for administration overhead.

C. Control through standards

- A standard is fixed for each item of expenses of administration overheads.
- Administration use standards by the application of a unit of measurement.
- The postal departments fix postal charges based on the weight, parcel, registered post etc. same is applied to courier services.
- Thus, unit of measurement is identified, and standard of each operation is fixed.

12. Accounting and Control of Selling and Distribution Overheads

- These are the expenses incurred for promoting, marketing, and distributing the goods to the customers.
- Therefore, these overheads are charged to the cost of goods sold to determine the cost of sales.
- It may be charged on any of the following basis: -

A. Sale Value

- It is considered that the sale value is ordinarily the most logical basis, there being some connection between the amount of sales and the amount of expenses incurred to achieve them.

B. Cost of Goods Sold

- Not a generally used method; this can be used as an alternative to Sales Value, only if all products have identical selling prices and gross margins.

C. Gross Profit on Sales

- This method follows the "ability to pay" principle. Hence products yielding high profit margins are charged with higher share of selling overheads.

D. Number of orders or units sold.

- Under this basis, expenses are classified into fixed and variable.
- Fixed expense per unit is ascertained by apportioning fixed costs based on benefits received and dividing the same by the quantities sold.
- Some fixed selling expenses and the basis of apportionment based on benefits received are:

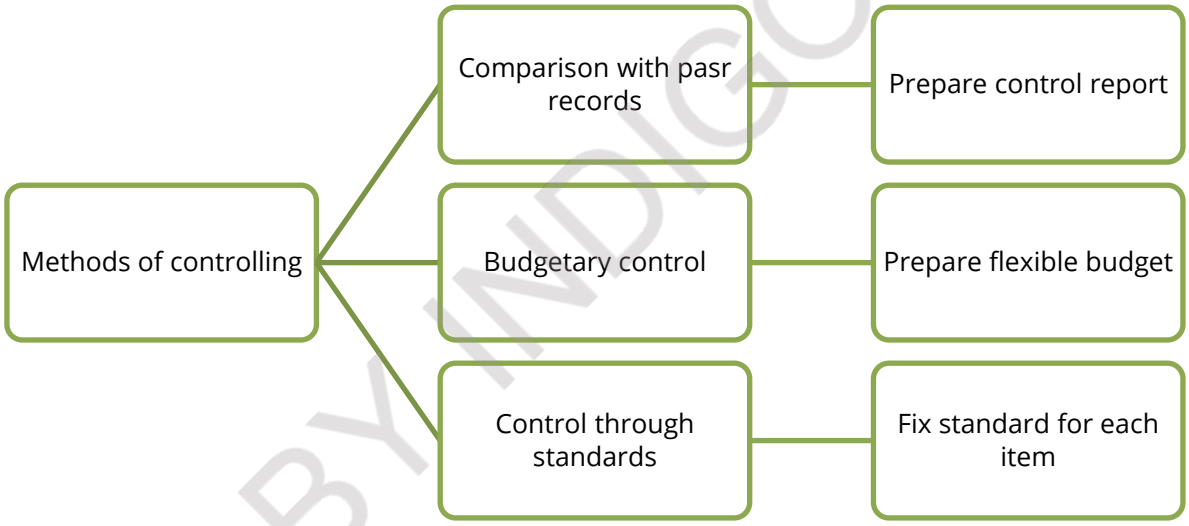
Expenses	Apportionment
Sales office expenses	• Proportion of time devoted to each product
Salesman and travelling expenses	• One Salesman for individual product – amount paid to him. • One Salesman for all products - proportion of time spent on each product

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Advertising	• Actual amount incurred for each product. Since these days it is usual to advertise each product separately. Common • expenses, such as in an exhibition, • Should be apportioned based on advertisement expenditure on each product.
Godowns	• Average quantities stored
Transport charges 1. Own vans 2. Contract basis 3. Information not available	• Average quantity delivered. • So much per case is paid. • Based on turnover.

13. Control of Selling and Distribution Overheads

- Selling and distribution overhead are incurred solely for the product sold.
- Size of the selling and distribution overhead depends upon the distance of market, behaviour of customer and market conditions.
- These expenses being of the nature of policy costs, are not amenable to control.
- Despite the above difficulties, the following methods may be used for controlling them.



A. Comparison with past records

- Company prepares control report.
- It contains the details regarding selling and distribution overheads.
- It helps the management to compare the actual selling overheads with the past record.

B. Budgetary control

- The expenses are classified into fixed and variable.
- Flexible budgets showing expenses at different levels of activities are prepared.
- It helps to compare the actual expenses with the budgets and in the case of variances suitable actions are taken.

C. Standard costing

- Standards are fixed for each item of selling and distribution overhead.
- Standards may be set up for salesmen, territories, products etc.
- Once the standards are set up, comparison is made between the actual and standard: variances are enquired into and suitable action taken.

14. Concepts related to capacity.

A. Installed capacity:

- It is the maximum productive capacity according to the manufacturer's specification of machines/equipment.

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- If manufacturer's technical specifications are not available, installed capacity is ascertained using estimates by technical experts.
- It is also called as maximum capacity, rated capacity, theoretical capacity, and normal capacity.
- Installed capacity is determined based on manufacturer's technical specifications, capacities of individual or interrelated production centres, operational constrains or any other factors.

B. Practical capacity

- Practical = Maximum capacity minus normal/unavoidable time loss.
- So, the following adjustments are made to the maximum capacity to get practical capacity.
- Available production hours considering holidays, normal shut down days and normal idle time.
- Normal time loss in batch changeover, break downs of machines, repair, etc
- Loss in efficiency due to ageing of the machines or equipment etc

C. Normal capacity

- Normal capacity is the capacity of a plant, which is expected to be utilized over a long period based on sales expectations.
- Normal capacity = practical capacity minus loss of productive capacity due to external factors
- Normal capacity is determined based on the productive capacity achieved over a period.
- The periods influenced by abnormalities should be excluded for this purpose.

D. Actual capacity

- Actual capacity utilization is the volume of production achieved, or actual operating hours worked, in relation to installed capacity.

E. Idle capacity

- It is that part of the capacity of a plant, machine or equipment which cannot be effectively utilised in production.
  - **A. Normal Idle Capacity:** It is the difference between Installed capacity and Normal capacity.
  - **B. Abnormal idle capacity:** It is the difference between Installed capacity and Normal capacity. The idle capacity may arise due to lack of product demand, non-availability of raw material, shortage of skilled labour, absenteeism, shortage of power fuel or supplies, seasonal nature of product etc.

Treatment of idle capacity costs

- Idle capacity costs can be treated in product costing in the following ways.
- Normal and unavoidable reasons: such costs arising due to normal reasons like repairs, maintenance shut down; job changeover etc should be treated as regular cost and included as overhead.
- Supplementary overhead rate should be used to recover the idle capacity cost.
- Abnormal and avoidable reasons; such cost arising due to avoidable reasons like faulty planning, power failure, etc should be charged to profit and loss account.
- **Seasonal factors:** if the idle capacity cost is due to seasonal factors, then the cost should be charged the cost of production by inflating overhead rates.

15. Treatment of certain items in costing

A. Interest and financing charges

- It includes any payment in nature of interest for use of
- non-equity funds and incidental cost that an entity incurs in arranging those funds.
- Example of interest and financing charges are interest on borrowings.
- Financing charges in respect of finance leases, cash discount allowed to customers.
- The term interest and financing charges, finance costs and borrowing costs are used interchangeably.
- It does not include imputed costs.
- Interest and financing charges shall be presented in the cost statement as a separate item of cost of sales.

B. Depreciation

- Depreciation is an accounting method of allocation of cost of tangible or physical asset over its economic life.
- Depreciation is thus the result of two factors viz., the use, and the lapse of time.

Assignment of Deprecation:

- It shall be traced to the cost object to the extent economically feasible.
- Where it is not directly traceable it should be assigned using either or two principles,

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- Cause and Effect and
- Benefit received.

C. Packing expenses

1. Primary Packing

Cost of primary packing necessary to protect the product or for preserving the quality of goods, should become a part of the Prime Cost.

2. Secondary Packing

The cost of packing to facilitate the transportation & handling of the product from the factory to the customer should become a part of the Distribution cost. The cost of fancy packing necessary to attract customers is an advertising expenditure. Hence, it will be treated as a Selling Overhead.

3. Special Packing

When there is a special packing at the request of a customer, its cost should be charged to the specific work order or job.

D. Fringe Benefits

- These are the additional payments or facilities provided to the workers apart from their salary and direct cost-allowances like house rent, dearness, and city compensatory allowances.
- These benefits are given in the form of overtime, extra shift duty allowance, holiday pay, pension facilities etc.

Treatment:

- If the amount of fringe benefits is considerably large, it may be recovered as direct charge by means of a supplementary wage or labour rate; otherwise, these may be collected as part of production overheads.

E. Expenses on removal and re-erection of machines

- Expenses may sometimes be incurred on removal and re-erection of machinery in factories.
- Such expenses may be incurred due to factors like change in method of production; an addition or alternation in factory building, change in flow of production, etc.
- All such expenses are treated as production overheads.
- When amount of such expenses is large, and benefit from re-erection of machinery is expected to be received over a longer period, then it may be spread over a period.

F. Bad Debts:

- There is no unanimity among different authors of cost Accounting about the treatment of bad debts.

1. Exclusion View

- One view is that 'bad debts' should be excluded from cost. According to this view bad debts are financial loses and therefore, should not be included in the cost of a particular job or product. This view is more predominant and should be followed.

2. Inclusion View

- According to another view it should form part of selling and distribution overheads, especially when they arise in the normal course of trading.
- Therefore, bad debts should be treated in cost accounting in the same way as any other selling and distribution cost.
- However extraordinarily large bad debts should not be included in cost accounts.

G. Training Expenses

- Training is an essential input for industrial workers. Training expenses includes wages of workers, cost incurred in running training department, loss arising from the initial lower production, extra spoilage etc.

Treatment:

- Training expenses of factory workers are treated as part of the cost of production.
- The training expenses of office staff or salesmen should be treated as Administrative or Selling Overhead respectively.
- These expenses can be spread over the various departments of the concern, based on the number of workers on the roll.
- Training expenses would be abnormally high in the case of high labour turnover.
- Such expenses should be excluded from costs and charged to the costing profit and loss account.

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H. Canteen expenses

- An enterprise / factory may operate a canteen within its premises, to provide lunch and refreshments to workers, as part of its staff welfare measures.
- Sometimes, a small amount (say Rs. 2 per meal) may also be recovered from the workers.
- The loss incurred by the firm in running the canteen should be regarded as an overhead expense.
- If the canteen is meant only for factory workers, the expense should be apportioned based on the number of workers employed in each department. If office Staff also takes advantage of the canteen facility, a suitable share of the expense should be treated as Administrative Overheads.

I. Carriage and Cartage Expenses

- It refers to expenses incurred on the movement (inwards and outwards) and transportation of materials and goods.

1. Carriage Inward

- Carriage expenses related to direct material should be included in the cost of direct material (as a part of Landed Cost) and those relating to indirect material (stores) should be treated as Factory Overheads.

2. Carriage Outward

- Expenses related to the transaction of finished goods may be treated as Distribution Overhead.

J. Expenses for welfare activities

- All expenses incurred on the welfare activities of employees in a company are part of general overheads.
- Such expenses should be apportioned between factory, office, selling, and distribution overheads based on number of persons involved.

K. Night shift allowance

- Workers in the factories, which operate during night-time, are paid some extra amount known as 'night shift allowance'.
- If this allowance is treated as part of direct wages, the jobs/production carried at night will be costlier than jobs/production performed during the day.
- However, if additional expenditure on night shift is incurred to meet some specific customer order, such expenditure may be charged directly to the order concerned.
- If night shifts are run due to abnormal circumstances, the additional expenditure should be charged to the costing profit and loss account.

L. Research and Development Expenses

- It is incurred for searching new or improved products, production methods / techniques or plants / equipment's.
- Research related to original investigations to gain from new scientific or technical knowledge and understanding. It may be:

1. Basic Research

This is general, and not directed towards any specific practical aim.

2. Applied Research

This is directed towards a specific practical aim or objective.

3. Treatment

Basic Research	Applied Research
If continuous: charged to revenue as an expense of the period or as a separate functional overhead.	For specific existing products: Directly charged / allocated to the product.
If not continuous: Spread over a number of years (like deferred revenue expenditure, if the amount is large).	For all existing products / methods: Treated as manufacturing OH and absorbed over all products.
	For new products: Charged to the product if the venture is successful. Otherwise written off to costing P&L A/c either in lump-sum or by amortization.

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4. Development Expenses

- It begins with the implementation of the decision to produce a new or improved product or to employ a new or improved method.
- The treatment of Development Expenses is the same as that of applied research.

Illustrations

1. Illustration

A company has two products

(I) Vanilla ice-cream – 1,00,000 units

(II) Mango ice-cream – 35,000 units

The following information is given:

Particulars	Vanilla(Rs.)	Mango(Rs.)	Total(Rs.)
Direct Material Cost	5.0	2.0	7.0
Direct Labour Cost	3.0	1.0	4.50
Prime Cost	8.0	3.5	11.5
Overheads -Electricity			2,00,000

Electricity expenses – Rs.80,000 and Rs. 50,000 are directly attributable to production of vanilla and Mango respectively based on sub-meters and the unassigned balance charges of Rs.70,000 can be apportioned based on Direct Material Costs.

Allocate and distribute the overheads to both the products

Solution: 1

Statement showing Allocation and Distribution of Overheads

Particulars		Vanilla	Mango
No. of units	Given	1,00,000	35,000
Prime cost per unit	$\frac{(\text{Direct Materail + direct labour})}{\text{No. of units}}$	₹8 $\frac{₹8 \text{ lacs}}{(1 \text{ lac units})}$	₹10 $\frac{₹3.5 \text{ lacs}}{(35{,}000 \text{ units})}$
Electricity Charges -Direct Allocation	Given	₹80000	₹50000
Electricity Charges -Apportionment (70,000)	$70000 \times \frac{\text{Product Material cost}}{\text{Total material cost}}$	₹50,000 $70000 \times \frac{5}{7}$	₹20,000 $70000 \times \frac{2}{7}$
Total Absorbed Overheads	(Allocated + Apportioned)	₹1,30,000	₹70,000
Recovery / Absorption rate (per unit)	$\frac{\text{Total absorbed overheads}}{\text{No. of units}}$	₹1.3 $\frac{₹1{,}30{,}000}{1{,}00{,}000 \text{ units}}$	₹2.0 $\frac{₹70{,}000}{35{,}000 \text{ units}}$

2. Illustration

XL Ltd. has three production departments and four service departments. The expenses for these departments as per Primary Distribution Summary are as follows:

	(Rs.)	(Rs.)
Production Departments:		

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A	30,00,000	
B	26,00,000	
C	24,00,000	**80,00,000**
Service Departments:		
Stores	4,00,000	
Timekeeping & Accounts	3,00,000	
Power	1,60,000	
Canteen	1,00,000	**9,60,000**

The following information is also available in respect of the production departments

	Dept. A	**Dept. B**	**Dept. C**
Horsepower ofMachine	300	300	200
Number of workers	20	15	15
Value of stores requisition in (Rs.)	2,50,000	1,50,000	1,00,000

Apportion the costs of service departments over the production departments

Solution: 2

Items of cost (as per primary distribution summary)	**Basis of apportionment**	**Total (₹)**	**Production Departments**		
			A (₹)	**B (₹)**	**C (₹)**
Cost as per Primary distribution		80,00,000	30,00,000	26,00,000	24,00,000
Stores (5:3:2)	Value of Store requisition	4,00,000	2,00,000	1,20,000	80,000
Time-keeping and Accounts (4:3:3)	No. of workers	3,00,000	1,20,000	90,000	90,000
Power (3:3:2)	H.P. of Machine	1,60,000	60,000	60,000	40,000
Canteen (4:3:3)	No. of workers	1,00,000	40,000	30,000	30,000
		89,60,000	**34,20,000**	**29,00,000**	**26,40,000**

3. Illustration

Suppose the expenses of two production departments A and B and two service departments X and Y are as under:

Department	**Amount**	**Apportionment Basis**		
	(Rs.)	**Y**	**A**	**B**
X	2,00,000	25%	40%	35%
Y	1,50,000	—	40%	60%
A	3,00,000			
B	3,20,000			

Apportion the costs of service departments.

Solution: 3

Summary of Overhead Distribution (Non – Reciprocal Method)

Departments	**X (₹)**	**Y (₹)**	**A (₹)**	**B (₹)**	**Total (₹)**
Direct Distribution (Given)	2,00,000	1,50,000	3,00,000	3,20,000	9,70,000
Secondary Distribution	-	-	-	-	-
Expenses of service dept.X is apportioned among other	(2,00,000)	50,000	80.000	70,000	Nil

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departments = (Y:A:B = 25%:40%:35%)					
	0	**2,00,000**	**3,80,000**	**3,90,000**	
Expenses of Dept.-Y apportioned between department A and B in the ratio = 40%:60%		(2,00,000)	80,000	1,20,000	Nil
Overheads absorbed	**0**	**0**	**4,60,000**	**5,10,000**	**9,70,000**

4. Illustration

Service department's expenses

Particulars	Amount (Rs.)
Boiler House	3,00,000
Pump Room	60,000
Total	**3,60,000**

The allocation is:

Particulars	Production Departments		Service Departments	
	A	**B**	**Boiler House**	**Pump Room**
Boiler House	60%	35%	?	5%
Pump Room	10%	40%	50%	?

Find out the amount of the expenditure that must be allocated to the 2

Solution: 4 - Equation method

The total expenses of the two service departments will be determined as follows

Let B stand for Boiler House expenses and P for Pump Room expenses.

Then,

B = 3,00,000 + 0.50 P & P = 60,000 + 0.05 B

Substituting the value of B,

P = 60,000 + 0.05 (3,00,000 + 0.5 P) = 60,000 + 15,000 + 0.025 P = 75,000 + 0.025 P

⇨ P - 0.025P = 75,000 => P = (75,0000 / 9.75) => P = ₹76,923

The total of expenses of the Pump Room is ₹76,923 and that of the Boiler House is ₹3,38,462 i.e., ₹3,00,000 + 0.5 × ₹76,923.

Distribution of service Department Cost to Production Dept.

	Production Department	
	Dept.-A	**Dept.-B**
Boiler House (60% and 35% of Rs. 3,38,462)	2,03,077	1,18,462
Pump Room (10% and 40% of Rs. 76,923)	7,692	30,769
Total	**2,10,769**	**1,49,231**

Solution: 4 - Trial & Error Method

	Boiler House	**Pump House**
Direct Distribution (Given)	3,00,000	60,000
Cost absorbed by Pump Room from boiler House @ 5% (3,00,000 x 5%)	-	15,000
		75,000
Cost absorbed by boiler House from Pump Room @ 50% (75,000 x 50%)	37,500	-

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Cost absorbed by Pump Room from boiler House @ 5% (37,500 x 5%)	-	1875
Cost absorbed by boiler House from Pump Room @ 50% (1875 x 50%)	9,37.50	-
Cost absorbed by Pump Room from boiler House @ 5% (9,37.50 x 5%)	-	46.88
Cost absorbed by boiler House from Pump Room @ 50% (46.88 x 50%)	23.44	-
Cost absorbed by Pump Room from boiler House @ 5% (9,37.50 x 5%)	-	1.17
Total	**3,38,461**	**76,923**

OR

	Boiler House	**Pump House**
Direct Distribution (Given)	3,00,000	60,000
Cost absorbed by boiler House from Pump Room @ 50% (60,000 x 50%)	30,000	-
	3,30,000	
Cost absorbed by Pump Room from boiler House @ 5% (3,30,000 x 5%)	-	16,500
Cost absorbed by boiler House from Pump Room @ 50% (16,500 x 50%)	8,250	-
Cost absorbed by Pump Room from boiler House @ 5% (8,250 x 5%)	-	412.50
Cost absorbed by boiler House from Pump Room @ 50% (412.50 x 50%)	206.25	-
Cost absorbed by Pump Room from boiler House @ 5% (206.25x 5%)	-	10.31
Cost absorbed by boiler House from Pump Room @ 50% (10.31x 50%)	5.16	-
Cost absorbed by Pump Room from boiler House @ 5% (5.16 x 5%)	-	0.26
Total	**3,38,461**	**76,923**

Solution: 4 - Repeated Redistribution Method

Particulars	**Production Departments**		**Service Departments**	
	A	**B**	**Boiler House**	**Pump Room**
Cost as per Primary Distribution	**-**	**-**	3,00,000	60,000
Secondary Distribution of Boiler House (60%:35%:5%)	1,80,000	1,05,000	(3,00,000)	15,000
Secondary Distribution of Pump Room (10%:40%:50%)	7,500	30,000	37,500	(75,000)
Secondary Distribution of Boiler House (60%:35%:5%)	22,500	13,125	(37,500)	1,875
Secondary Distribution of Pump Room (10%:40%:50%)	187.5	750	937.50	(1,875)
Secondary Distribution of Boiler House (60%:35%:5%)	562.50	327.95	(937.50)	46.88
Secondary Distribution of Pump Room (10%:40%:50%)	4.69	18.75	23.44	(46.88)
Secondary Distribution of Boiler House (60%:35%:5%)	14.06	8.20	(23.44)	1.17
Secondary Distribution of Pump Room (10%:40%:50%)	0.12	1.05	-	(1.17)
Total	**2,10,769**	**1,49,231**	-	-

5. Illustration

Sanz Ltd. is a manufacturing company having three production departments, 'A', 'B' and 'C' and two service departments 'X' and 'Y'. The following is the budget for December 2018:

	Total (Rs.)	**A (Rs.)**	**B (Rs.)**	**C (Rs.)**	**X (Rs.)**	**Y (Rs.)**
Direct material		1,00,000	2,00,000	4,00,000	2,00,000	1,00,000
Directwages		5,00,000	2,00,000	8,00,000	1,00,000	2,00,000
Factoryrent	4,00,000					
Power	2,50,000					

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Depreciation	1,00,000					
Other overheads	9,00,000					
Additional information:						
Area (Sq.ft.)		500	250	500	250	500
Capital value of assets (Rs. lakhs)		20	40	20	10	10
Machine hours		1,000	2,000	4,000	1,000	1,000
Horsepower of machines		50	40	20	15	25

A technical assessment of the apportionment of expenses of service departments is as under:

	A	B	C	X	Y
Service Dept. 'X'(%)	45	15	30	?	10
Service Dept. 'Y'(%)	60	35	?	5	?

Required:

1) A statement showing distribution of overheads to various departments.
2) A statement showing re-distribution of service departments expenses to production departments using
   a. Trial and error method.
   b. Repeated redistribution method
3. Machine hour rates of the production departments 'A', 'B' and 'C'

Solution: 5

	Basis	**Total (₹)**	**A (₹)**	**B (₹)**	**C (₹)**	**X (₹)**	**Y (₹)**
Direct materials	Direct	**-**	**-**	**-**	**-**	2,00,000	1,00,000
Direct wages	Direct	**-**	**-**	**-**	**-**	1,00,000	2,00,000
Factory rent (2:1:2:1:2)	Area	4,00,000	1,00,000	50,000	1,00,000	50,000	1,00,000
Power (10:16:16:3:5)*	H.P. × Machine Hrs.	2,50,000	50,000	80,000	80,000	15,000	25,000
Depreciation (2:4:2:1:1)	Capital value	1,00,000	20,000	40,000	20,000	10,000	10,000
Other overheads (1:2:4:1:1)	Machine hrs.	9,00,000	1,00,000	2,00,000	4,00,000	1,00,000	1,00,000
		16,50,000	**2,70,000**	**3,70,000**	**6,00,000**	**4,75,000**	**5,35,000**

*{(1000×50) : (2000×40) : (4000×20) : (1000×15) : (1000×25)} (50000 : 80000 : 80000 : 15000 : 25000)

Redistribution of Service Department's expenses:

	Production Department	
	X (₹)	**Y (₹)**
Overheads as per primary distribution	4,75,000	5,35,000
(i) Apportionment of Dept-X expenses to Dept-Y (10% of Rs. 4,75,000)	-	47,500
	-	5,82,500
(ii) Apportionment of Dept-Y expenses to Dept-X [5% of (Rs. 5,35,000 + Rs. 47,500)]	29,125	-
(i) Apportionment of Dept-X expenses to Dept-Y (10% of Rs. 29,125)	-	2,913
(ii) Apportionment of Dept-Y expenses to Dept-X (5% of Rs. 2,913)	146	-
Total	**5,04,271**	**5,85,413**

Distribution of Service departments' overheads to Production Departments

	Production Departments		
	A (₹)	**B (₹)**	**C (₹)**
Overhead as per primary distribution	2,70,000	3,70,000	6,00,000

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Particulars	Total (Rs.)	Production Departments		Service Departments	
		Machine shop (Rs.)	Packing (Rs.)	General Plant (Rs.)	Stores & Maint. (Rs.)
Allocated Overheads:					
Indirectlabour	14,650	4,000	3,000	2,000	5,650
Maintenance material	5,020	1,800	700	1,020	1,500
Misc. supplies	1,750	400	1,000	150	200
Superintendent's salary	4,000	–	–	4,000	–
Cost &payrollsalary	10,000	–	–	10,000	–
Overheadsto be apportioned:					
Power	8,000				
Rent	12,000				
Fuel andheat	6,000				
Insurance	1,000				
Taxes	2,000				
Depreciation	1,00,000				
	1,64,420	**6,200**	**4,700**	**17,170**	**7,350**
Dept- X (90% of Rs. 5,04,300)			2,26,900	75,600	1,51,300
Dept- Y (95% of Rs. 5,85,400)			3,51,300	2,04,900	-

6. Illustration

The ABC Company has the following account balances and distribution of direct charges on 31st March 2019. The following data were compiled by means of the factory survey made in the previous year:

	Floor space	Radiator Sections	No. of Employees	Investment (Rs.)	H.P hours
Machine Shop	2,000 sq. ft.	45	20	640,000	3,500
Packing	800 sq. ft.	90	10	200,000	500
General Plant	400 sq. ft.	30	3	10,000	–
Stores & Maint.	1,600 sq. ft.	60	5	150,000	1,000
	4,800 sq. ft.	**225**	**38**	**1,000,000**	**5,000**

Expenses charged to the stores and maintenance departments are to be distributed to the other departments by the following percentages:

Machine shop 50%; Packing 20%; General Plant 30%; General Plant overheads is distributed based on number of employees:

You are required to

(a) Prepare an overhead distribution statement with supporting schedules to show computations and basis of distribution including distribution of the service department expenses to producing department.

(b) Determine the service department distribution by the method of continued distribution. Carry through 3 cycles. Show all calculations to the nearest rupees.

Solution: 6

(a) Statement Showing Distribution of Overheads

Particulars	Production Department		Service Department	
	Machine	Packing	General Plant	Stores&Maint.

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Allocated Expenses:				
Indirect labour	4,000	3,000	2,000	5,650
Maintenance material	1,800	700	1,020	1,500
Superintendent's Salary	-	-	4,000	-
Cost & payroll salaries	-	-	10,000	-
Misc. supplies	400	1,000	150	200
Total Allocated Overheads	**6,200**	**4,700**	**17,170**	**7,350**
Apportioned expenses (as per schedule below)	77,720	25,800	2,830	22,650
Total Overheads	**83,920**	**30,500**	**20,000**	**30,000**

Schedule of Apportioned Expenses

Item	**Basis**	**Total Amount**	**Production Depts.**		**Service Depts.**	
			Machine shop	**Packing**	**Gen. Plant**	**Store & Maint.**
		(₹)	**(₹)**		**(₹)**	
Power (7:1:2)	HP hours	8,000	5,600	800	-	1,600
Rent (5:2:1:4)	Floor Space	12,000	5,000	2,000	1,000	4,000
Fuel and heat (3:6:2:4)	Radiator Secs.	6,000	1,200	2,400	800	1,600
Insurance (64:20:1:15)	Investment	1,000	640	200	10	150
Trade license fees (64:20:1:15)	Investment	2,000	1,280	400	20	300
Depreciation (64:20:1:15)	Investment	1,00,000	64,000	20,000	1,000	15,000
Total		**1,29,000**	**77,720**	**25,800**	**2,830**	**22,650**

(b) Distribution of Service Department Expenses

	Production Depts.		**Service Depts.**	
	Machine shop	**Packing**		**Store & Maint.**
(₹)		**(₹)**	**(₹)**	**(₹)**
Total Expense [as per (**a**)]	83,920	30,500	20,000	30,000
Dist. of Store & Maint. (5:2:3)	15,000	6,000	9,000	-30,000
Dist. of General plant (4:2:1)	16,571	8,286	-29,000	4,143
Dist. of Store & Maint. (5:2:3)	2,072	829	1,242	-4,143
Dist. of General plant (4:2:1)	710	355	-1,242	177
Dist. of Store & Maint. (5:2:3)	89	35	53	-177
Dist. of General plant (4:2:1)	35	18	-53	0
Total	**1,18,397**	**46,023**		

7. Illustration

Modern Manufactures Ltd. has three Production Departments P1, P2, P3 and two Service Departments S1 and S2 details pertaining to which are as under:

	P1	**P2**	**P3**	**S1**	**S2**
Direct wages (Rs.)	3,000	2,000	3,000	1,500	195
Workinghours	3,070	4,475	2,419	-	-

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Value of machines(Rs.)	60,000	80,000	1,00,000	5,000	5,000
H.P. of machines	60	30	50	10	-
Light points	10	15	20	10	5
Floor space(sq. ft.)	2,000	2,500	3,000	2,000	500

The following figures extracted from the Accounting records are relevant:

Particulars	Amount (Rs.)
Rent and Rates	5,000
General Lighting	600
Indirect Wages	1,939
Power	1,500
Depreciation on Machines	10,000
Sundries	9,695

The expenses of the Service Departments are allocated as under:

	P1	P2	P3	S1	S2
S1	20%	30%	40%	-	10%
S2	40%	20%	30%	10%	-

Find out the total cost of product X, which is processed for manufacture in Departments P1, P2 and P3 for 4, 5 and 3 hours respectively, given that its Direct Material Cost is Rs.50 and Direct Labour Cost is Rs.30.

Solution: 7

Statement Showing Distribution of Overheads of Modern Manufactures Ltd.

Particulars	**Basis**	**Total**	**Production Departments**			**Service Departments**	
			P1	**P2**	**P3**	**S1**	**S2**
			(₹)	**(₹)**	**(₹)**	**(₹)**	**(₹)**
Direct wages	Actual	1,695	-	-	-	1,500	195
Apportionment							
Rent & rates	Area (4:5:6:4:1)	5,000	1,000	1,250	1,500	1,000	250
General lighting	Light points(10:15:20:10:5)	600	100	150	200	100	50
Indirect wages	Directwages(3000:2000:3000:1500:195)	1,939	600	400	600	300	39
Power	H.P(60:30:50:10:0)	1,500	600	300	500	100	-
Depreciation of machines	Value of machines (60:80:100:5:5)	10,000	2,400	3,200	4,000	200	200
Sundries	Direct Wages	9,695	3,000	2,000	3,000	1,500	195
Total OH as per Primary Distribution		**30,429**	**7,700**	**7,300**	**9,800**	**4,700**	**929**

Redistribution of Service Department's Expenses over Production Departments using Repeated Redistribution Mathod (Reciprocal Method)

Particulars	P1	P2	P3	S1	S2
Total overhead distributed as above	7,700	7,300	9,800	4,700	929

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Dept. S1 Overheads apportioned (20:30:40:—:10)	940	1,410	1,880	(4,700)	470
Dept. S2 overheads apportioned (40:20:30:10:—)	560	280	420	139	(1,399)
Dept. S1 Overheads apportioned(20:30:40:—:10)	28	42	56	(139)	13
Dept. S2 overheads apportioned (40:20:30:10:—)	5	3	5	-	(13)
	9,233	**9,035**	**12,161**		
Working hours	3070	4475	2419		
Rate per hour	3.01	2.02	5.03		

Determination of total cost of Product 'X'

Direct Material Cost	50.00
Direct Labour Cost	30.00
Overhead cost (See working note)	37.19
	117.19

Working Note:

Overhead Cost:

(₹3 × 4 hrs.) + (₹2.02 × 5 hrs.) + (₹5.03 × 3 hrs.)

= ₹12 + ₹10.10 + ₹15.09 = ₹37.19

8. Illustration

Deccan Manufacturing Ltd. have three departments which are regarded as production departments.

Service departments' costs are distributed to these production departments using the "Step Ladder Method" of distribution.

Estimates of factory overhead costs to be incurred by each department in the forthcoming year are as follows.

Data required for distribution is also shown against each department:

Department	Factory Overheads (Rs.)	Direct Labour Hours	No. of employees	Area in Sq. mts
Production				
X	1,93,000	4,000	100	3,000
Y	64,000	3,000	125	1,500
Z	83,000	4,000	85	1,500
Service				
P	45,000	1,000	10	500
Q	75,000	5,000	50	1,500
R	1,05,000	6,000	40	1,000
S	30,000	3,000	50	1,000

The overhead costs of the four service departments are distributed in the same order, viz., P,Q,R and S respectively on the following basis

Department	Basis
P	Number of employees
Q	Direct labour hours
R	Area in square meters
S	Direct labour hours

You are required to:

(a) Prepare a schedule showing the distribution of overhead costs of the service departments to the three production departments; and

(b) Calculate the overhead recovery rate per direct labour hour for each of the three production departments

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Solution: 8

Statement Showing Secondary Distribution of Overheads

	Production Depts.			Service Depts.			
Particulars	**X**	**Y**	**Z**	**P**	**Q**	**R**	**S**
Overhead cost (As Per Primary distribution)	1,93,000	64,000	83,000	45,000	75,000	1,05,000	30,000
Distribution of Dept P (100:125:85:0:50:40:50)	10,000	12,500	8,500	(45, 000)	5,000	4,000	5,000
Distribution of Dept Q (4:3:4:0:0:6:3)	16,000	12,000	16,000	-	(80,000)	24,000	12,000
Distribution of Dept.R (6:3:3:0:0:0:0:2)	57,000	28,500	28,500	-	-	(1,33,000)	19,000
Distribution of Dept S (4:3:4:0:0:0:0)	24,000	18,000	24,000	0	0	0	(66,000)
Total Overheads	**3,00,000**	**1,35,000**	**1,60,000**	-	-	-	-

(b) Calculation of overhead recovery rate

	Dept-X	**Dept-Y**	**Dept-Z**
Total apportioned overheads	₹3,00,0 00	₹1,35,000	₹1,60,000
Direct labour hours	4,000	3,000	4,000
Overhead recovery rate per labour hour (Total OH / Direct Labour Hours)	₹75	₹45	₹40

9. Illustration

Gemini enterprises undertakes three different jobs A, B and C.

All of them require the use of a special machine and also the use of a computer.

The computer is hired, and the hire charges work out to Rs. 4,20,000 per annum. The expenses regarding the machine are estimated as follows:

Particulars	**Amount (Rs.)**
Rent for the quarter	17,500
Depreciation per annum	2,00,000
Indirect charges per annum	1,50,000

During the first month of operation the following details were taken from the job register:

Particulars	**Job**		
	A	B	C
Number of hoursthe machine wasused:			
1. Without theuse of computer	600	900	-
2. With the use of computer	400	600	1000

You are required to compute the machine hour rate:

1) For the firm as a whole for the month when the computer was used and when the computer was not used.
2) For the individual jobs A, B and C.

Solution: 9

Working notes:

(i) Total machine hours used 3,500 i.e (600 + 900 + 400 + 600 + 1,000)

(ii) Total machine hours without the use of computers 1,500 i.e (600 + 900 + 0)

(iii) Total machine hours with the use of computer 2,000 i.e (400 + 600 + 1,000)

(iv) Computer hire charges for a month = Rs. 35,000 (Rs. 4,20,000 ÷ 12 months)

(v) Total cost of using the machine/overhead (per month)

	₹
Rent (Rs. 17,500 ÷ 3 months)	5,833.33

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Depreciation (Rs. 2,00,000 ÷ 12 months)	16,666.67
Indirect Charges (Rs. 1,50,000 ÷ 12 months)	12,500.00
Total	**35,000**

(vi) Overheads for using machines without computer = (₹35,000 / 3,500 hrs.) × 1,500 hrs. = Rs. 15,000

(a) Computation of Machine hour rate for the firm as a whole for a month.

1) When the Computer was used: = (₹55,000 /2,000 hours) = ₹27.50 per hour

(2) When the computer was not used = (Rs.15,000 / 1,500 hrs.) = ₹10 per hour

(b) Computation of Machine hour rate for the Individual job

Rate per Hour		**Job**					
		A		**B**		**C**	
	₹	**Hrs.**	**₹**	**Hrs.**	**₹**	**Hrs.**	**₹**
Overheads							
Without computer	10.0	600	6,000	900	9000	-	-
With computer	27.5	400	11,000	600	16,500	1,000	27,500
Total		1,000	17,000	1,500	25,500	1,000	27,500
Machine hour rate			**17**		**17**		**27.5**

10. Illustration

A light engineering factory fabricates machine parts to customers. The factory commenced fabrication of 12 Nos. machine parts to customers' specifications and the expenditure incurred on the job for the week ending 21st August, 20X1 is given below:

Particulars	**Amount (Rs.)**	**Amount (Rs.)**
Direct materials (allitems)		780.00
Direct labour (manual) 20hours @Rs. 15 per hour		300.00
Machine facilities:		
Machine No. I: 4 hours @Rs.45	180.00	
Machine No. II: 6 hours @Rs. 65	390.00	570.00
Total		**1,650.00**
Overheads @ Rs.8 per houron 20 manual hours		160.00
Total cost		**1,810.00**

- The overhead rate of Rs.8 per hour is based on 3,000-man hours per week;
- similarly, the machine hour rates are based on the normal working of Machine Nos. I and II for 40 hours out of 45 hours per week.
- After the close of each week, the factory levies a supplementary rate for the recovery of full overhead expenses on the basis of actual hours worked during the week.
- During the week ending 21st August, 20X1, the total labour hours worked was 2,400 and Machine Nos. I and II had worked for 30 hours and 32.5 hours respectively.
- Prepare a Cost Sheet for the job for the fabrication of 12 Nos. machine parts duly levying the supplementary rates.

Solution: 10

Calculation of Revised Cost Sheet for week ending 21st August

Particulars	**₹**	**₹**
Direct Materials (all items)		780.00
Direct labour (manual) 20 hours @₹15 per hour		300.00
Machine facilities:		
Machine No. I : 4 hours @ ₹45	180.00	
Machine No. II : 6 hours @ ₹65	390.00	570.00
Total		1,650.00
Overheads @ ₹8 per hour on 20 manual hours		160.00
Total cost		**1,810.00**

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Supplementary Rates		
Overheads 20 hours @ ₹2 per hour (Refer WN)	40.00	
Machine facilities:		
Machine No. I - 4 hours @₹15	60.00	
Machine No. II - 6 hours @₹15	90.00	190.00
Revised Cost		**2,000.00**

Working Notes:

Particulars	**Overhead (Manual Hours)**	**Machine No. 1**	**Machine No. 2**
Estimated Recovery Rate	₹8 / hour	₹45 / hour	₹65 / hour
Estimated Normal Number of hours	3000	40	40
Budgeted/estimated OH	24,000	₹1,800 (40 × ₹45)	₹2,600 (40 × ₹65)
Assuming that Actual OH = Budgeted			
Actual OH	24,000	1,800	2,600
Actual Working Hours	2,400	30	32.50
Actual OH Rate (Normal Rate)	₹10 / hour	₹60/ hour	₹80/hour
Supplementary rate per hour	₹2(₹10 – ₹8) per hour	₹15 (₹60 – ₹45) per hour	₹15.00 (₹80 – ₹65) per hour

11. Illustration

In a manufacturing unit, factory overhead was recovered at a pre-determined rate of Rs. 25 per man-day.
The total factory overhead expenses incurred and the man- days actually worked were Rs. 41.50 lakhs and 1.5 lakh man-days respectively.
Out of the 40,000 units produced during a period, 30,000 were sold.
On analysing the reasons, it was found that 60% of the unabsorbed overheads were due to defective planning and the rest were attributable to increase in overhead costs.
How would unabsorbed overheads be treated in Cost Accounts?

Solution: Illustration 11

Computation of Unabsorbed Overheads

Particulars	**₹**
Man-days worked	1,50,000
Overhead actually incurred	41,50,000
Less: Overhead absorbed @ ₹25 per man-day (₹25 × 1,50,000)	(37,50,000)
Unabsorbed Overheads	4,00,000
Less: Unabsorbed Overheads due to defective planning (i.e. 60% of ₹4,00,000)	(2,40,000)
Balance of Unabsorbed Overhead	**1,60,000**

Treatment of Unabsorbed Overheads in Cost Accounts

(i) The unabsorbed overheads of Rs. 2,40,000 due to defective planning to be treated as abnormal and therefore be charged to Costing Profit and Loss Account.
(ii) The balance unabsorbed overheads of ₹1,60,000 be charged to production i.e., 40,000 units at the supplementary overhead absorption rate i.e ₹4 per unit (Refer to Working Note)

Working Note:

	₹
Charge to Costing Profit and Loss Account as part of the cost of unit sold (30,000 units @ ₹4 p.u.)	1,20,000
Add: To closing stock of finished goods	40,000
Total	**1,60,000**

Supplementary Overhead Absorption rate = ₹1,60,000 /40,000 units = ₹4 p.u

12. Illustration

In a factory, overheads of a particular department are recovered on the basis of Rs. 5 per machine hour.

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The total expenses incurred and the actual machine hours for the department for the month of August were Rs.80,000 and 10,000 hours respectively.
Of the amount of Rs. 80,000, Rs. 15,000 became payable due to an award of the Labour Court and Rs. 5,000 was in respect of expenses of the previous year booked in the current month (August).
Actual production was 40,000 units, of which 30,000 units were sold.
On analysing the reasons, it was found that 60% of the under-absorbed overhead was due to defective planning and the rest was attributed to normal cost increase. How would you treat the under-absorbed overhead in the cost accounts?

Solution: 12

	₹	₹
Total expenses incurred in the month of August:		80,000
Less: The amount paid according to labour court award (Assumed to be non-recurring)	15,000	
Expenses of previous year	5000	(20000)
Net overhead expenses incurred for the month		60,000
Overhead recovered for 10,000 hours @ ₹5 per hour		(50,000)
Under-absorbed overheads		**10,000**

60% (₹6,000) of under-absorbed overhead was **due to defective planning**, it will be charged to costing profit & loss account.
40% of under-absorbed overhead i.e. ₹4,000 may be distributed over Finished Goods and Cost of Sales using supplementary overhead rate:
Supplementary rate = Under-absorbed OH / Units produced $=\frac{4000}{40,000}$ = ₹0.10 per unit

Treatment of ₹4,000
Since 30,000 units are sold (30,000 x 0.10) ₹3,000 should be debited to costing P&L as Cost of Sales.
For 10,000 units in stock, increase the value of finished goods by ₹1,000 (10000 x ₹0.10)

13. Illustration
ABC Ltd. manufactures a single product and absorbs the production overheads at a pre-determined rate of Rs. 10 per machine hour.
At the end of financial year 20X1-X2, it has been found that actual production overheads incurred were Rs. 6,00,000. It included Rs. 45,000 on account of 'written off' obsolete stores and Rs.30,000 being the wages paid for the strike period under an award.
The production and sales data for the year 20X1-X2 is as under:

Particulars	Amount (Rs.)
Production:	
Finished Goods	20,000 units
Work-in-progress (50% complete in all respects)	8,000 units
Sales:	
Finished Goods	18,000 units

The actual machine hours worked during the period were 48,000.
It has been found that one-third of the under-absorption of production overheads was due to lack of production planning and the rest was attributable to normal increase in costs.
Calculate the amount of under-absorption of production overheads during the year 20X1-X2; and
Show the accounting treatment of under-absorption of production overheads.

Solution: 13
(i) **Computation of under absorbed Overheads**

	₹
Actual OH incurred	6,00,000
Less : 'Written off' obsolete stores	(45,000)
Less :Wages paid for strike period	(30,000)
Net production Overheads actually incurred (A)	**5,25,000**

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Production overheads absorbed by 48,000 machine hours @ ₹10 per hour **(B)**	4,80,000
Amount of under – absorption of production overhead [(A) – (B)]	**45,000**

(ii) Accounting treatment of under absorption of production overheads

Total under absorbed overhead is ₹45,000.

(a) out of which 1/3rd of Rs. 45,000) i.e., ₹15,000 of under-absorbed overheads were due to lack of production planning. This being abnormal, should be debited to the Costing Profit and Loss A/c.

(b) Balance (2/3rd of ₹45,000) i.e., ₹30,000 of under-absorbed overheads should be distributed over work-in-progress, finished goods and cost of sales by using supplementary rate.

Break- up of unabsorbed overheads of Rs. 30,000 over, work-in progress, finished goods and cost of sales

	Equivalent Units	Completed Units
Work-in-Progress (4,000 units × ₹1.25) (Refer to working note)	4,000	5,000
Finished goods (2,000 units × ₹1.25)	2,000	2,500
Cost of sales (18,000 units × ₹1.25)	24,000	30,000

Working Note

Supplementary Rate

Under absorbed overhead ₹30,000

No. of units (Equivalent Units):

Produced and sold	18,000 units
Finished goods Inventory	2,000 Units
WIP Inventory	4,000 Units
Total	24,000 Units

Therefore, Supplementary rate per unit = ₹30,000 / 24,000 = ₹1.25

14. Illustration

A factory has three production departments.

The policy of the factory is to recover the production overheads of the entire factory by adopting a single blanket rate based on

- percentage of total factory overheads to
- total factory wages.

The relevant data for a month are given below:

Department	Direct Material	DirectWages	Factory OH Amount(Rs.)	Direct Labour Hours Amount(Rs.)	Machine Hours Amount(Rs.)
Budget:					
Machining	6,50,000	80,000	3,60,000	20,000	80,000
Assembly	1,70,000	3,50,000	1,40,000	1,00,000	10,000
Packing	1,00,000	70,000	1,25,000	50,000	–
Actual:					
Machining	7,80,000	96,000	3,90,000	24,000	96,000
Assembly	1,36,000	2,70,000	84,000	90,000	11,000
Packing	1,20,000	90,000	1,35,000	60,000	–

The details of one of the representative jobs produced during the month are as under:

Job No. CW7083				
Department	**Direct Materials**	**Direct Wages Amount (Rs.)**	**Direct Labour Hours**	**Machine Hours**
Machining	1,200	240	60	180
Assembly	600	360	120	30
Packing	300	60	40	-

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The factory adds 30% on the factory cost to cover administration and selling overheads and profit.
Requirements:

1) Calculate the overhead absorption rate as per the current policy of the company and determine the selling price of the Job No. CW 7083.
2) Suggest any suitable alternative method(s) of absorption of the factory overheads and calculate the overhead recovery rates based on the method(s) so recommended by you.
3) Determine the selling price of Job CW 7083 based on the overhead application rates calculated in (ii) above.
4) Calculate the department-wise and total under or over recovery of overheads based on the company's current policy and the method(s) recommended by you.

Solution: 14

(i) Computation of overhead absorption rate (as per the current policy of the company)

Department	**Budgeted factory Overheads (₹)**	**Budgeted direct wages (₹)**
Machinery	3,60,000	80,000
Assembly	1,40,000	3,50,000
Packing	1,25,000	70,000
Total	**6,25,000**	**5,00,000**

Overhead absorption rate = $\frac{\text{Budgeted factory overheads}}{\text{Budgeted direct wages}}$ x 100 = $\frac{6,25,000}{5,00,000}$ x 100 = 125% of Direct wages

Selling Price of the Job No. CW-7083

Particulars	**₹**
Direct materials (₹1,200 + ₹ 600 + ₹300)	2,100.00
Direct wages (₹240 + ₹360 + ₹60)	660.00
Overheads (125% × ₹ 660	825.00
Total factory cost	**3,585.00**
Add: Mark-up (30% × Rs. 3,585)	1,075.50
Selling price	4,660.50

(ii) Methods available for absorbing factory overheads and their overhead recovery rates in different departments

(a) In the machining department, the use of machine time is the predominant factor of production. Hence machine hour rate should be used to recover overheads in this department. The overhead recovery rate based on machine hours has been calculated as under:

Machine hour rate= $\frac{\text{Budgeted factory overheads}}{\text{Budgeted machine hours}}$ = $\frac{3,60,000}{80,000}$ = ₹4.50 per hour

(b) **Assembly Department**

In the machining department, the use of machine time is the predominant factor of production. Hence machine hour rate should be used to recover overheads in this department. The overhead recovery rate based on machine hours has been calculated as under:

Direct labour hour rate = $\frac{\text{Budgeted factory overheads}}{\text{Budgeted direct labour hours}}$ = $\frac{1,40,000}{1,00,000 \text{ hours}}$ = ₹1.40 per hour

(c) **Packing Department**

Labour is the most important factor of production in this department. Hence direct labour hour rate method should be used to recover overheads in this department.

The overhead recovery rate in this case comes to:

$\frac{\text{Budgeted factory overheads}}{\text{Direct labour hours}}$ = $\frac{1,25,000}{50,000 \text{ hours}}$ = ₹2.50 per hour

(iii) Selling Price of Job CW-7083 [based on the overhead application rates calculated in (ii) above]

	₹
Direct materials	2,100.00
Direct wages	660.00
Overheads (Refer to Working note)	1,078.00

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Factory cost	**3,838.00**
Add: Mark up (30% of ₹3,838)	1,151.40
Selling price	**4,989.40**

Working note:

Computation of overhead

Dept. Overheads	Basis	Hours	Rate (₹)	(₹)
Machining	Machine hour	180	4.50	810
Assembly	Direct labour hour	120	1.40	168
Packing	Direct labour hour	40	2.50	100
			Total	**1,078**

(iv) Department-wise statement of total under or over recovery of overheads

(a) Under current policy

Particulars	**Departments**			
	Machining (**₹**)	Assembly (**₹**)	Packing (**₹**)	Total (**₹**)
Direct wages (Actual)	96,000	2,70,000	90,000	4,56,000
Overheads recovered @ 125% of Direct wages: **(A)**	1,20,000	3,37,500	1,12,500	5,70,000
Actual overheads: **(B)**	3,90,000	84,000	1,35,000	6,09,000
(Under)/Over recovery of overheads: (A—B)	**(2,70,000)**	**2,53,500**	**(22,500)**	**(39,000)**

(b) Over/ under recovery of overhead (using recommendation)

Particulars	**Basis of overhead recovery**			
	Machine hours	**Direct labour hours**	**Direct labour hours**	Total (**₹**)
No of machine Hours Actually worked	96,000	-	-	
No of direct labour Hours Actually worked	-	90,000	60,000	
Rate/hour (**₹**)	4.50	1.40	2.50	
Overhead recovered (**₹**): (A)	4,32,000	1,26,000	1,50,000	7,08,000
Actual overheads (**₹**): (B)	3,90,000	84,000	1,35,000	6,09,000
(Under)/Over recovery: (A−B)	42,000	42,000	15,000	99,000

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CHAPTER 3 – COST BOOK KEEPING
UNIT 1 : COST SHEET

OVERVIEW

- Functional classification of cost
- Heads of cost in cost sheet
- Format of cost sheet
- Advantages of cost sheet
- Illustrations

INTRODUCTION

Cost Sheet is a statement, which is prepared at given intervals of time that provides information regarding elements of cost incurred in production. It discloses both the total cost and the cost per unit of the product manufactured during the given period. If it is desired to check or goods, the results of the cost sheet of a specific period with any of the preceding periods, comparative columns can be provided within the Cost Sheet.
The cost sheet is prepared to arrive at the cost of product/job/operation, or it is prepared to give quotations or to determine tender price for supply of goods or providing service.
A cost sheet is an exercise in assortment of data regarding all the costs incurred in the industry and arranging them in an exceedingly sure order. The data required to prepare a cost sheet is gathered from many records within the organization.

1. Functional classification of elements of cost

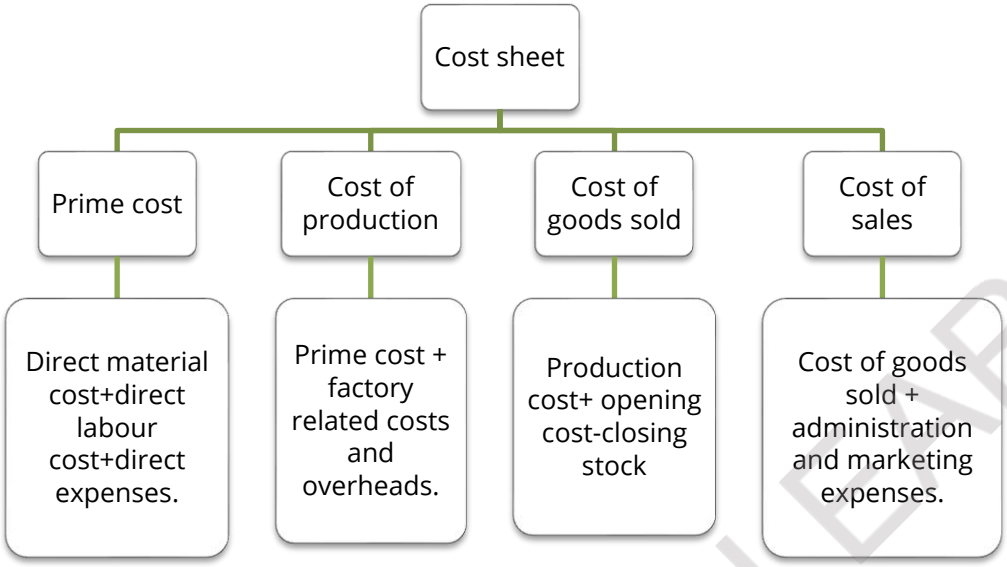
Costs are divided according to the function for which they have been incurred. The classifications of cost based on their functions are as follows:

1. Direct material cost
2. Direct employee cost
3. Direct expenses
4. Production or manufacturing overheads
5. Administration or office overheads
6. Selling overheads
7. Distribution overheads
8. Research and development cost etc

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2. Heads of cost in a cost sheet

Grouping of the costs incurred based on their functions are as follows.



A. Prime cost

- Prime cost comprises of direct material cost, direct labour cost and direct expenses.
- Each element's total cost is calculated separately and added together to find out prime cost.

Direct Material cost	XX
Direct Labour Cost	XX
Direct expenses	XX
Total: Prime Cost	**XX**

a. Direct material cost

- It is the cost of direct material consumed.
- Direct materials are the materials from which a product is produced or manufactured.
- The cost of direct material will vary according to the level of output derived.
- For example: Milk is the direct material of butter.

The cost of direct material consumed is calculated as follows.

Opening Cost of Material	XX
Add: Additions/Purchases	XX
Less: Closing Stock of Materials	XX
Direct Materials consumed	**XX**

b. Direct labour cost

- It refers to the amount paid to the workers who are directly engaged in the production of goods.
- Cost object is called direct labour.

it includes the following.

1. Wages and salary.
2. Allowances and incentives.
3. Payment for overtimes.
4. Employer's contribution to Provident fund and other welfare funds.
5. Other benefits (leave with pay, free or subsidised food, leave travel concession etc.)

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c. Direct expenses

- It includes all expenses other than direct material or direct labour.
- Which are specially incurred for a particular cost object and can be identified in an economically feasible way.

The following costs are examples for direct expenses:

1. Hire charges for some special machinery,
2. Cost of defective work.
3. Royalty paid/ payable for production or provision of service.
4. Cost of product/ service specific software.
5. Other expenses which are directly related with the production of goods or provision of service.

B. Cost of Production

- In a conventional cost sheet, this item of cost can be seen.
- It is the total of prime cost and factory related costs and overheads.

Prime Cost	XX
Add: Factory Overhead	XX
Gross Works Costs	**XX**
Add: Opening stock of Work in Progress	XX
Less: Closing stock of Work-in-process	(XX)
Factory or Works Costs	**XX**
Add: Quality Control Cost	XX
Add: Research & Development cost (Process related)	XX
Add: Administrative Overheads related with Production	XX
Less: Credit for recoveries (miscellaneous income)	(XX)
Add: Packing Cost (Primary packing)	XX
Cost of Production	**XX**

Stock of work in process

- The cost of opening and closing stock of work-in process is adjusted to arrive at factory/ works cost.
- The WIP stock is valued based on percentage of completion in respect of each elements of cost.

Quality Control Cost

- This is the cost of resources consumed towards quality control procedures.

Factory overheads

- It is otherwise known as manufacturing overhead, works overhead or production overhead.
- All the indirect expenses, which are incurred in the factory and for the running of the factory, are treated as production overhead.
- Examples of factory overheads
    1. Indirect employees cost connected with production activities.
    2. Drawing and Designing department cost.
    3. Consumable stores and spares.
    4. Depreciation of plant and machinery, factory building etc.
    5. Lease rent of production assets.
    6. Amortized cost of jigs, fixtures, tooling etc.

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Research and development cost

- Research and development related cost which with is incurred for the improvement of process, system, product, or services are included in the research and development cost.

Credit for recoveries

- The realised or realisable value of scrap or waste is deducted.

Packing Cost (primary)

- Packing material which is essential to hold and preserve the product for its use by the customer.

C. Cost of goods sold.

- It is the cost of production for goods sold. After adjusting the values of opening and closing stocks of finished goods, cost of goods sold is calculated.
- It is calculated as follows.

Cost of Production	XX
Add: Cost of Opening stock of finished goods	XX
Less: Cost of Closing stock of finished goods	XX
Cost of Goods Sold	**XXX**

D. Cost of sales

- Cost of the product which is incurred to make available the product to the customer or consumer is known as cost of sales.
- It is the aggregate of cost of goods sold and administration and marketing expenses.

It is calculated as below.

Cost of Goods Sold	XX
Add: Administrative Overheads (General)	XX
Add: Selling Overheads	XX
Add: Packing Cost (secondary)	XX
Add: Distribution Overheads	XX
Cost of Sales	**XX**

Administration overheads

- The term administration refers to the formulation of policy, direction, and management of affairs.
- Indirect expenses related to management and administration of business come under administration overheads.

Examples of administration overheads

1. Insurance,
2. Rent,
3. Building maintenance,
4. Machine maintenance,
5. Property taxes.

Selling and overheads

Cost incurred on the sale of the products or services is selling overheads.

- Salary and wages of the sales department and employees directly related with selling of goods.
- Rent, depreciation, maintenance, and other cost related with sales department.
- Cost of advertisement, maintenance of website for online sales, market research etc.

Packing cost (secondary)

- Packing material that enables to store, transport, inform the customer, promote, and otherwise make the product marketable.

Distribution Overhead:

- Cost incurred on making product available for sale in the market.

The costs are.

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- Salary and wages of employees engaged in distribution of goods.
- Transportation and insurance costs related with distribution.
- Depreciation, hire charges, maintenance and other operating costs related with distribution vehicles etc.

3. Cost sheet / statement

Sl.no	Particulars	Total cost	Cost per Unit
1	Direct materials consumed.		
	- Opening Stock of Raw Material	XX	XX
	- Add: Additions/ Purchases		
	- Less: Closing stock of Raw Material	XX	XX
		(XX)	(XX)
2	Direct employee (labour) cost	XX	XX
3	Direct expenses	XX	XX
4	**Prime Cost (1+2+3)**	**XX**	**XX**
5	Works/ Factory Overheads	XX	XX
6	Gross Works Cost (4+5)	XX	XX
7	Add: Opening Work in Process	XX	XX
8	Less: Closing Work in Process	(XX)	(XX)
9	**Works/ Factory Cost (6+7-8)**	**XX**	**XX**
10	Quality Control Cost	XX	XX
11	Research and Development Cost	XX	XX
12	Administrative Overheads (relating to production activity)	XX	XX
13	Less: Credit for Recoveries/Scrap/By-Products / misc. income	(XX)	(XX)
14	Add: Packing cost (primary)	XX	XX
15	**Cost of Production (9+10+11+12-13+14)**	**XX**	**XX**
16	Add: Opening stock of finished goods	XX	XX
17	Less: Closing stock of finished goods	(XX)	(XX)
18	**Cost of Goods Sold (15+16-17)**	**XX**	**XX**
19	Add: Administrative Overheads (General)	XX	XX
20	Add: Marketing Overheads	XX	XX
	- Selling Overheads	XX	XX
	- Distribution Overheads	XX	XX
21	**Cost of Sales (18+19+20)**	**XX**	**XX**

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4. Advantages of cost sheet

- Provides total cost figures as well as cost per unit of production
- Helps in cost comparison
- Facilitates preparation of cost estimates
- Provides sufficient help in arriving at the figure of selling price.
- Facilitates cost control by disclosing operational efficiency.

Illustrations

1. Illustration

The following information has been obtained from the records of ABC Corporation for the period from June 1 to June 30, 2018.

	June 1, 2018 (Rs.)	June 30, 2018 (Rs.)
Cost of Raw materials	60,000	50,000
Cost of Work in Progress	12,000	15,000
Cost of Stock of Finished goods	90,000	1,10,000
Purchase of raw materials during June 2018		4,80,000
Wages Paid		2,40,000
Factory Overheads		1,00,000
Administration overheads (related to production)		50,000
Selling & distribution overheads		25,000
Sales		10,00,000

Prepare a statement giving the following information:

a) Raw materials consumed;
b) Prime cost;
c) Factory cost;
d) Cost of goods sold; and
e) Net profit.

Solution:

Statement showing Cost and Profit [June 2018]

Particulars	Amount (₹)
Direct material Purchased	4,80,000
Add: Opening stock of Raw Materials	60,000
Less: Closing stock of Raw materials	(50,000)
Direct Material Consumed	4,90,000
Direct Labour	2,40,000
Direct Expenses	-
Prime cost	7,30,000
Add: Factory Overheads/Works OH	1,00,000
Factory Cost/Works Cost [Gross]	8,30,000
Add: Opening WIP	12,000
Less: Closing WIP	(15,000)

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Particulars	Amount (₹)
Factory Cost/Works Cost (Net)	8,27,000
Add: Administration Overheads (Related to Production)	50,000
Cost of Production	8,77,000
Add: Opening stock of Finished Goods	90,000
Less: Closing Stock of Finished Goods	(1,10,000)
Cost of Goods Sold	8,57,000
Add: Selling & Distribution Overheads	25,000
Cost Of Sales	8,82,000
Add: Net Profit (Balancing Figure)	1,18,000
Sales	10,00,000

2. Illustration

The following data relates to the manufacture of a standard product during the month of April, 2018:

Particulars	
Raw materials	Rs. 1,80,000
Direct Wages	Rs. 90,000
Machine hours worked (hours)	10,000 hrs
Machine rate per hour	Rs. 8
Administration Overheads	Rs. 35,000
Selling overhead per unit	Rs. 5
Units Produced	4,000
Units sold	3600
Selling price per unit	Rs.125

You are required to prepare a cost sheet in respect of the above showing:

i. Cost per unit
ii. Profit for the month

Solution: Illustration 2

(i) Cost Sheet **Output:4,000 units**

Particulars	Total Cost (₹)	Cost per unit (₹)
Raw materials	1,80,000	45.00
Direct wages	90,000	22.50
Prime cost	**2,70,000**	**67.50**
Add: Factory overheads (10,000 hrs × ₹8 per hour)	80,000	20.00
Works Cost/Factory Cost	**3,50,000**	**87.50**
Add: Other Production Overhead	-	-
Cost of Production	**3,50,000**	**87.50**
Less: Closing Stock of finished goods (4,000 – 3,600 units)	(35,000)	-
Cost of Goods Sold	**3,15,000**	**87.50**
Add: Administration overheads (general)	35,000	9.72
Add: Selling Overheads (3,600 units × ₹5 unit)	18,000	5.00
Cost of sales (Total Cost)	**3,68,000**	**102.22**

(ii) Computation of Profit

Particulars	Total Cost (₹)
Sales revenue (3,600 units @ ₹125)	4,50,000
Less: Cost of sales	3,68,000
Profit	82,000

3. Illustration

The books of Adarsh Manufacturing Company present the following data for the month of April, 2019:

- Direct labour cost Rs. 17,500 being 175% of works overheads.
- Cost of goods sold excluding administrative expenses Rs. 56,000.

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	April 1	April 30
Raw materials	8,000	10,600
Work in progress	10,500	14,500
Finished Goods	17,600	19,000

	Rs.
Selling Expenses	3,500
General and Administration expenses	2,500
Sales for the month	75,000

You are required to:

- Compute the value of materials purchased.
- Prepare a cost statement showing the various elements of cost and also the profit earned

Solution: **3**

Statement showing Cost and Profits

To find out the value of materials purchased, reverse calculations from the given data can be presented as below:

Particulars	Amount (₹)
Direct Material Purchased) (Balancing Figure)	36,500
Add: Opening stock of raw materials	8,000
Less: Closing stock of raw materials	(10,600)
Direct Material Consumed	33,900
Add: Direct labour cost	17,500
Prime cost	**51,400**
Add: Factory overheads	10,000
Works cost /Factory cost (Gross)	**61,400**
Add: Opening work-in-progress	10,500
Less: Closing work-in-progress	(14,500)
Works cost /Factory cost (Net) (Balancing Figure)	57,400
Add: Other Production Overhead	-
Cost of Production	57,400
Add: Opening stock of finished goods	17,600
Less: Closing stock of finished goods	(19,000)
Cost of goods sold	**56,000**
Add: General and administration expenses	2,500
Add: Selling expenses	3,500
Cost of sales	**62,000**
Profit (Balance figure ₹75,000 – ₹62,000)	13,000
Sales	**75,000**

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UNIT 2 : COST ACCOUNTING SYSTEM

OVERVIEW

- Meaning of cost accounting system
- Meaning and features of non-integrated system of accounting
- Ledgers maintained in integrated and non-integrated system of accounting.
- Reasons for the differences in profit under financial and cost accounting systems
- Reconciliation statement for profit under financial and cost accounting systems
- Accounting for management information and cost control

INTRODUCTION

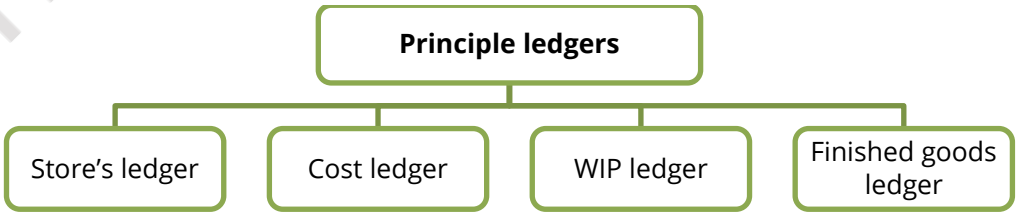
To operate business operations in efficient and successful manner, it is necessary to make use of the appropriate accounting system. Those system should state in clear manner whether cost and financial transactions should be integrated or kept aside (Non-integrated). Where cost and financial accounting records are integrated, the system so evolved is called as integrated or integral accounting.

In case cost and financial transactions were kept individually, the system is called Non - Integrated Accounting or Cost Control System. While non-integrated system of accounting makes necessary to reconcile between financial and cost accounts, no reconciliation between two sets of accounts is required under integrated accounting.

1. Non-integrated accounting system

- It is the system of accounting under which separate ledgers are to be maintained for cost and financial accounts by accountants.
- Under such a system the cost accounts restrict itself to recording only those transactions that relate to the product or service which is being provided.
- Hence items of expenses that have a bearing with sales or, production or for that matter any other items which are the factory management are the ones that are dealt with in such accounts.
- A unique feature of the non-integrated system of accounts is the ability to deal with notional expenses like rent or interest on capital that are tied up in the stock.
- The accounting of notional rent facilitates comparisons amongst factories.
- Recognition of interest on capital that are tied up in stock would help to make the stores and works managers aware of the money which is being blocked because of holding the stock.
- Non-integrated accounting systems contains fewer accounts when it is compared with financial accounting due to the exclusion of purchases, expenses and balance sheet items like fixed assets, debtors, and creditors.
- Items of accounts that are excluded are represented by an account called as cost ledger control account.

2. Principle ledgers



A. Store's ledger

- It is used to record both the quantity and amount of receipts, issues and balance of materials and supplies.
- It consists of all stores accounts.

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- The entries in each account maintained in this ledger are made from the invoice, goods received note, material requisitions, material received note etc.

B. Finished goods stock ledger.

- Finished goods stock ledger record the receipt of finished goods from production department, the sale and stock of finished goods both in terms of quantity and value.

C. Cost Ledger

- This is the principal ledger of the cost department in which impersonal accounts are recorded.
- It is made self-balancing by maintaining therein a Control Account for each subsidiary ledger.

D. **Work-in-Process Ledger**

- This ledger is also known as job ledger, it contains accounts of unfinished jobs and processes.
- All material costs, wages, and overheads for each job in process are posted to the respective job account in this ledger.
- The balance in a job account represents total balance of job/work-in-process, as shown by the job account.

3. Principal accounts

A. General ledger adjustment account

- It is also called as cost ledger control account or nominal ledger control account.
- In these accounts transactions with single entry is recorded and contra entry appears in financial book.
- Sales are debited to this account and net profit/loss from Costing Profit & Loss Account is transferred to this account.
- All transactions of income and expenditure which originate in the financial accounts should be entered in the ledger for eventual transfer to cost accounts and total of this account equals to total of all balances of the impersonal accounts maintained.

B. Stores ledger control account

- It is debited with purchase of materials for the stores and credited with issues of material.
- The balance in this account indicates the total balance of all the individual stores accounts.
- Abnormal losses or gains if any in this account, are transferred to Costing Profit & LossA/c.
- Entries are made based on goods received notes and stores requisitions etc.

C. Wages control account

- In this account the wages accrued and paid and allocation of wages in this account are recorded.
- Direct wages are further transferred to Work-in-Process Control Account and indirect wages to Production Overhead; Administration Overhead or Selling & Distribution Overhead Control Accounts, as the case may be.
- Wages paid for abnormal idle time are transferred to Costing Profit & Loss Account either directly or through Abnormal Loss Account.

D. Manufacturing/Production/Works/ Factory Overhead Control Account

- This account is debited with indirect costs of production such as indirect material, indirect employee, indirect expenses (carriage inward etc.).
- Overhead recovered is credited to this Account.
- Under absorption or over absorption (The difference between overhead incurred and overhead recovered) is transferred to Overheads Adjustment Account.

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E. Work-in-Process Control Account

- It is debited with the total cost of production, which includes direct materials, direct employee, direct expenses, production overhead recovered, and it is credited with the amount of finished goods completed and transferred.
- Balance in this account represents total balances of jobs/WIP, that of several job accounts.

F. Administrative Overhead Control Account

- This account is debited with overhead incurred and credited with overhead recovered.
- The overhead recovered are debited to Finished Goods Control Account, if administrative overhead is related with production activities otherwise to Cost of Sales A/c.
- The difference between administrative overheads incurred and recovered is transferred to Overhead Adjustment Account.

G. Finished Goods Control Accounts

- This account is debited with the value of goods transferred from Work-in-process Control Account administration costs recovered (if relates to production activities).
- This account is credited with Cost of Sales Account.
- The balance of this account represents the value of goods unsold at the end of the period.

H. Selling and Distribution Overhead Control Account

- This account is debited with selling and distribution overheads incurred and credited with the selling and distribution overheads recovered.
- Difference between overheads incurred and recovered is transferred to Overhead Adjustment Account.

I. Cost of Sales Account

- This account is debited with the cost of finished goods transferred from Finished Goods Control Account for sale, General Administrative overhead recovered, Selling and distribution overhead recovered.
- Balance of this account is ultimately transferred to Sales Account / Costing Profit & Loss A/c.

J. Costing Profit & Loss Account

- This account is debited with cost of goods sold, under-absorbed overheads and abnormal losses and is credited with sales value, over-absorbed overhead, and abnormal gains.
- The net profit or loss in this account is transferred to Cost Ledger Control Account.

K. Overhead Adjustment Account

- This account is to be debited for under-recovery of overhead and credited with over-recovery of overhead amount.
- The net balance in this account is transferred to Costing Profit & Loss Account.

4. Entries under non-integrated system

1. Materials purchased.

Material control A/c	Dr	XXX	
To General ledger adjustments A/c			XXX
Stores ledger control account	Dr	XXX	
To Material control A/c			XXX

2. Material purchased for a special job.

Material control A/c	Dr	XXX	
To general ledger adjustment A/c			XXX

3. For issue of Direct materials to production department

Work in progress A/c	Dr	XXX	

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To stores ledger control A/c				XXX

4. For issue of indirect materials to production departments

Overhead control A/c	Dr	XXX	
To stores ledger control account			XXX

5. For returning materials to supplier

General ledger adjustment A/c	Dr	XXX	
To stores ledger control A/c			XXX

6. For materials returned from production department

Stores ledger control A/c	Dr	XXX	
To work in progress A/c			XXX

7. For materials transferred from job to job

No entry passed in control account.			
Entry in WIP ledger			
Transferee job A/c	Dr	XXX	
To transferor job A/c			XXX

8. For total salary and wages paid

Wages control A/c	Dr	XXX	
To general ledger A/c			XXX

9. For allocation of direct and indirect labour

Work in progress control A/c	Dr	XXX	
Overhead control A/c	Dr	XXX	
To wages control A/c			XXX

10. For recording direct expenses

Work in progress control A/c	Dr	XXX	
To general ledger adjustment A/c			XXX

11. For recording overhead incurred and accrued

Overhead control A/c	Dr	XXX	
To general ledger adjustment A/c			XXX

12. For adjusting under or over absorption overheads

Overhead account control account is closed by transferring to overhead suspense account.

13. For recording finished stock produced

Finished goods stock ledger control A/c	Dr	XXX	
To work in progress A/c			XXX

14. When finished goods are sold at cost:

Cost of sales A/c	Dr	XXX	
To finished goods stock ledger control A/c			XXX

15. When finished goods are sold at total sales value:

General ledger adjustment A/c	Dr	XXX	

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To costing profit and loss account			XXX

16. **For recording sales return**

Costing profit and loss account	Dr	XXX	
To general ledger adjustment A/c			XXX

17. **For recording cost of sales**

Cost of sales A/c	Dr	XXX	
To Costing profit and loss			XXX

18. **For recording under absorption of overheads which is not yet adjusted**

Costing profit and loss A/c	Dr	XXX	
To Overhead suspense A/c			XXX

19. **For recording over absorption of overheads which is not yet adjusted**

Overhead suspense A/c	Dr	XXX	
To Costing profit and loss account			XXX

20. **For recording profit**

Costing profit and loss A/c	Dr	XXX	
To General ledger adjustment A/c			XXX

21. **For recording production and selling and distribution overheads**

Production Overhead Control A/c	Dr	XXX	
Administrative Overhead Control A/c	Dr	XXX	
Selling & Dist. Overhead Control A/c	Dr	XXX	
To Cost Ledger Control A/c			XXX

22. **For recording Carriage Inward**

Production Overhead Control A/c	Dr	XXX	
To Cost Ledger Control A/c			XXX

23. **For recoding Production overhead recovered**

Work-in-Process Ledger Control A/c	Dr	XXX	
To Production Overhead Control A/c			XXX

24. **For recording Administrative Overhead recovered from finished goods**

Finished Goods Ledger Control A/c	Dr	XXX	
To Administrative Overhead Control A/c			XXX

25. **For recording Selling and Distribution Overhead recovered from sales**

Cost of Sales A/c	Dr	XXX	
To Selling & Dist. Overhead Control A/c			XXX

26. **For recording Loss**

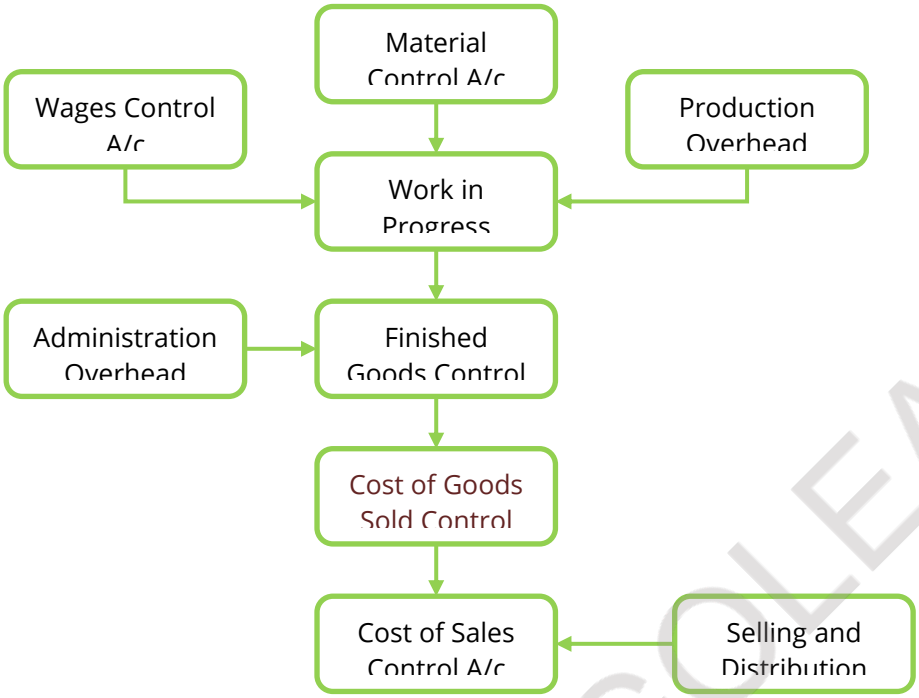
Cost Ledger Control A/c	Dr	XXX	
To Costing Profit & Loss A/c			XXX

27. **Sales**

Cost Ledger Control A/c	Dr	XXX	
To Costing Profit & Loss A/c			XXX

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5. Non-Integrated Accounting System-flowchart



6. Integrated Accounting System

- Integrated Accounts was the name given to a system of accounting, whereby cost and financial accounts were kept in the same set of books.
- Obviously, then there will be no separate sets of books for Costing and Financial records.
- Integrated accounts provide or else meet out fully the information requirement for Costing as well as for the Financial Accounts.
- Under Costing it provides information useful for ascertainment of the cost of each product, job, process, or operation of any other identifiable activity and for carrying necessary analysis.
- Integrated accounts provide relevant information which is necessary for the preparation of profit and loss account and the balance sheets as per the requirements of law and helps in exercising effective control over the liabilities and assets of its business.

Advantages

The main advantages of Integrated Accounts are as follows:

No need for Reconciliation

There will be no need for reconciliation as it maintains only one set of accounting records.

Less effort

It is an easy method to maintain accounts and avoid unnecessary complications.

Less time consuming

There is saving of time, because two different sets of books need not be maintained.

Economical process

It is economical also as it is based on the concept of "Centralisation of Accounting function".

Essential pre-requisites for Integrated Accounts

- There should be a perfect coordination between the responsible staff for the cost as well as financial aspects to ensure an efficient accounting document process.
- For the preparation of internal accounts there should be an agreed duty for the treatment after accruals, prepaid expenses and other adjustments which are necessary.
- Ledger with detailed information recorded on it should be kept at minimum. Each department's full information or process being contained in tables is prepared by cost office.
- These tables are also called as third entries to emphasize that they are not a part of double entry system.

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- The management's decision about the extent of integration of the two sets of books. Some concerns find it useful to integrate up to the stage of prime cost or factory cost while other prefer full integration of the entire accounting records.
- A suitable coding system must be made available to serve the accounting purposes of financial and cost accounts.

Features of Integrated Accounting System

- It records financial transactions not normally required for cost accounting be sided recording internal costing transaction prepayments and accruals are opened.
- Wages control account is debited with the wages paid, the credit is given to cash or bank account.
- Overhead's expense is debited to the overhead control account corresponding credit is given to cash or bank account or the sundry creditors.
- All advances' payments are credited, and the accruals are given debit to the respective control account by contra entries in the prepayments and accrual account.
- Capital asset account is debited, and respective credit entry is given to control account in the process of cost analysis of capital expenditure.
- Except the general ledger adjustment account all the accounts which are maintained in the cost ledger are also maintained in the integrated accounting system that is General ledger adjustment account is eliminated.
  Following accounts are also usually maintained.
    - Bank account
    - Receivables (Debtors) account
    - Payables (Creditors) account
    - Provision for depreciation account etc.
    - Bank account
    - Receivables (Debtors) account
    - Payables (Creditors) account
    - Provision for depreciation account
    - Fixed assets account
    - Share capital account.

7. Reconciliation of Cost and Financial Accounts

- The two systems of accounting that is financial and cost accounts co – exist in the same organization and they deal with same basic transactions say, purchases, consumption of materials, wages, and other expenses.
- But the difference of purpose asks for a difference in the approach in collection, analysis, and presentation of data to meet the objective of individual system.
- Financial accounts are concerned with the ascertainment of profit or loss for the entire operations of the organization for a relatively long period generally a year, without being too much concerned with cost computation, whereas cost accounts are provided for ascertainment of the profit or loss made by manufacturing or product divisions/products for cost comparison and preparation and use of various types of cost statement.
- The difference in the purpose and approach often results in a different profit from what is disclosed by the financial accounts and this establishes the need for a reconciliation of profit between cost accounts and financial accounts.

8. Causes of differences in Financial and Cost Accounts

Items included in Financial Accounts only.

Purely Financial Expenses:

- Loss on investments
- Penalties and fines
- Losses due to scrapping of machinery
- Interest on bank loan, mortgages, debenture etc.
- Loss on sale of fixed assets

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- Discount of issue of shares
- Expenses of the company's share transfer office
- Damages payable
- Income tax, donations, subscription
- Preliminary expenses written off.

Purely Financial Income

- Transfer fees received.
- Brokerage received.
- Rent receivable.
- Profit made on sale of investments fixed assets etc.
- Discount, commission, etc. received.
- Interest received on bank deposits.
- Interest, dividends etc. received on investment.

Item included in Cost Accounts only (notional expenses)

- Interest on capital employed in production but upon which no interest is actually paid.
- Salary of the proprietor where that proprietor works but it does not charge salary Notional Depreciation on the assets fully depreciated for which book value is nil.
- Charge in lieu of rents where premises are owned.

Items whose treatment is different in the two sets of accounts.

- The objective of cost accounting is to provide information to management for decision making and control purposes while financial accounting conforms to external reporting requirements.
- Hence there are chances that certain items are treated differently in the two sets of accounts.
- Similarly cost accounting may use a different method of depreciation than what is allowed under financial accounting.

Varying basis of valuation

- It is another factor which sometimes is responsible for the difference.
- It is well known that in financial accounts stock are valued either at cost or market price, whichever is lower.
- But in Cost Accounts, stocks are only valued at cost.

Procedure for reconciliation

There are 3 steps involved in the procedure for reconciliation.

- Ascertainment of profit as per financial accounts
- Ascertainment of profit as per cost accounts
- Reconciliation of both the profits (similar to the bank reconciliation statement)

Circumstances where reconciliation statement can be avoided.

- When the Cost and Financial Accounts are integrated - there is no need to have a separate reconciliation statement between the two sets of accounts.
- Integration means that the same set of accounts fulfil the requirement of both i.e., Cost and Financial Accounts.

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Illustrations

1. Illustration

As on 31st March, 20X3, the following balances existed in a firm's Cost Ledger:

	Dr. (Rs.)	Cr. (Rs.)
Stores Ledger Control A/c	3,01,435	
Work-in-Process ControlA/c	1,22,365	
Finished Stock LedgerControl A/c	2,51,945	
Manufacturing OverheadControl A/c		10,525
Cost Ledger Control A/c		6,65,220
	6,75,745	**6,75,745**

During the next three months the following items arose:	(Rs.)
Finished product (at cost)	2,10,835
Manufacturing overhead incurred	91,510
Raw materials purchased	1,23,000
Factory Wages	50,530
Indirect Labour	21,665
Cost of Sales	1,85,890
Material issued to production	1,27,315
Sales returned at Cost	5,380
Material returned to suppliers	2,900
Manufacturing overhead charged toproduction	77,200

You are required to pass the Journal Entries; write up the accounts and schedule the balances, stating what each balance represents.

Solution: **1**

Journal entries are as follows:

S.No	Particulars		Dr. (₹)	Cr. (₹)
1.	Finished stock ledger Control A/c To Work-in-Process Control A/c (Being trf. Of goods from WIP a/c to Finished goods a/c.)	Dr.	2,10,835	2,10,835
2.	Manufacturing Overhead Control A/c To Cost Ledger Control A/c (Being manufacturing OH spent.)	Dr.	91,510	91,510
3.	Stores Ledger Control A/c To Cost Ledger Control A/c (Being RM purchased.)	Dr.	1,23,000	1,23,000
4. (i)	Wage Control A/c To Cost Ledger Control A/c (Being expenditure incurred in relation wages.)	Dr.	50,530	50,530
(ii)	Work-in-Process Control A/c To Wages Control A/c (Being trf. Of wages from wage control a/c to WIP a/c)	Dr.	50,530	50,530
	Wage Control A/c To Cost Ledger Control A/c	Dr.	21,665	21,665

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	(Being Expenditure incurred in relation to wages.)			
(iii)	Manufacturing Overhead Control A/c To Wages Control A/c (Being trf from wages a/c to manufacturing OH a/c.)	Dr.	21,665	 21,665
5.	Cost of Sales A/c To Finished Stock Ledger A/c (Being trf from finished stock a/c to COS a/c.)	Dr.	1,85,890	 1,85,890
6.	Work-in-Process Control A/c To Stores Ledger Control A/c (Being material issued to production.)	Dr.	1,27,315	 1,27,315
7.	Finished Stock Ledger Control A/c To Cost of Sales A/c (Being reversal of entry due to goods returned.)	Dr.	5,380	 5,380
8.	Cost Ledger Control A/c To Stores Ledger Control A/c (Being Material from suppliers)	Dr.	2,900	 2,900
9.	Work-in-Process Control A/c To Manufacturing Overhead Control A/c ((Being absorption of overheads.)	Dr.	77,200	 77,200

Cost Ledgers

Cost Ledger Control Account

Particulars	(₹)	Particulars	(₹)
To Stores Ledger Control A/c (Return)	2,900	By Balance b/d	6,65,220
To Balance c/d	9,49,025	By Manufacturing OH Control A/c	91,510
		By Stores Ledger Control A/c	1,23,000
		By Wages Control A/c	72,195
	9,51,925		**9,51,925**

Wages Control Account

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	72,195	By Work in Process Control A/c	50,530
		By Manufacturing OH Control A/c	21,665
	72,195		**72,195**

Manufacturing Overhead Control Account

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	91,510	By Balance b/d	10,525
To Wages Control A/c	21,665	By Work in Process Control A/c	77,200
		By Balance c/d	25,450
	1,13,175		**1,13,175**

Work-in-Process Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	1,22,365	By Finished Stock Ledger Control A/c	2,10,835
To Wages Control A/c	50,530	By Balance c/d	1,66,575
To Stores Ledger Control A/c	1,27,315		
To Manufacturing OH Control A/c	77,200		
	3,77,410		**3,77,410**

Finished Stock Ledger Control Account

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Particulars	(₹)	Particulars	(₹)
To Balance b/d	2,51,945	By Cost of Sales Control A/c	1,85,890
To Work in Process Control A/c	2,10,835	By Balance c/d	2,82,270
To Cost of Sales Control A/c (Return at cost)	5,380		
	4,68,160		**4,68,160**

Cost of Sales Account

Particulars	(₹)	Particulars	(₹)
To Finished Stock Ledger Control	1,85,890	By Finished Stock Ledger Control (Return)	5,380
		By Balance c/d	1,80,510
	1,85,890		**1,85,890**

Trial Balance

Particulars	Dr. (₹)	Cr. (₹)
Stores Ledger Control A/c	2,94,220	
Work-in-Process Control A/c	1,66,575	
Finished Stock Ledger Control A/c	2,82,270	
Manufacturing Overhead Control A/c	25,450	
Cost of Sales A/c	1,80,510	
Cost Ledger Control A/c		9,49,025
	9,49,025	**9,49,025**

2. Illustration

From the following details show the necessary accounts in the Cost Ledger

	Materials (Rs.)	Work-in-Process (Rs.)		Finished Stock (Rs.)
Opening balance	8,000	5,000		10,000
Closing balance	11,000	9,000		12,000
Transactions duringthe period:			**(Rs.)**	
Materials purchased			25,000	
Wages paid (including2,000 indirect)			10,000	
Overheads incurred			8,000	
Overheads absorbed			9,000	
Sales			**50,000**	

Solution: **2**

Cost Ledger Control Account

Particulars	(₹)	Particulars	(₹)
To cost of sales A/c	50,000	By Balance b/d (8,000 + 5,000 + 10,000)	23,000
		By Stores Ledger Control A/c	25,000
To Balance c/d (11,000 + 9,000 + 12,000)	32,000	By Wages Control A/c	10,000
		By Costing P&L A/c (Profit)	16,000
	82,000		**82,000**

Stores Ledger Control Account

Particulars	(₹)	Particulars	(₹)

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To Balance b/d	8,000	By Work – In – Process Control A/c (Balancing figure)	22,000
To Cost Ledger Control A/c	25,000	By Balance C/d	11,000
	33,000		**33,000**

Work – In – Process Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	5,000		
To Wages Control A/c	8,000	By Finished stock (Balancing figure)	35,000
To Production Overhead Control A/c	9,000	By Balance C/d	9,000
To Stores ledger Control A/c	22,000		
	44,000		**44,000**

Finished Stock Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	10,000	By Cost of Sales A/c (Balancing figure)	33,000
To Work – In – Process Control A/c	35,000	By Balance C/d	12,000
	45,000		**45,000**

Wages Control Account

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	10,000	By Work – In – Process Control A/c	8,000
		By Overheads A/c	2,000
	10,000		**10,000**

Cost of Sales Account

Particulars	(₹)	Particulars	(₹)
To Finished stock	33,000	By Costing P&L A/c	33,000
	33,000		**33,000**

Costing P&L Account

Particulars	(₹)	Particulars	(₹)
To Overheads A/c (Under – absorbed)	1,000	By Cost Ledger Control A/c (Sales A/c)	50,000
To Cost of Sales	33,000		
To Cost Ledger Control A/c (Profit)	16,000		
	50,000		**50,000**

3. Illustration

On 31st March, 20X3 the following balances were extracted from the books of the Supreme Manufacturing Company:

Particulars	Debit (Rs.)	Credit (Rs.)
Stores Ledger Control A/c	35,000	
Work-in-Process ControlA/c	38,000	
Finished Goods ControlA/c	25,000	
Cost Ledger Control A/c		98,000
	98,000	**98,000**

The following transactions took place in April 20X3:

	(Rs.)
Raw Materials:	

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-Purchased	95,000
-Returned to suppliers	3,000
-Issued to production	98,000
-Returned to stores	3,000
Productive wages	40,000
Indirect wages	25,000
Factory overhead expenses incurred	50,000
Selling and Administrative expenses	40,000
Cost of finished goods transferred towarehouse	2,13,000
Cost of Goods sold	2,10,000
Sales	3,00,000

Factory overheads are applied to production at 150% of direct wages, any under/over absorbed overhead being carried forward for adjustment in the subsequent months. All administrative and selling expenses are treated as period costs and charged off to the Profit and Loss Account of the month in which they are incurred.
Show the following Accounts:

1. Cost Ledger Control A/c
2. Stores Ledger Control A/c
3. Work-in-Process Control A/c
4. Finished Goods Stock Control A/c
5. Factory Overhead Control A/c
6. Costing Profit and Loss A/c
7. Trial Balance as at 30th April, 20X3.

Solution: **3**

Cost Ledger Control Account

Particulars	(₹)	Particulars	(₹)
To costing P&L (Sales)	3,00,000	By Balance b/d	98,000
To Stores Ledger Control	3,000	By Stores Ledger Control A/c	95,000
		By Wages Control A/c	40,000
		By Wages Control A/c	25,000
		By Factory OH Control A/c	50,000
		By Selling & admin. OH A/c	40,000
To Balance c/d	95,000	By Costing P&L A/c (Profit)	50,000
	3,98,000		**3,98,000**

Stores Ledger Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	35,000	By Cost Ledger Control A/c	3,000
To Cost Ledger Control A/c	95,000	By WIP Control	98,000
To WIP Control	3,000	By Balance C/d	32,000
	1,33,000		**1,33,000**

Work – In – Process Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	38,000	By Stores ledger Control A/c	3,000
To Wages Control A/c	40,000	By Finished stock	2,13,000
To Factory Overhead Control A/c	60,000	By Balance C/d	20,000
To Stores ledger Control A/c	98,000		
	2,36,000		**2,36,000**

Wages Control Account

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Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	40,000	By WIP Control	40,000
To Cost Ledger Control A/c	25,000	By Factory Overhead Control A/c	25,000
	65,000		**65,000**

Finished Stock Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	25,000	By COGS A/c	2,10,000
To WIP Control	2,13,000	By Balance C/d	28,000
	2,38,000		**2,38,000**

COGS A/C Dr.

Particulars	(₹)	Particulars	(₹)
To Finished Stock Control A/c	2,10,000	By Costing P&L	2,10,000
	2,10,000		**2,10,000**

Factory Overhead Control Account

Particulars	(₹)	Particulars	(₹)
To wages Control A/c (Indirect Wages)	25,000	By WIP Control (150% of ₹40,000)	60,000
To Cost Ledger Control A/c	50,000	By Balance C/d	15,000
	75,000		**75,000**

Selling & Admin. OH Account

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	40,000	By Cost of Sales	40,000
	40,000		**40,000**

Cost of Sales Account

Particulars	(₹)	Particulars	(₹)
To COGS A/c	2,10,000		
To Selling & admin. OH A/c	40,000	By Costing P&L	2,50,000
	2,50,000		**2,50,000**

Costing P&L Account

Particulars	(₹)	Particulars	(₹)
To Cost of Sales A/c	2,50,000	By Cost Ledger Control A/c (Sales A/c)	3,00,000
To Cost ledger Control (bal fig.) (Profit)	50,000		
	3,00,000		**3,00,000**

Trial Balance (as at 30th April,2019)

Particulars	Dr. (₹)	Cr. (₹)
Stores Ledger Control A/c	32,000	
Work-in-Process Control A/c	20,000	
Finished Stock Ledger Control A/c	28,000	
Factory Overhead Control A/c	15,000	
Cost Ledger Control A/c		95,000
	95,000	**95,000**

4. Illustration

Acme Manufacturing Co. Ltd. opens the costing records, with the balances as on 1st July, 20X2 as follows:

	(Rs.)	(Rs.)
Material Control A/c	1,24,000	
Work-in-Process Control A/c	62,500	

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Finished Goods Control A/c	1,24,000	
Production Overhead Control A/c	8,400	
Administrative Overhead Control A/c		12,000
Selling & Distribution Overhead Control A/c	6,250	
Cost Ledger Control A/c		3,13,150
	3,25,150	**3,25,150**

The following are the transactions for the quarter ended 30th September 20X2:

	(Rs.)
Materials purchased	4,80,100
Materials issued to jobs	4,77,400
Materials to works maintenance	41,200
Materials to administration office	3,400
Materials to selling department	7,200
Wages direct	1,49,300
Wages indirect	65,000
Transportation for indirect materials	8,400
Production overheads	2,42,250
Absorbed production overheads	3,59,100
Administration overheads	74,000
Administration allocation to production	52,900
Administration allocation to sales	14,800
Sales overheads	64,200
Sales overheads absorbed	82,000
Finished goods produced	9,58,400
Finished goods sold	9,77,300
Sales realization	14,43,000

Make up the various accounts as you envisage in the Cost Ledger and prepare a Trial Balance as at 30th September, 20X2.

Solution: **4 - Cost Ledgers:**

Material Control Account

Particulars	**Debit (₹)**	**Particulars**	**Credit (₹)**
To Balance b/d	1,24,000	By Work-in-process Control A/c	4,77,400
To Cost Ledger Control A/c (purchase)	4,80,100	By Production OH Control A/c	41,200
		By Admn. OH Control A/c	**3**,400
		By S&D OH Control A/c	7,200
		By Balance c/d	74,900
	6,04,100		**6,04,100**

*Material Control A/c may also be written as Stores Ledger Control A/c

Work-in-Process Control A/c

Particulars	**Debit (₹)**	**Particulars**	**Credit (₹)**
To Balance b/d	62,500	By Finished goods Control A/c	
To Material Control A/c	4,77,400		
To Wages Control A/c	1,49,300		
To Production OH Control A/c	**3,59,100**		
		By Balance c/d	89,900
	10,48,300		**10,48,300**

Finished Goods Control A/c

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Particulars	Debit (₹)	Particulars	Credit (₹)
To Balance b/d	1,24,000	By Cost of Sales A/c	9,77,300
To Administrative Overhead Control A/c	52,900		
By Work-in-process Control A/c	9,58,400		
		By Balance c/d	1,58,000
	11,35,300		**11,35,300**

Wages Control A/c

Particulars	Debit (₹)	Particulars	Credit (₹)
To Cost Ledger Control A/c	2,14,300	By Work-in-process Control A/c	1,49,300
		By Production OH Control A/c	65,000
	2,14,300		**2,14,300**

Production Overhead Control A/c

Particulars	Debit (₹)	Particulars	Credit (₹)
To Balance b/d	8,400	By Work-in-process Control A/c	3,59,100
To Cost Ledger Control A/c:			
-Transportation	8,400		
-Production OH	2,42,250		
To Wages Control A/c	65,000		
To Material Control A/c	41,200		
		Balance c/d	6,150
	3,65,250		**3,65,250**

Administrative Overhead Control A/c

Particulars	Debit (₹)	Particulars	Credit (₹)
To Cost Ledger Control A/c	74,000	By Balance b/d	12,000
To Material Control A/c	3,400	By Finished Goods Control A/c	52,900
		By Cost of sales A/c	14,800
To Balance c/d	2,300		
	79,700		**79,700**

Selling and Distribution Overhead Control A/c

Particulars	Debit (₹)	Particulars	Credit (₹)
To Balance b/d	6,250	By Cost of Sales A/c	82,000
To Cost Ledger Control A/c	64,200		
To Material Control A/c	7,200		
	82,000		**82,000**

Cost of Sales A/c

Particulars	Debit (₹)	Particulars	Credit (₹)
To Finished Goods Control A/c	9,77,300	By Costing P&L A/c	10,74,100
To Admn. OH Control A/c	14,800		
To S&D OH Control A/c	82,000		
	10,74,100		**10,74,100**

Cost Ledger Control A/c

Particulars	Debit (₹)	Particulars	Credit (₹)
To Costing P&L A/c (Sales)	14,43,000	By Balance b/d	3,13,150
		Material Control A/c	4,80,100

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		Wages Control A/c (Rs.1,49,300+Rs.65,000)	2,50,650
		Administrative OH A/c	74,000
		S&D OH Control A/c	64,200
		Costing P&L A/c	3,68,900
	17,65,300		**17,65,300**

Costing Profit & Loss A/c

Particulars	**Debit (₹)**	**Particulars**	**Credit (₹)**
To Cost of sales A/c	10,74,100	By Cost Ledger Control A/c (sales)	14,43,000
To Cost Ledger Control A/c (profit) (balancing figure)	3,68,900		
	14,43,000		**14,43,000**

Trial Balance as at 30th September, 2018

Particulars	**Dr. (₹)**	**Cr. (₹)**
Material Control A/c	74,900	
Production OH Control A/c	6,150	
Administrative OH Control A/c		2,300
Selling and Distribution Overhead Control A/c		4,350
Work-in-Process Control A/c	89,900	
Finished Stock Ledger Control A/c	1,58,000	
Cost Ledger Control A/c		3,22,300
	3,28,950	**3,28,950**

5. Illustration

Bangalore Petrochemicals Co. keeps books on integrated accounting system. The following balances appear in the books as on 1st January 2018.

Particulars	**Debit (Rs.)**	**Credit (Rs.)**
Stores Ledger control A/c	18,000	
Work-in-Process ControlA/c	17,000	
Finished Goods ControlA/c	13,000	
Bank A/c	10,000	
Creditors A/c		8,000
Fixed assets A/c	55,000	
Debtors A/c	12,000	
Share capital A/c		80,000
Provision for depreciationA/c		5,000
Profit and loss A/c		32000
	1,25,000	**1,25,000**

Transaction for the year ended 31st Dec., 20X2 were as given below:

	(Rs.)	**(Rs.)**
Wages-direct	87,000	
Wages-indirect	5000	92,000
Purchase of materials (on credit)		1,00,000
Materials issued to production		1,10,000
Materials for repairs		2,000
Goods finished during the year (at cost)		2,15,000
Sales (credit)		3,00,000
Cost of goods sold		2,20,000

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Production overhead absorbed		48,000
Production overhead incurred		40,000
Administration overhead incurred (production)		12,000
Selling overhead incurred		14,000
Payments of creditors		1,01,000
Payments of debtors		2,90,000
Depreciation on machinery		1,300
Prepaid rent (included in factory overheads)		300

Write up accounts in the integrated ledger.

Solution: **5**

Journal entries under Non – Integral Accounting System are as follows:

Particulars		**Dr. (₹)**	**Cr. (₹)**
Wages Control A/c	Dr.	92,000	
To Cost Ledger Control A/c			92,000
(Being Wages incurred.)			
Work-in-Process Control A/c	Dr.	87,000	
Production OH Control A/c	Dr.	5,000	
To Wages Control A/c			92,000
(Being transfer of wages to respective control A/cs)			
Stores Ledger Control A/c	Dr.	1,00,000	
To Cost Ledger Control A/c			1,00,000
(Being Materials Purchased)			
Work-in-Process Control A/c	Dr.	1,10,000	
To Stores Ledger Control A/c			1,10,000
(Being material issued to production.)			
Production OH Control A/c	Dr.	2,000	
To Stores Ledger Control A/c			2,000
(Being material issued for repairs from stores.)			
Finished Stock Ledger Control A/c	Dr.	2,15,000	
To Work-in-Process Control A/c			2,15,000
(Being goods finished are transferred.)			
Cost Ledger Control A/c	Dr.	3,00,000	
To Costing P&L A/c			3,00,000
(Being sales made during the year.)			
COGS A/c Dr.	Dr.	2,20,000	
To Finished Stock Ledger Control A/c			2,20,000
(Being transfer of goods to COGS A/c.)			
Work-in-Process Control A/c	Dr.	48,000	
To Production OH Control A/c			48,000
(Being production OHs absorbed.)			
Production OH Control A/c	Dr.	40,000	
To Cost Ledger Control A/c			40,000
(Being production OHs incurred.)			
Administrative OH control A/c	Dr.	12,000	
To Cost Ledger Control A/c			12,000
(Being Admin. OHs incurred.)			
Work-in-Process Control A/c	Dr.	12,000	
To Administrative OH control A/c			12,000
(Being Admin OH transferred WIP A/c)			
Selling and Distribution OH control	Dr.	14,000	

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To Cost Ledger Control A/c (Being Selling and Distribution OHs incurred.)			14,000
Amount paid to Creditors -**No entry**			
Amount Received from debtors –**No Entry**			
Production OH Control A/c To Cost Ledger Control A/c (Being depreciation on machinery provided)	Dr.	1,300	 1,300
Cost Ledger Control A/c To Production OH Control A/c (Being prepaid expenses paid)	Dr.	300	 300

Journal entries under Integral Accounting System are as follows:

Particulars		**Dr. (₹)**	**Cr. (₹)**
Wages Control A/c To Bank A/c (Being Wages incurred.)	Dr.	92,000	 92,000
Work-in-Process Control A/c Production OH Control A/c To Wages Control A/c (Being transfer of wages to respective control A/cs)	Dr. Dr.	87,000 5,000	 92,000
Stores Ledger Control A/c To Sundry Creditors (Being Materials Purchased)	Dr.	1,00,000	 1,00,000
Work-in-Process Control A/c To Stores Ledger Control A/c (Being material issued to production.)	Dr.	1,10,000	 1,10,000
Production OH Control A/c To Stores Ledger Control A/c (Being material issued for repairs from stores.)	Dr.	2,000	 2,000
Finished Stock Ledger Control A/c To Work-in-Process Control A/c (Being goods finished are transferred.)	Dr.	2,15,000	 2,15,000
Debtors A/c To Sales (Being sales made during the year.)	Dr.	3,00,000	 3,00,000
COGS A/c Dr. To Finished Stock Ledger Control A/c (Being transfer of goods to COGS A/c.)	Dr.	2,20,000	 2,20,000
Work-in-Process Control A/c To Production OH Control A/c (Being production OHs absorbed.)	Dr.	48,000	 48,000
Production OH Control A/c To Bank A/c (Being production OHs incurred.)	Dr.	40,000	 40,000
Administrative OH control A/c To Bank A/c (Being Admin. OHs incurred.)	Dr.	12,000	 12,000
Work-in-Process Control A/c To Administrative OH control A/c (Being Admin OH transferred WIP A/c)	Dr.	12,000	 12,000
Selling and Distribution OH control To Bank A/c	Dr.	14,000	 14,000

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(Being Selling and Distribution OHs incurred.)			
Creditors A/c To Bank A/c (Being Creditors were paid.)	Dr.	1,01,000	 1,01,000
Bank A/c To Debtors (Being Amount Received From Debtors.)	Dr.	2,90,000	 2,90,000
Production OH Control A/c To Provision for Depreciation A/c (Being depreciation on machinery provided)	Dr.	1,300	 1,300
Prepaid Rent A/c To Production OH Control A/c (Being prepaid expenses paid)	Dr.	300	 300

Accounts in the Integrated Ledger

Stores Control Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	18,000	By Work-in-Progress A/c	1,10,000
To Creditors A/c	1,00,000	By Production Overheads	2,000
		By Balance c/d	6,000
	1,18,000		**1,18,000**

Wages Control Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Bank A/c	92,000	By Work-in-Progress A/c	87,000
		By Production overheads A/c	5,000
	92,000		**92,000**

Work-in-Progress Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	17,000	By Finished goods A/c	2,15,000
To Stores control A/c	1,10,000	By Balance c/d	47,000
To Wages control A/c	87,000		
To Production overheads A/c	48,000		
	2,62,000		**2,62,000**

Production Overhead Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Wages Control A/c	5,000	By Work-in-Progress A/c	48,000
To Stores Control A/c	2,000	By Prepaid Rent A/c	300
To Bank A/c	40,000		
To Depreciation Provision	1,300		
	48,300		**48,300**

Finished Goods Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	13,000	By Cost of Sales A/c	2,20,000
To Work-in-Progress	2,15,000	By Balance c/d	20,000
To Administration Overhead	12,000		
	2,40,000		**2,40,000**

Administration Overheads Account

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Particulars	Amount (₹)	Particulars	Amount (₹)
To Bank A/c	12,000	By Finished Goods A/c	12,000
	12,000		**12,000**

Cost of Sales Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Finished Goods A/c	2,20,000	By Sales A/c	2,34,000
To Selling and Distribution Overheads A/c	14,000		
	2,34,000		**2,34,000**

Selling and Distribution Overheads Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Bank A/c	14,000	By Cost of Sales A/c	14,000
	14,000		**14,000**

Sales Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Cost of Sales	2,34,000	By Debtors A/c (Cr. Sales)	3,00,000
To P & L A/c (Profit)	66,000		
	3,00,000		**3,00,000**

Prepaid Rent Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Production Overheads	300	By Balance c/d	300
	300		**300**

Depreciation Provision Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance c/d	6,300	By Balance b/d	5,000
		By Production Overhead A/c	1,300
	6,300		**6,300**

Profit and Loss Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance c/d	98,000	By Sales A/c	66,000
		By Profit b/d (last year)	32,000
	98,000		**98,000**

Debtors Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	12,000	By Bank A/c	2,90,000
To Sales	3,00,000	By Stores Control A/c	22,000
	3,12,000		**3,12,000**

Creditors Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Bank	1,01,000	By Balance b/d	8,000
To Balance c/d	7,000	By Stores Control A/c	1,00,000
	1,08,000		**1,08,000**

Bank Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	10,000	By Creditors	1,01,000
To Debtors	2,90,000	By Wages Control A/c	92,000

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		By Production Overhead A/c	40,000
		By Administration Overhead A/c	12,000
		By Selling & Distribution Overhead A/c	14,000
		By Balance c/d	41,000
	3,00,000		**3,00,000**

Fixed Assets Account

Particulars	**Amount (₹)**	**Particulars**	**Amount (₹)**
To Balance b/d	55,000	By Balance c/d	55,000
	55,000		**55,000**

Share Capital Account

Particulars	**Amount (₹)**	**Particulars**	**Amount (₹)**
To Balance c/d	80,000	By Balance b/d	80,000
	80,000		**80,000**

Trial Balance As on 31st December, 2018

Particulars	**Dr. (₹)**	**Cr. (₹)**
Stores Control A/c	6,000	
Work-in-Progress A/c	47,000	
Finished Goods A/c	20,000	
Bank A/c	41000	
Creditors A/c		7,000
Fixed Assets A/c	55,000	
Debtors A/c	22,000	
Share Capital A/c		80,000
Depreciation Provision A/c		6,300
Profit and Loss A/c		98,000
Prepaid Rent A/c	300	
Total	**1,91,300**	**1,91,300**

6. Illustration

In the absence of the Chief Accountant, you have been asked to prepare a month's cost accounts for a company which operates a batch costing system fully integrated with the financial accounts. The following relevant information is provided to you:

	Debit (Rs.)	**Credit (Rs.)**
Balances at the beginning of the month:		
Stores Ledger Control Account		25,000
Work-in-Process Control Account		20,000
Finished Goods Control Account		35,000
Prepaid Production Overheads brought forward fromprevious month		3,000
Transactions during the month:		
Materials Purchased		75,000
Materials Issued:		
To production	30,000	
To factory maintenance	4,000	34,000
Materials transferred between batches		5,000

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Total wages paid:		
To direct workers	25,000	
To indirect workers	5,000	30,000
Direct wages charged to batches		20,000
Recorded non-productive time of direct workers		5,000
Selling and Distribution Overheads Incurred		6,000
Other Production Overheads Incurred		12,000
Sales		1,00,000
Cost of Finished Goods Sold		80,000
Cost of Goods completed and transferred into finished goods during the month		65,000
Physical value of work-in-Process at the end of the month		40,000

The production overhead absorption rate is 150% of direct wages charged to work- in- Process.
Required: Prepare the following accounts for the month:

1. Stores Ledger Control Account.
2. Work-in-Process Control Account.
3. Finished Goods Control Account.
4. Production Overhead Control Account.
5. Costing Profit and Loss Account.

Solution: **6**

(a) Stores Ledger Control Account

Particulars	**Amount (₹)**	**Particulars**	**Amount (₹)**
To Balance b/d	25,000	By Work in Process Control A/c	30,000
To Creditors/ Bank A/c	75,000	By Production OH Control A/c	4,000
		By Balance c/d	66,000
	1,00,000		**1,00,000**

(b) Wages Control Account

Particulars	**Amount (₹)**	**Particulars**	**Amount (₹)**
To Bank A/c (Paid to direct workers)	25,000	By Work in Process Control A/c (Charged to batches)	20,000
To Bank A/c (Paid to indirect workers)	5,000	By Production OH Control A/c	5,000
		Production OH Control A/c (Non-productive wages)	5,000
	30,000		**30,000**

(c) Production Overhead Control Account

Particulars	**Amount (₹)**	**Particulars**	**Amount (₹)**
To Balance b/d (Prepaid amount)	3,000	By Work-in-Process Control A/c (150% of direct wages)	30,000
To Stores Ledger Control A/c	4,000		
Wages Control A/c (Rs.5,000 + Rs.5,000)	10,000		
Bank A/c	12,000		
(Over-absorption, balancing figure)	1,000		
	30,000		**30,000**

* Alternatively, the over absorbed overhead may be carried forward.

(d) Work-in-Process Control Account

Particulars	**Amount (₹)**	**Particulars**	**Amount (₹)**

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To Balance b/d	20,000	By Finished Goods Control A/c	65,000
To Store Ledger Control A/c	30,000	By Balance c/d (Physical value)	40,000
To Wages Control A/	20,000		
To Production OH Control A/c (150% of direct wages)	30,000		
To Costing P&L A/c (Stock Gains)	5,000		
	1,05,000		**1,05,000**

(e) Finished Goods Control Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	35,000	By Cost of Goods Sold* A/c	80,000
To Work-in-Process Control A/c	65,000	By Balance c/d	20,000
	1,00,000		**1,00,000**

* Alternatively, Costing Profit & Loss Account

(f) Costing Profit & Loss Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Finished goods control A/c or Cost of Goods Sold A/c	80,000	By Sales A/c	1,00,000
To Selling & distribution OH A/c	6,000	To Production OH Control A/c	1,000
To Balance c/d	20,000	To Work-in-Process Control A/c (Stock gain)	5,000
	1,06,000		**1,06,000**

Notes:

1) Materials transferred between batches will not affect the Control Accounts.
2) Non-production time of direct workers is a production overhead and therefore will not be charged to work-in-Process control A/c.
3) Production overheads absorbed in work-in-Process Control A/c equals to Rs. 30,000 (150% of Rs. 20,000).
4) In the work-in-Process Control A/c the excess physical value of stock is taken resulting in stock gain. Stock gain is transferred to Profit & Loss A/c.

COGS A/c

Particulars	Amount (₹)	Particulars	Amount (₹)
To Finished Goods Control A/c	80,000	By Cost Of sales	80,000
	80,000		**80,000**

Selling & Distribution OH Control A/c

Particulars	Amount (₹)	Particulars	Amount (₹)
To Bank	6,000	By Cost Of sales	6,000
	6,000		**6,000**

7. Illustration

The following figures are available from the financial records of ABC Manufacturing Co. Ltd. for the year ended 31-3-20X9.

	Amount (Rs.)
Sales (20,000 units)	25,00,000
Materials	10,00,000
Wages	5,00,000
Factory Overheads	4,50,000
Office and administrative Overhead(production related)	2,60,000
Selling and distribution Overheads	1,80,000
Finished goods (1,230 units)	1,50,000

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	Debit (Rs.)	Credit (Rs.)
Work-in-Process:		
Materials	30,000	
Labour	20,000	
Factory overheads	20,000	70,000
Goodwill written off		2,00,000
Interest on capital		20,000

In the Costing records, factory overhead is charged at 100% of wages, administration overhead 10% of factory cost and selling and distribution overhead at the rate of Rs.10 per unit sold.
Prepare a statement reconciling the profit as per cost records with the profit as per financial records.

Solution: **7**

Profit & Loss Account of ABC Manufacturing Co. Ltd. (for the year ended 31-3-20X9)

Particulars	Amount (₹)	Particulars	Amount (₹)
To Opening Stock	Nil	By Sales (20,000 units)	25,00,000
To Materials	10,00,000	By Closing Stock:	
To Wages	5,00,000	Finished goods (1,230 units)	1,50,000
To Factory Overheads	4,50,000	Work-in-Process	70,000
To Admn. Overheads	2,60,000		
To S&D Overheads	1,80,000		
To Goodwill written off	2,00,000		
To Interest on loan	20,000		
To Net Profit	1,10,000		
	27,20,000		**27,20,000**

Cost Sheet

Particulars	Amount (₹)
Materials	10,00,000
Direct Expenses	Nil
Prime Cost	**15,00,000**
Add: Factory overhead @ 100% of wages	5,00,000
Gross Factory Cost	20,00,000
Less: Closing WIP	(70,000)
Factory Cost of (20,000 + 1,230) units	19,30,000
Add: Admn. Overhead @ 10% of Factory cost	1,93,000
Total Production Cost	21,23,000
Less: Closing Stock of finished goods (1,230 units)	(1,23,000)*
Cost of Goods sold (20,000 units)	**20,00,000**
Add: Selling & Dist. Overhead @ Rs. 10 per unit	2,00,000
Cost of sales (20,000 units)	**22,00,000**
Sales of 20,000 units	25,00,000
Profit	**3,00,000**

* (₹21,23,000 × 1,230 units/ 21,230 units)

Reconciliation Statement

Particulars	Amount (₹)	Amount (₹)
Profit as per Cost Accounts		3,00,000
Add: Factory overheads over-absorbed (₹5,00,000 – ₹4,50,000)	50,000	
Selling & Dist. Overhead over-absorbed (₹2,00,000 – ₹1,80,000)	20,000	
Difference in the valuation of closing stock of finished goods (₹1,50,000 – ₹1,23,000)	27,000	97,000

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		3,97,000
Less: Admn. overhead under-absorbed (₹2,60,000 – ₹1,93,000)	67,000	
Goodwill written off taken in financial accounts	2,00,000	
Interest on loan	20,000	2,87,000
Profit as per financial accounts		**1,10,000**

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CHAPTER 4 – METHODS OF COSTING
UNIT 1 : JOB AND CONTRACT COSTING

OVERVIEW

- Meaning of job costing
- Understanding of job card or sheet
- Accounting entries for cost elements under both the methods
- Advantages and disadvantages of job costing
- Meaning of contract costing
- Terms used in contract costing.
- Meaning of cost-plus contracts

1. JOB COSTING

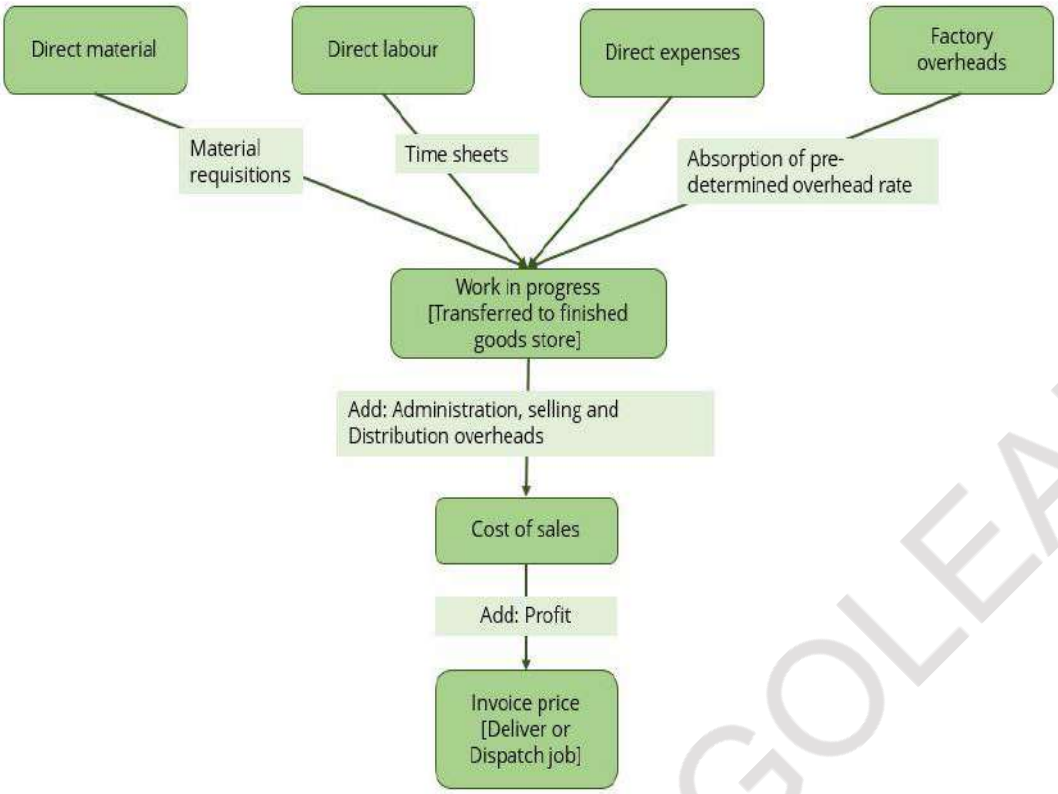
- Job costing may be defined as a system of costing in which the elements of cost are accumulated separately for each job or work order undertaken by a management.
- Industries manufacturing products or services against a particular order use job costing or job order method of cost accounting.
- In the job costing system, an order or unit, lot or batch of product may be taken as cost unit, i.e., a job.
- Job costing is a method of costing in which cost units can be separately identified and need to be separately costed.
- The primary purpose of job costing is to bring together all the cost incurred for completing a job.
- The system of job costing can be sub-divided into two categories viz.
  (a) Factory job costing and
  (b) Contract costing.
- Variant of job costing system is batch costing in which cost are accumulated for specific batches of products of a similar type ordered for manufacture.

> Job costing is applicable to engineering concern, construction companies, ship building, furniture making, machine manufacturing, industries, repair shops, automobile garages and such other in factories where jobs or orders can be kept separately.

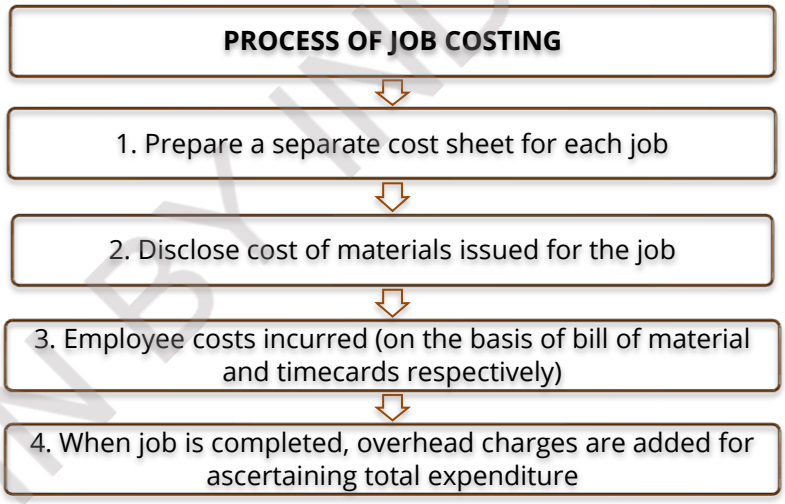
Principles of job costing

- Analysis and ascertainment of cost of each unit of production
- Control and regulate cost.
- Determine the profitability.

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2. Process of Job Costing



Suitability of Job Costing

- When jobs are executed for different customers according to their specifications.
- When no two orders are alike, and each order/job needs special treatment.
- Where the work-in-progress differs from period to period based on the
- Number of jobs in hand.

3. Collection of costs for a job

A. Material cost

- An essential requirement of job order costing accounting is that direct materials and their costs must be traced to and identified with specific jobs or work orders.
- The shop prepares the requisite materials from the stores Once the receipt of production order is received.
- On the authority of the bill of materials, the withdrawals of material are made on materials requisitions.
- Number of the Particular job order for which material is drawn is indicated in each requisition.

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- Surplus, excess, or incorrect materials or returned from the shops to the stores noted on the materials return note.
- A daily or weekly analysis of materials requisitions, materials written notes and bills of materials is made and it is posted in the journal maintained for materials requisition.
- For cost accounting, materials issue analysis sheet is prepared showing the cost of materials issued against the various job order numbers.
- Direct material cost is reflected on the cost sheet, relating to the production order while indirect materials cost is treated as overhead cost.

B. Labour cost

- All indirect labour cost should be analysed according to the individual jobs or work orders.
- On the authority of operation schedule, time is booked or timesheets, job cards, time tickets for piece work cards, the job cards are valued by the department of costing; the wages paid are divided into direct and indirect labour and booked to production order and standing order numbers, respectively.
- Labour summaries or wages analysis sheets are prepared for each accounting period.
- Amount on account of overtime, idle time, shift differential and fringe benefits may also be included in the wage's analysis sheet.
- Direct labour costs are posted on the respective cost sheets on the other hand indirect labour costs are treated as overhead cost.

C. Overheads

- Overhead costs are accumulated against standing order numbers and against cost centre.
- Overhead rates whether it is predetermined or actual are worked out for each centre.
- The amount of overhead cost recoverable on each job order is summarized in an overhead absorption or applied overhead analysis sheet subsequently it is posted on the relevant cost sheet.
- Usually, overheads are added into account only when the job is complete but at the end of an accounting period, the amount of overheads that could be applied to incomplete jobs are ascertained for the reason of establishing the extent of over or under absorption of overheads.

4. Treatment of spoiled and defective work

Circumstances	Treatment
Where a percentage of defective work is allowed in a particular batch as it cannot be avoided	• When a normal rate of defectives has already been established, if the actual number of defectives is under the normal limit or is near that to the cost of rectification will be charged to the whole job and spread over the entire output of the batch. • If on the other hand the number of defective units substantially exceeds the normal, the cost of rectification of the number which exceeds the normal will be written off as a loss in the costing profit and loss account
Due to bad work man ship	• In this case cost of rectification will be abnormal cost i.e., not a legitimate element of the cost. • Therefore, the cost of rectification shall be written off as a loss unless by an arrangement it is to be recovered as a penalty from the workmen concerned. • It is possible however that the management did provide certain proportion of defectives on account of bad workmanship as an unavoidable feature of production. • If that be the case, on the cost of rectifying to the extent provided for by the management will be treated as a normal cost and charged to the batch
Where defect is due to the inspection department wrongly accepting incoming material of poor quality	• In this case the cost of rectification will be charged to the department and will not be considered as cost of manufacture of the batch. • Being and abnormal cost, it will be written off to the

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	costing profit and loss account

5. Job Cost Card / Sheet

- Job cards or job tickets are used to record the time spent on each job, which is having a specified work order or a job order number.
- Job cards may be of two types, first one is a job cost card, and it contains that information regarding material consumption as well as time spent by operators.
- The other one is, in effect, at job ticket, which may be issued to an operator by the supervisor and contains only the operation details.
- When the operator starts doing the work, he records the time either manually or through time recording clock on the card.
- The finishing time is recorded once the operation is completed.
- If there is any break in between, then the "time out" and "time in" are also recorded indicating hours not used on job and it shall be considered as indirect labour hours.
- When the job is completed, the operator deposits those cards with the supervisor and then collects the next job ticket.
- At the end of each day the timekeeper collects all the cards and record the time of each job or process or operation.

Company ABC			
Job Cost Sheet			
Job Number		Order No	
Customer Name			
Date Started		Date Completed	
Job Supervisor			
Units Ordered		Units Completed	
Direct Material:			
Request No.	Units	Price	Amount
Total Direct Materials (A)			
Direct Labour:			
Employee	Hours	Wage Rate	Amount
Total Direct Labour (B)			
Manufacturing Overheads:			
Allocation Base	Base Units	Rate	Amount
Total Manufacturing Overheads (C)			
Total Job Cost (D=A+B+C)			
Total Revenue (E)			
Percentage of Cost Recovered (D/E)			

6. Accounting of costs for a Job

Entries in control account

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a. For purchase of materials

Store's ledger account Dr

To Cost ledger account

b. For the value of direct materials issued to jobs

Work in progress account Dr

To Stores ledger account.

c. For return of direct materials from jobs

Store's ledger account Dr

To Work in progress

d. For return of materials to suppliers

Cost ledger control account Dr

To Stores ledger control account.

e. For indirect materials

Factory overhead control account Dr

To Stores ledger control account.

f. For wages paid

Wages control account Dr

To Cost ledger control account

g. For Direct wages incurred on jobs

Work in progress account Dr

To Wages control account

h. For indirect wages

Factory overhead control account Dr

To cost ledger control account

i. For any indirect expenses paid

Factory overhead control Dr

To Cost ledger control account

j. For charging overhead to job

Work in progress account Dr

To factory overhead control account

k. For the total cost of job completed

Cost of sales Dr

To work in progress control account

l. The Balance of cost of sales Account is transferred to costing profit and loss account.

Costing profit and loss Dr

To Cost of sales

m. For sales value of job completed

Cost ledger control account Dr

To costing profit and loss.

Example 1

Manufacturing cost of a work order is 50000rs, 10% of the production against order spoiled and the rejection is estimated to have a realizable value of 1000 only. The normal rate of spoilage is 2%. Give necessary journal entry.

Solution

Actual loss due to spoilage = 50000 ×10%

= 5000rs

Normal loss = 50000×2% =1000rs

Therefore 5000-1000=4000rs is abnormal loss

The rejection has a realizable value of 1000rs that is to be apportioned between normal and abnormal loss in the ratio 1:4.

Material control account Dr 1000

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Overhead control account	**Dr**	**800**	
Costing P & L account	**Dr**	**3200**	
To Work in progress account			**5000**

Advantages

- Job costing helps the management in the process of detection of which jobs are profitable and which are not. Estimates of cost for similar work in the future may be flexibly made based on accurate record of job cost.
- The cost of material, labour and overhead of every job or product in a department is available regularly and periodically which enables the management to know the trend of cost and thus by proper comparison, to control the efficiency of operations, material, and machines.
- Application of a system of budgetary control of overheads with all the advantages is necessary for adopting predetermined overhead rate in job costing.
- Responsibilities may be fixed on department or individuals due to spoilage and defective works. Because they are easily identifiable with the specific jobs or products in the job costing.

Disadvantages

- Job costing sis time consuming and it requires keeping detailed record. This makes the method very much Expensive.
- Job costing used to keep record of different jobs which makes it more complicated.
- Job costing is not suitable in inflationary condition.
- Previous records of cost will be meaningless if there is any change in market condition.

7. Difference between job costing and process costing

Job costing	**Process costing**
A Job is carried out or a product is produced by specific orders	The Process of producing the product has a continuous flow and the product produced is homogeneous.
Cost is determined for each job separately	Cost is compiled based on time i.e., for production of a given accounting period for each process or department
Each job is separate and independent of other jobs	Products lose their individual identity as they are manufactured in a continuous flow
Each job or order has a number and costs are collected against the same job number	The unit cost of process is an average cost for the period

8. Contract costing

- Contract (for terminal) costing is one form of application of principles of job order costing.
- Every contract is treated as a cost unit in contract costing and the cost is ascertained individually for each contract.
- It is suitable for business which is concerned with building or engineering projects for structural or construction contracts.
- Usually, a separate account of each contract is prepared in contract costing.
- Also, the number of contracts which are undertaken during the time generally, not being very large, the contract ledger can very well be operated as part of the financial books.
- Contract account is debited with all those direct and indirect expenses incurred in relation to a contract.
- It is credited with the amount of contract price on completion of contract.
- The balance in the account represents profit or loss made on contract and the same is transferred to the profit and loss account.
- In case the contract which is not yet completed at the end of an accounting period, a reasonable amount of profit, out of the total profit made so far on the account of incomplete contract, may be transferred to the profit and loss account.

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Features:

- A major part of the work in relation with each contract is ordinarily carried out at the site of the contract.
- The bulk of the expenses which is incurred by the contractor are considered as direct.
- The indirect expenses consist of office expenses, stores and works mostly.
- A separate account is generally maintained for each contract.
- The number of contracts which is undertaken by a contractor at a time is usually few.
- The cost unit in contract costing is itself the contract.

9. Recording of contract costs

Material cost

Contract account (contract no) Dr
To Stores ledger control account
(Issued from stores) or
To cost ledger control account
(Direct purchase)

a. In case of transfer of excess material from one contract to another

Contract account (contract no xyz) Dr
To contract account (contract no abc)

b. In case of the return of surplus material appears uneconomical on account of high-cost transportation, the same is sold.

Cost ledger control account Dr
Costing profit and loss account (loss) Dr
To contract account
To costing profit and loss account (profit)

c. Any loss of material due to theft or destruction etc

Costing profit and loss account Dr
To contract account

d. If any stores items are used for manufacturing tools

Work expenses account Dr
To stores ledger account.
(With amount of stores used for works)
Contract account Dr
To works expenses
(With amount of work used in the contract)

e. If the contractee has supplied some materials without affecting the contract price, no accounting entries will be made in the contract account, only a note may be given about it.

Employee cost

Wages paid to direct employees charged to the concerned contract directly. If an employee is engaged concurrently in other contract also then the total wages paid is apportioned to the contracts on some reasonable basis, usually on time basis.

Contract account Dr
To Wages control account

Direct expenses

Direct expenses are directly charged to the concerned contract account.
Contract account Dr
To Direct expenses account

Indirect expenses

Indirect expenses may be distributed over several contracts on certain reasonable basis as overheads.
Contract account Dr
To overheads account

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Plant and machinery

The value of the plant in a contract may be either debited to contract account and the written down value thereof at the end of the year entered on the credit side for closing the contract account, or only a charge for use of the plant may be debited to the contract account.

Contract account Dr
To plant and machinery account (With cost)

Plant and machinery account (WDV)
To contract account

Or

Contract account Dr
To depreciation on plant and machinery account

Subcontract

Subcontract cost are also debited to contract account.

Contract account Dr
To cost of subcontract account

10. Meaning of Terms Used in Contract Costing

A. Work in Progress

- In contract accounts, the value of work in progress consists of the amount of work certified and the amount of work uncertified.
- The work in progress account appears in the assets side of the balance sheet.
- The amount of cash received from the contractee and contingencies reserves will be deducted out of this amount. work-in-progress consists of
  (i) The cost of work completed, both certified and uncertified.
  (ii) The cost of work not yet completed; and
  (iii) The amount of estimated/ notional profit.

B. Cost of Work Certified or Value of Work Certified:

- A contract is a continuous process and to know the cost or value of the work completed as on a particular date; assessment of the completion of work is carried out by an expert (it may be any professional like surveyor, architect, engineer etc.).
- The expert, based on his assessment, certifies the work completion in terms of percentage of total work.

(a) Value of Work Certified = Value of Contract × Work certified (%)

(b) Cost of Work Certified = Cost of work to date – (Cost of work uncertified+ Material in hand + Plant at site)

C. Cost of Work Uncertified:

- It represents the cost of the work which has been carried out by the contractor but has not been certified by the expert.
- It is always shown at cost price.

Particulars	(₹)	(₹)
Total cost to date		XX
Less: Cost of work certified	XX	
Material in hand	XX	
Plant at site	XX	XX
Cost of work uncertified		XX

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D. Progress Payment:

- When a contractor is engaged on a contract for several years, he is unable to block large amount of money until the completion of the contract agreed.
- Because of that the system of progress payment will be adopted in case of large contracts.
- The contractee agrees for the part payment of the contract price from period to period which depends on the satisfactory progress of the work.
- Contractee's architect or surveyor or engineer judges the progress who will then issue a certificate stating the value of work completed so far.
- Such work is termed is work certified.

Progress payment = Value of work certified - Retention money - Payment to date

E. Retention Money:

- In a contract, a contractee generally keeps some amount payable to contractor with himself as security deposit.
- To ensure that the work carried out by the contractor is as per the plan and specifications, it is monitored periodically by the contractee.
- To have a cushion against any defect or undesirable work the contractee uphold some money payable to contractor.
- This security money upheld by the contractee is known as retention money.
- In some contracts the contractor must deposit some security money before staring of the contract as a term of contract. This is known as Earnest money.
- If any deficiency or defect is noticed in the work, it is to be rectified by the contractor before the release of the retention money.
- Retention money provides a safeguard against the risk of loss due to faulty workmanship.

Retention Money = Value of work certified - Payment made/cash paid

F. Cash Received:

It is ascertained by deducting the retention money from the value of work certified i.e.

Cash received = Value of work certified - Retention money

G. Notional Profit:

- It represents the difference between the value of work certified and cost of work certified.
- It is determined:

Notional profit = Value of work certified - (Cost of work to date - Cost of work not yet certified)

H. Estimated Profit:

It is the excess of the contract price over the estimated total cost of the contract.

I. Cost plus contract

- Cost plus contract is a contract in that the value of a contract is ascertained by adding a certain percentage of profit over the total cost of the work.
- This is used in case of those contracts whose exact cost is unable to be correctly estimated at the time of undertaking a work.
- The profit that is to be paid to the contractor may be a fixed amount or it may be a particular percentage of cost of capital employed.
- These types of contracts are undertaken for production of special articles not usually manufactured and is generally employed, when the government happens to be a contractee.

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- Generally, in such contract, contractor and contractee will have a clear agreement about the items of cost to be included, type of material to be used, normal wastages to be permitted, labour rate for different grades and the rate or amount of profit.

Advantages

- Cost plus contract ensures that a reasonable profit accrues to the contractor even in risky projects.
- It simplifies the process of hiring tenders and quotations.
- It provides escalation clauses and discovers the contractor from fluctuations in price and utilization of elements of production.
- The customer is assured of paying only reasonable amount of profit.
- The customer has the right to conduct cost audit so that he can ensure that is not being cheated by the contractor.

J. Escalation clause

- Escalation clause is usually provided in the contract as a safeguard against any likely changes in the price or utilization of material and labour.
- This class provides that in case prices of items of raw materials, labour etc.
- Specified in the contract change during the execution of the contract, beyond the specified limit over the prices prevailing at the time of signing the agreement, the contract price will be suitably adjusted.
- The terms of contract specify the procedure for calculating such adjustment to avoid all future disputes.
- This clause safeguards the interest of both the contractor and the contractee in case of fluctuations in the price of materials, labour etc.

Illustrations

Job Costing

1. Illustration

In a factory following the Job Costing Method, an abstract from the work-in- progress as on 30th September was prepared as under.

Job No.	Materials (Rs.)	Direct Hrs.	Labour (Rs.)	Factory Overheads applied (Rs.)
115	1325	400 hrs.	800	640
118	810	250 hrs.	500	400
120	765	300 hrs.	475	380
	2,900		**1775**	**1420**

Materials used in October were as follows:

Material Requisition No.	Job No.	Cost (Rs.)
54	118	300
55	118	425
56	118	515
57	120	665
58	121	910
59	124	720
		3,535

A summary for labour hours deployed during October is as under:

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Job no.	Number of Hours	
	Shop A	Shop B
115	25	25
118	90	30
120	75	10
121	65	--
124	25	10
	275	**75**

Indirect Labour

	Shop A	Shop B
Waiting for material	20	10
Machine Breakdown	10	5
Idle time	5	6
Overtime Premium	6	5
	316	**101**

A shop credit slip was issued in October, that material issued under Requisition No. 54 was returned back to stores as being not suitable. A material transfer note issued in October indicated that material issued under Requisition No. 55 for Job 118 was directed to Job 124.

The hourly rate in shop A per labour hour is Rs.3 per hour while at shop B, it is Rs.2 per hour. The factory overhead is applied at the same rate as in September. Job 115, 118 and 120 were completed in October.

An abstract from the work-in-progress as on 30th September was prepared as under:

Job No.	Materials (Rs.)	Direct Hrs.	Labour (Rs.)	Factory OH applied (Rs.)	Factory OH ÷ Labour
115	1325	400 hrs.	800	640	80%
118	810	250 hrs.	500	400	80%
120	765	300 hrs.	475	380	80%
	2,900		**1775**	**1420**	

Overheads is to be recovered at 80% of the direct labour costs The hourly rate in shop A per labour hour is Rs.3 per hour while at shop B, it is Rs.2 per hour. The factory overhead is applied at the same rate as in September. Job 115, 118 and 120 were completed in October.

You are asked to compute the factory cost of the completed jobs. It is the practice of the management to put a 10% on the factory cost to cover administration and selling overheads and invoice the job to the customer on a total cost plus 20% basis. What would be the invoice price of these three jobs?

Solution:

Cost Sheet for Job No 115

Particulars	Cost Incurred in September	Cost incurred During October	Total
Material	1,325	--	1,325
Labour *(25 hrs. in Shop A @ 3/hr. 25 hrs. in Shop B @ 2/hr.)	800	125*	925
Prime Cost	**2,125**	**100**	**2,250**
Add: Factory OH (80% of direct labour cost)	640	100	740
Factory Cost	2,765	225	2990
Add: Admin & Selling OH @10% of Factory Cost			299.00

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Total cost			3,289.00
Profit (20% of total cost)			657.80
Invoice Price			**3,946.80**

Cost Sheet for Job No 118

Particulars	**Cost Incurred in September**	**Cost incurred During October**	**Total**
Material	810	515 (MRN No:56)	1,325
Labour *(90 hrs. in Shop A @ ₹3/hr. 30 hrs. in Shop B @ ₹2/hr.)	500	330	830
Prime Cost	**1,310**	**845**	**2,155**
Add: Factory OH (80% of direct labour cost)	400	264	664
Factory Cost	1,710	1,109	2,819
Add: Admin & Selling OH @10% of Factory Cost			281.90
Total cost			3,100.90
Profit (20% of total cost)			620.18
Invoice Price			**3721.08**

Cost Sheet for Job No 120

Particulars	**Cost Incurred in September**	**Cost incurred During October**	**Total**
Material	765	665 (MRN No:56)	1,430
Labour* (75 hrs. in Shop A @ ₹3/hr. 10 hrs. in Shop B @ ₹2/hr.)	475	245*	720
Prime Cost	**1,240**	**910**	**2,150**
Add: Factory OH (80% of direct labour cost)	380	196	576
Factory Cost	1,620	1,106	2,726
Add: Admin & Selling OH @10% of Factory Cost			272.6
Total cost			3,100.90
Profit (20% of total cost)			620.18
Invoice Price			**3721.08**

Contract Costing

1. Illustration

From the following information compute notional profit & estimated profit

	Rs.
Total expenditure to date	22,50,000
Estimated further expenditure to complete the contract (includingcontingencies)	2,50,000
Contract Price	32,50,000
Work Certified	27,50,000
Work Uncertified	1,75,000
Cash Received	21,25,00

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Solution:

Calculation of Estimated Profit**:**

Total Estimated Cost = Cost Incurred + Estimated further expenditure

= ₹22,50,000 + ₹2,50,000

= ₹25,00,000

Estimated profit on contract = Total Contract Value – Total Estimated Cost

= ₹32,50,000 - ₹25,00,000

= ₹7,50,000

Contract Account

Particulars	**₹**	**Particulars**	**₹**
To Cost Incurred	22,50,000	By Work-in-progress:	
		Value of work certified	27,50,000
To Costing P&L A/c (Notional Profit) (Bal. fig)	6,75,000	Cost of work uncertified	1,75,000
	22,50,000		**22,50,000**

Cost of Certified work = Total Cost – WIP (work uncertified)

=₹ 22,50,000 - ₹1,75,000 = ₹20,75,000

Notional Profit = Value of work certified - Cost of Certified work

= ₹27,50,000 - ₹20,75,000 = ₹6,75,000

2. Illustration

Compute the notional profit and estimated profit from the following

	Rs.
Total Expenditure to date	4,50,000
Estimated further expenditure for theproject	25,000
Contract Price	6,12,000
Work Certified	5,50,800
Work Uncertified	34,000
Cash received	4,40,640

Solution:

Calculation of Estimated Profit:

Value of Contract = ₹6,12,000

Estimated Total Cost = Cost Incurred + Estimated Further Expenditure

= ₹4,50,000 + ₹25,000

= ₹4,75,000

Estimated Profit = Total Contract Value - Total Estimated Cost

= ₹6,12,000 - ₹4,75,000

= ₹1,37,000

Cost of Certified Work = Total Cost Incurred – Work Uncertified

= ₹4,50,000 - ₹34,000

= ₹4,16,000

Notional Profit = Value of work certified - Cost of Certified work

= ₹5,50,800 - ₹4,16,000

= ₹1,34,800

Contract Account

Particulars	**₹**	**Particulars**	**₹**
To Cost Incurred	4,50,000	By Work-In-progress:	

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		Value of work certified	5,50,800
To Costing P&L A/c (Notional Profit) (Bal. fig)	1,34,800	Cost of Work Uncertified	34,000
	5,84,800		**5,84,800**

3. Illustration

The following expenses were incurred on a contract:

	₹
Material purchased	6,00,000
Material drawn from stores	1,00,000
Wages	2,25,000
Plant issued	75,000
Chargeable expenses	75,000
Apportioned indirect expenses	25,000

The contract was for Rs. 20,00,000 and it commenced on January 1, 2019.

The value of the work completed and certified up to 30th November 2019 was Rs. 13, 00,000 of which Rs.10,40,000 was received in cash, the balance being held back as retention money by the contractee.

The value of work completed subsequent to the architect's certificate but before 31st December 2019 was Rs. 60,000. There were also lying on the site materials of the value of Rs. 40,000. It was estimated that the value of plant as at 31st December 2019 was Rs. 30,000.

You are required to compute value of work certified, cost of work not certified and notional profit on the contract till the year ended 31st December 2019.

Solution:

Contract Account

Particulars	**₹**	**Particulars**	**₹**
To Material Purchased	6,00,000	By Material unused	40,000
To Wages	2,25,000	By Plant less depreciation	30,000
To Plant	75,000	By Works Cost (Bal. Figure)	10,30,000
To Chargeable expenses	75,000		
To Stores issued	1,00,000		
To Apportioned Indirect Expenses	25,000		
	11,00,000		**11,00,000**
To Works Cost	10,30,000	By Work-in-progress:	
		Value of work certified	13,00,000
Costing P&L A/c (Notional profit) (bal. figure)	3,30,000	Cost of work uncertified	60,000
	13,60,000		**13,60,000**

4. Illustration

A contractor prepares his accounts for the year ending 31st December each year. He commenced a contract on 1st April 2018.

The following information relates to the contract as on 31st December 2018:

	(Rs.)
Material issued	2,51,000
Labour charges	5,65,600
Salary to Foreman	81,300

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- A machine costing Rs. 2,60,000 has been on the site for 146 days, its working life is estimated at 7 years and its final scrap value at Rs. 15,000.
- A supervisor, who is paid Rs. 8,000 p.m. has devoted one-half of his time to this contract.
- All other expenses and administration charges amount to Rs.1,36,500.
- Material in hand at site costs Rs. 35,400 on 31st December 2018.
- The contract price is Rs. 20,00,000. On 31st December 2018 two-third of the contract was completed. The architect issued certificates covering 50% of the contract price, and the contractor had been paid Rs.7,50,000 on account.

Prepare Contract A/c and show how much profit or loss should be included in financial accounts to 31st December 2018.

Solution:

Contract Account

Particulars	**₹**	**Particulars**	**₹**
To Material Issued	2,51,000	By Plant @ Site (depreciated) (Working note 1)	2,46,000
To Wages	5,65,600	By Material (in hand)	35,400
To Foreman's salary	81,300		
To Machine Issued	2,60,000		
To Supervisor's salary (₹8,000 × 9)/2)	36,000		
To Administrative charges	1,36,500	By Works Cost (Bal. Figure)	10,49,000
	13,30,400		**13,30,400**
To Works Cost	10,49,000	By Work-in-progress:	
		-Value of work certified	10,00,000
To Costing P&L A/c (Notional profit) (balancing figure)	2,13,250	-Cost of work uncertified (Working Note 2)	2,62,250
	12,62,250		**12,62,250**

Working notes:

1. **Written down value of Machine:**

$= \frac{₹2,60,000 - ₹15,000}{7 \text{ Years}} \times \frac{146 \text{days}}{365 \text{ Days}} = ₹14,000$

Hence the value of machine after the period of 146 days = ₹2,60,000 – ₹14,000 = ₹2,46,000

2. The cost of 2/3rd of the contract is ₹10,49,000

Therefore, cost for 100% = $\frac{10,49,000}{2} \times 3 = ₹15,73,500$

Therefore, Cost of 50% of the contract which has been certified by the architect is ₹7,86,750.

Also the cost of 1/3rd of the contract, which has been completed but not certified by the architect is ₹2,62,250.

5. Illustration

M/s. Bansal's Construction Company Ltd. took a contract for Rs. 60,00,000 expected to be completed in three years. The following particulars relating to the contract are available:

	Rs.		
	2016	**2017**	**2018**
Materials	6,75,000	10,50,000	9,00,000
Wages	6,20,000	9,00,000	7,50,000
Cartage	30,000	90,000	75,000
Other Expenses	30,000	75,000	24,000
Cumulative Work certified	13,50,000	45,00,000	60,00,000
Cumulative work uncertified	15,000	75,000	-

- Plant costing Rs. 3,00,000 was bought at the commencement of the contract.

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- Depreciation was to be charged at 25% per annum, on the written down value method.
- The contractee pays 75% of the value of work certified as and when certified, makes the final payment on completion of the contract.

You are required to make a contract account for three years and total estimated profit or loss from the contract.

Solution:

Contract Account (For the year ended 2016)

Particulars	**₹**	**Particulars**	**₹**
To Materials	6,75,000	By Plant @ site c/d (75% of ₹3,00,000)	2,25,000
To Wages	6,20,000		
To Transportation cost	30,000		
To Other expenses	30,000		
To Plant Issued	3,00,000	By Works Cost (Bal. Figure)	14,30,000
	16,55,000		**16,55,000**
To Works Cost	14,30,000	By Work-in-progress c/d:	
		-Work certified	13,50,000
		-Work uncertified	15,000
		By Costing P&L A/c (Notional Loss for the year)	65,000
	14,30,000		14,30,000

Contract Account (For the year ended 2017)

Particulars	**₹**	**Particulars**	**₹**
To Plant @ site b/d	2,25,000	By Plant @ site c/d (75% of ₹2,25,000)	1,68,750
To Work-in-progress b/d:			
- Work certified	13,50,000		
- Work uncertified	15,000		
To Materials	10,50,000		
To Wages	9,00,000		
To Transportation cost	90,000		
To Other expenses	75,000	By Works Cost (Bal. Figure)	35,36,250
	37,05,000		**37,05,000**
To Works Cost	35,36,250	By Work-in-progress c/d:	
		-Work certified	45,00,000
		-Work uncertified	75,000
To Costing P&L A/c (Notional profit) (balancing figure)	10,38,750		
	45,75,000		**45,75,000**

Contract Account (For the year ended 2018)

Particulars	**₹**	**Particulars**	**₹**
To Plant @ site b/d	1,68,750	By Plant @ site c/d (75% of ₹1,68,750)	1,26,563
To Work-in-progress b/d:			
- Work certified	45,00,000		
- Work uncertified	75,000		
To Materials	9,00,000		

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To Wages	7,50,000		
To Transportation cost	75,000		
To Other expenses	24,000	By Works Cost (Bal. Figure)	63,66,187
	64,92,750		**64,92,750**
To Works Cost	63,66,187	By Contractee	60,00,000
		By Costing P&L A/c (Notional Loss for the year)	3,66,187
	45,75,000		**45,75,000**

Therefor Profit on Contract:
2016 = Loss of (₹65,000)
2017 = Profit of ₹10,38,750
2018 = Loss of (₹3,66,187)
Estimated/Actual Profit **= ₹6,07,563**

6. Illustration

RST Construction Ltd. commenced a contract on April 1, 2018. The total contract was for Rs. 49,21,875. It was decided to estimate the total profit on the contract and to take to the credit of Costing Profit and Loss A/c that proportion of estimated profit on cash basis, which work completed bore to total contract.
Actual expenditure for the period April 1, 2018 to March 31, 2019 and estimated expenditure for April 1, 2019 to September 30, 2019 are given below:

	April 1, 2018 to March 31, 2019 (Actual) (Rs.)	**April 1, 2019 to Sept. 30, 2019 (Estimated) (Rs.)**
Materials issued	7,76,250	12,99,375
Labour : Paid Prepaid Outstanding	5,17,500 37,5000 12,500	6,18,750 - 5,750
Plant Purchased	4,00,000	-
Expenses : Paid Outstanding Prepaid	2,25,000 25,000 15,000	3,75,000 10,000 -
Plant returns to store (historical cost)	1,00,000 (on September 30th 2018)	3,00,000 (on September 30th 2019)
Work Certified	22,50,000	Full
Work uncertified	25,000	-
Cash received	18,75,000	-
Material at site	82,500	42,500

The plant is subject to annual depreciation @ 25% on written down value method. The contract is likely to be completed on September 30, 2019.
Required:
Prepare the Contract A/c. Determine the profit on the contract for the year 2018-19 on prudent basis, which has to be credited to Costing Profit and Loss A/c.

Contract A/c (1-4-2018 to 31-3-2019)

Particulars	**₹**	**Particulars**	**₹**
To Material Issued	7,76,250	By Plant returned to Store	

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			1,00,000 Less: Depreciation (1,00,000 ×25% ×1/2) = (12,500)	87,500
To Wages Less: Prepaid Add: Outstanding	5,17,500 (37,500) 12,500	4,92,500	By Plant at site on 3,00,000 Less: Depreciation (75,000)	2,25,000
To Plant purchased		4,00,000	By Materials at site c/d	82,500
To Expenses Less: Prepaid Add: Outstanding	2,25,000 (15,000) 25,000	2,35,000		
			By Works Cost (Bal. Figure)	15,08,750
		19,03,750		**19,03,750**
To Works Cost		15,08,750	By Work-in-progress c/d:	
			-Work certified	22,50,000
To Costing P&L A/c (Notional profit) (balancing figure)		7,66,250	-Work uncertified	25,000
		22,75,000		**22,75,000**

Statement Showing Computation of Estimated Profit

Particulars	**Actuals**	**Estimated Upto 30/9/19**	**Total**
Materials issued	7,76,250	12,99,375	20,75,625
Wages:			
Paid	5,17,500	6,18,750	
Less: Closing Prepaid	(37,500)	--	
Add: Opening Prepaid	--	37,500	
Add: Closing Outstanding	12,500	5,750	
Less: Opening Outstanding	--	(12,500)	
	4,92,500	6,49,500	11,42,000
Plant Purchased			
Depreciation on Plant:			
- ₹1,00,000 x 25/100 x 6/12 = ₹12,500	12,500	--	12,500
- ₹3,00,000 x 25/100	75,000	--	75,000
- ₹2,25,000 x 25/100 x 6/12	--	28,125	28,125
Expenses			
Paid	2,25,000	3,75,000	
Add: Closing Prepaid	--	15,000	
Less: Opening Prepaid	(15,000)	--	
Add: Closing Outstanding	25,000	--	
Less: Opening Outstanding	--	(25,000)	
	2,35,000	3,75,000	6,10,000
Material Unused @ Site			(42,500)
Estimated Contract Cost	-	-	39,00,750
Estimated Contract Revenue	-	-	49,21,875
Estimated Profit			**10,21,125**

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7. Illustration

AKP Builders Ltd. commenced a contract on April 1, 2018. The total contract was for Rs. 5,00,000. Actual expenditure for the period April 1, 2018 to March 31, 2019 and estimated expenditure for April 1, 2019 to December 31, 2019 are given below:

Particulars	2018-13 (actual) (Rs.)	2019-14 (9 months) (estimated) (Rs.)
Materials issued	90,000	85,750
Labour : Paid Outstanding at the end	75,000 6,250	87,325 8,300
Plant	25,000	-
Sundry expenses : Paid Prepaid at the end	7,250 625	6,875 -
Establishment charges	14,625	-

A part of the material was unsuitable and was sold for Rs. 18,125 (cost being Rs.15,000) and a part of plant was scrapped and disposed of for Rs. 2,875.

The value of plant at site on 31 March, 2019 was Rs. 7,750 and the value of material at site was Rs. 4,250. Cash received on account to date was Rs. 1,75,000, representing 80% of the work certified. The cost of work uncertified was valued at Rs. 27,375.

The contractor estimated further expenditure that would be incurred in completion of the contract:

i) The contract would be completed by 31st December, 2019.

ii) A further sum of Rs. 31,250 would have to be spent on the plant and the residual value of the plant on the completion of the contract would be Rs.3,750.

iii) Establishment charges would cost the same amount per month as in the previous year.

iv) Rs. 10,800 would be sufficient to provide for contingencies.

Required:

Prepare Contract Account and calculate estimated total profit on this contract. Profit transferrable to Costing Profit and Loss Account is to be calculated by reducing estimated profit in proportion of work certified and contract price.

Contract A/c (1-4-2018 to 31-3-2019)

Particulars		₹	Particulars	₹
To Material Issued		90,000	By Material sold	18,125
To Wages	75,000		By Plant sold	2,875
Add: Outstanding	6,250	81,250	By Plant @ Site	7,750
To Plant purchased		25,000	By Materials at site c/d	4,250
To Expenses	7,250			
Less: Prepaid	(625)	6,625		
To Establishment Charges		14,625	By Works Cost	1,87,625
To Costing P&L A/c (Profit on sale)		3,125		
		2,20,625		**2,20,625**
To Works Cost b/d		1,87,625	By Work-in-progress c/d:	
			-Work certified $(\frac{1,75,000}{80\%})$	2,18750
To Costing P&L A/c (Notional profit) (balancing figure)		58,500	-Work uncertified	27,375
		2,46,125		**2,46,125**

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Statement Showing Calculation of Estimated Profit

Particulars	**(2018-19) Actuals**	**2019 -20 (9 Months) Estimated**	**Total**
Materials issued	90,000	85,750	
Less: Material sold (18,125 – 3,125)	(15,000)	--	
Less: Closing stock	(4,250)	--	
Add: Opening Stock	--	4,250	
Material Consumed	70,750	90,000	1,60,750
Wages:			
Paid	75,000	87,325	
Add: Closing Outstanding	6,250	8,300	
Less: Opening Outstanding	--	(6,250)	
	81,250	89,375	1,70,625
Plant:			
Issued	25,000	31,250	
Less: Plant sold	(2,875)	--	
Less: Closing Value	(7,750)	(3,750)	
Add: Opening Value	--	7,750	
	14,375	35,250	49,625
Establishment Charges	14,625	10,969 $(\frac{14,625}{12 \text{ Months}} \times 9)$	25,594
Sundry Expenses:			
Paid	7,250	6,875	
Less: Closing Prepaid	(625)	--	
Add: Opening Prepaid	--	625	
	6,625	7,500	14,125
Reserve For Contingencies			10,800
Estimated Contract Cost	-	-	4,31,519
Estimated Contract Revenue	-	-	5,00,000
Estimated Profit			**68,481**

8. Illustration

A contractor has entered into a long-term contract at an agreed price of Rs.17,50,000 subject to an escalation clause for materials and wages.

The standard requirements of materials and wages as spelt out in the contract and corresponding actual are as follows:

	Standard	**Actual**
Materials:		
A	5000 tons @ Rs.50	5050 tons @ Rs.48
B	3500 tons @ Rs. 80	3450 tons. @ Rs.79
C	2500 tons. @ Rs. 60	2600 Tons @ Rs.66
Wages:		
P	2000 Hrs. @ Rs. 70	2100 Hrs. @ Rs. 72
Q	2500 Hrs. @ Rs. 75	2450 Hrs. @ Rs. 75
R	3000 Hrs. @ Rs. 65	3100 Hrs. @ Rs. 66

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Reckoning the full actual consumption of materials and wages the company has claimed a final price of Rs.17,73,600. Give your analysis of the admissible claim and indicate the final price payable.

Solution:

Working Of Claim Made

Particulars	Standards			Actuals			Variation (Std. v/s Actuals)
	Qty/Hrs	Rate (₹)	Std. cost (₹)	Qty/Hrs	Rate (₹)	Actual cost (₹)	(₹)
Materials							
A	5,000	50	2,50,000	5,050	48	2,42,400	
B	3,500	80	2,80,000	3,450	79	2,72,550	
C	2,400	60	1,50,000	2,600	66	1,71,600	
			6,80,000			**6,86,550**	**6,550**
Wages							
X	2,000	70	1,40,000	2,100	72	1,51,200	
Y	2,500	75	1,87,500	2,450	75	1,83,750	
Z	3,000	65	1,95,000	3,100	66	2,04,600	
			5,22,500			**5,39,550**	**17,050**
Increase in cost considering variation in Quantity and Price							**23,600**

	₹
Contract price	17,50,000
Add: Increase in cost	23,600
The final price claimed by the company	17,73,600

This claim is **not admissible** because escalation clause covers **only** that part of **increase in cost**, which has been caused **by inflation**.

Escalation Claim Admissible

Particulars	Standard Rate	Actual Rate	Variation in Rate	Standard Qty/Hrs	Difference
Materials					
A	50	48	(2)	5,000	(10,000)
B	80	79	(1)	3,500	(3,500)
C	60	66	6	2,500	15,000
Total					**1,500**
Wages					
X	70	72	2	2,000	4,000
Y	75	75	--	2,500	--
Z	65	66	1	3,000	3,000
Total					**7,000**
Final Claim (Material + Wages)					**8,500**

Statement showing final price payable

	₹
Agreed price	17,50,000
Final Claim	8,500
Final price payable	**17,58,500**

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UNIT 2 : UNIT AND BATCH COSTING

OVERVIEW

- Unit costing method meaning
- Calculation of cost under Unit costing
- Batch costing methods meaning
- Determination of cost under batch costing
- Difference between job costing and batch costing

INTRODUCTION

Today there are varieties of businesses and industries which need different costing systems to meet their requirements individually. Single costing system to fulfil everybody's needs is impossible. Different methods of costing for different industries depending upon the type of manufacture and their nature have been developed. There are various methods that can suit the needs of business. But the basic principle is same for all methods. Choosing the method of costing depends on nature of the business of the company. Industries can be grouped into two basic types i.e., Industries doing job work and Industries engaged in mass production of a single product or identical production.

For industry doing job work

- In the job order industries, the production will be based on the requirements of the customer.
- In those industries the production will not be on continuous basis.
- It is only produced when the order from customer is received and that too as per specifications of the customers.
- Each job work is different from other one.
- Here each job or unit of production is treated as a separate identity for the purpose of costing.
- Method used in that type of business is job costing or batch costing or contract costing.
- Examples of jobs order type of production are ships building, roads, bridges, manufacture of heavy electrical machinery, machine tools, iron foundries, wood working shops, etc.

For continuous and process type of industries

- The continuous or process type of industries are characterised by the continuous production of uniform products according to standard specifications.
- In such a case the successive lots are generally indistinguishable as to size and form and, even if there is some variation in specifications, it is of a minor character.
- Examples of continuous type of industries are chemical and pharmaceutical products, paper/food products, canning, paints and varnish oil, rubber, textile etc.
- Here the methods of costing used for the purpose of ascertaining costs are process costing; single output costing; operating costing etc.

1. Unit Costing

- Unit costing refers to the costing procedure where the costs are accumulated and analysed under different elements of cost and after that cost per unit is ascertained by dividing total cost by number of units manufactured.
- Concerns which produce single article ideally use this method of costing.
- The unit of output is identical.
- The products are homogeneous.
- Concern using this type of costing produces single or two or more grades of one product.
- Maintaining separate cost accounts is not necessary under this system.
- As all the information required can be obtained only by analysis and organization of financial accounts
- On dividing the total expenditure by number of units produced we can ascertain cost per unit
- Examples – breweries, collieries, cement works, steel, brick making, flour mills etc use this type of costing.
- If we must state it in the form of a formula,

$$\textbf{Cost per unit} = \frac{\textbf{Total Cost Production}}{\textbf{No. of Units produced}}$$

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2. Cost Collection Procedure in Unit Costing

The cost for production of output is collected element wise and posted in the cost accounting system for cost ascertainment. The element-wise collection is done as below:

Collection of Materials Cost

- Material requisition notes gives the necessary details regarding cost of materials issued for production and it is accumulated for a certain period or volume of activity.
- The accumulated cost of material is posted in cost accounting system.
- Through the cost accounting system cost sheet for the period or activity is prepared to know cost for the period element wise as well as functions-wise

Collection of Employees (labour) Cost

- Job timecard or sheets gives the details regarding all direct employee cost and it is accumulated for a certain period or volume of activity.
- The time booked or recorded in the job time and idle timecards is valued at appropriate rates and entered in the cost accounting system.
- As regards other items of indirect employee (labour) cost are concerned, these are collected from the payrolls books for the purpose of posting against standing order or expenses code numbers in the Overhead Expenses ledger.

Circumstances	**Treatment**
Loss due to normal reasons	When a normal rate of defectives has already been established and actual number of defectives is within the normal limit, the cost. of rectification or loss will be charged to the Entire output. If, on the other hand, the number of defective units substantially exceeds the normal limits, the cost of rectification or loss are written off in Costing Profit and Loss Account.
Loss due to abnormal reasons	In this case cost of rectification and loss is treated as abnormal cost and the cost of rectification or loss is written off as loss in costing Profit and Loss account.

Example 1:

Data relating to a manufacturing concern are as follows.

Raw materials consumed	500000
Administration overheads	10% of work cost
Machine hours worked	4000 hrs
Machine hour rate	30rs
Direct wages	340000
Selling overheads	10rs per unit
Units produced and sold	10000 units at 150 each

Particulars	**Cost /unit (In Rs.)**	**Amount (In Rs.)**
Raw materials consumed.	50	500000
Direct wages	34	340000
Prime cost	**84**	**840000**
ADD: Manufacturing overheads (4000 hrs× 30)	12	120000
Works' cost	**96**	**960000**
ADD: Office overheads	10.4	104000
Cost of goods sold.	**106.4**	**1064000**
ADD: Selling and distribution overheads (10000×20)	30	300000
Cost of sales	**136.4**	**1364000**
ADD: Profit	13.6	136000

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Sales	**150**	**1500000**

3. Batch Costing

- This is another form of job costing which can be adopted in the companies where the manufacturing of large number of components of machines or other articles is needed.
- Since the large number of them are manufactured together.
- Each batch of products is maintained by preparing separate job card sheets.
- A batch consists of certain number of units which are processed simultaneously to be for manufacturing operation.
- Under this method of manufacturing the inputs are accumulated in the assembly line till it reaches minimum batch size.
- Cost of each component in the batch is determined by dividing total cost by the number of articles manufactured.
- Example: in pen manufacturing industry, it would be too costly to manufacture one pen of a particular design at a time to meet the demand of one customer. On the other hand, the production of say 10,000 pens of the same design will reduce the cost to a sizeable extent.
- To initiate production process, an entity must incur expenditures on engaging workers for production and supervision, setting-up of machine to run for production etc.
- These are the minimum level of expenditure which must be incurred each time a batch is run irrespective of number of units produced.

Costing Procedure in Batch Costing

Batch costing is the extension of the job costing. Hence the cost is ascertained in the same manner as for jobs.
To facilitate convenient cost determination, one number is allotted for each batch.

- **Material cost:** Material requisitions are priced in the cost department. Likewise material cost is allocated to relevant batch to which it is issued.
- **Labour cost:** Time sheets or job tickets are used to be prepared to determine the amount of time spent on each batch. By multiplying time spent at appropriate rates of wages we can charge direct wages to the batch
- **Overheads:** Overheads are absorbed on suitable basis e.g., percentage of direct labour, labour hour rate, etc

Economic Batch Quantity

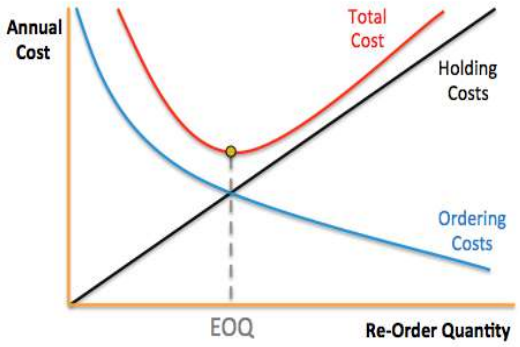
- Economic batch quantity represents the optimum size for the batch production, at which the preparation cost or holding cost is minimum.
- The EBQ includes two types of costs.
    - Machine Set Up Cost and
    - Inventory holding cost.
- If the batch size increases, there is increase in the carrying cost and a decrease in the setup cost per unit of product.
- Likewise, if the batch size decreases there is an increase in the setup cost and decrease in the carrying cost.
- Thus, there is one batch size for which total holding cost and setup cost are minimum. This is known as Economic Batch Quantity.

Formula for EBQ

$$\mathbf{EBQ} = \frac{\sqrt{\mathbf{2DS}}}{\sqrt{\mathbf{C}}}$$

Where,
D = Annual demand for the product
S = Setting up cost per batch
C = Carrying cost per unit of production

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- As can be seen in the above diagram, Costs are shown on the Y axis and Batch size or Batch Quantity is shown on the X Axis.
- With the higher batch size, holding cost shows a tendency to increase whereas Set-up costs show a declining trend.
- The point where both the cost lines intersect each other represents the lowest cost combination.
- The economic batch size or Economic Batch Quantity may be determined by calculating the total cost for a series of possible batch sizes and checking which batch size that gives the minimum cost.
- Alternatively, a formula can be derived which is similar to determination of Economic Order Quantity (EOQ).
- The objective here being to determine the production lot (Batch size) that optimizes on both set up and inventory holding cots formula.

Example:

If monthly demand of the product is 500 units
Set up cost per batch is 60rs.
Cost of manufacturing per unit is 20rs.
Rate of interest is 10%
Then

EBQ= $\sqrt{2DS/C}$

$= \sqrt{2\times500\times12\times60\div\sqrt{0.1\times20}}$

$=\sqrt{720000\div\sqrt{2}}$

$=\sqrt{360000}$

EBQ= 600 Units

4. Difference between Batch & Job Costing

Sl. No	Job Costing	Batch Costing
1.	Method of costing used for nonstandard and non-repetitive products produced as per customer specifications and against specific orders	Homogeneous products produced in a continuous production flow in lots.
2.	It is determined for each Job	It is compiled on time basis
3.	Jobs are different from each other and independent of each other. Each Job is unique.	Products produced in a batch are homogeneous and lack of individuality

Illustrations

Unit Costing

1. Illustration

The following data relate to the manufacture of a standard product during the 4- week ended 28th February 20X6:

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Particulars	Amount (Rs.)
Raw Materials Consumed	Rs.4,00,000
Direct Wages	Rs.2,40,000
Machine Hours Worked	3,200 hours
Machine Hour Rate	Rs. 40
Office Overheads (related to production activities)	10% of works cost
Selling Overheads	Rs.20 per unit
Units produced and sold	10,000 at Rs.120 each

You are required to find out the cost per unit and profit for the 4- week ended 28thFebruary 20X6.

Solution:

Statement of Cost per Unit
No. of units produced:10,000 units

Particulars	Cost per unit (₹)	Amount (₹)
Raw Materials Consumed	40.00	4,00,000
Direct Wages	24.00	2,40,000
Prime cost	64.00	6,40,000
Add: Manufacturing Overheads (3,200 hours × ₹40)	12.80	1,28,000
Works cost	76.80	7,68,000
Add: Office Overheads (10% of Works Cost)	7.68	76,800
Cost of goods sold	84.48	8,44,800
Add: Selling Overheads (10,000 units × ₹20)	20.00	2,00,000
Cost of sales / Total cost	104.48	10,44,800
Add: Profit (Bal Figure)	15.52	1,55,200
Sales	120.00	12,00,000

2. Illustration

Atharva Pharmacare Limited produced a uniform type of product and has a manufacturing capacity of 3,000 units per week of 48 hours. From the records of the company, the following data are available relating to output and cost of 3 consecutive weeks.

Week Number	Units Manufactured	Direct Material (Rs.)	Direct Wages (Rs.)	Factory Overheads (Rs.)
1	1,200	9,000	3,600	31,000
2	1,600	12,000	4,800	33,000
3	1,800	13,500	5,400	34,000

Assuming that the company charges a profit of 20% on selling price, find out the selling price per unit when the weekly output is 2,000 units.

Solution:

Working Notes:

(1) Break-up of Factory OH

Calculation of Factory Overheads - An observation of cost related to different output levels for factory overheads shall reveal 2 things:

a. Total cost increases from **₹31,000** to **₹34,000** along with increase in output from 1,200 units to 1,800 units but cost per unit is **not constant**. Thus it is **not a variable cost**. Cost per unit is reducing along with increase in output from ₹25.83 (₹31,000 ÷ 1,200 units) to ₹18.89 (₹34,000 ÷ 1,800 units)

b. Since the cost is varying with the output, it is also **not a fixed cost**. Hence, we can see that the cost is a **semi-variable cost** and has to be calculated for 2,000 units by analysing its fixed and variable components

Week Number	Units Manufactured	Factory Overheads
1	1,200	31,000
2	1,600	2,000
Difference	400	2,000

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Therefore, Variable Cost per unit = $\frac{\text{Change in Factory Overheads}}{\text{Change in outputs}} = \frac{₹3,000}{₹600}$ = ₹5per unit

Now, total factory overheads for week 1 = 31,000
Out of this, Variable Overheads = 1,200 units × ₹5 = ₹6,000
Thus, fixed component = ₹31,000 – ₹6,000 = ₹25,000

(2) Direct Material and Direct Labour cost is varying directly in proportion to units produced and shall remain same per unit of output. Thus, direct material cost is equal to ₹9000 ÷ 1200 units = **₹7.50** per unit and labour cost is equal to ₹3600 ÷ 1200 units = **₹3 per unit.**

Statement of Cost and Selling price for 2,000 units of output

Particulars	Cost per unit (₹)	Amount (₹)
Direct Materials	7.50	15,000
Direct Labour	3.00	6,000
Prime cost	10.50	21,000
Add: Factory Overheads (Refer working note-1)	17.50	35,000
Total cost	28.00	56,000
Add: Profit (20% of Sales is equivalent to 25% of Cost)	7.00	14,000
Sales	35.00	70,000

3. Illustration

Wonder Ltd. Has a capacity of 120,000 Units per annum as its optimum capacity. The production costs are as under:

Particulars	**Amount (Rs.)**
Direct Material	90 per unit
Direct Labour	60 per unit
Overheads:	
Fixed	30,00,000 per annum
Variable	100 per unit
Semi Variable	1. 20,00,000 per annum (up to 50%capacity) 2. Extra amount of 4,00,000 (for every 25% increase in capacity orpart thereof)

The production is made to order and not for stocks. If the production programme of the factory is as indicated below and the management desires a profit of Rs.20,00,000 for the year work out the average selling price at which each unit should be quoted.

- First 3 months: 50% capacity
- Remaining 9 months: 80% capacity

Ignore Administration, Selling and Distribution overheads.

Solution:

Statement of Cost Details and Total Sales Amount

Particulars	**First 3 months**	**Next 9 months**	**Total**
Capacity Utilisation (No of units)	$(\frac{₹1,20,000}{12})$ ×3×50% = 15,000	$(\frac{₹1,20,000}{12})$ ×9×80% = 72,000	87,000
Direct Material	13,50,000	64,80,000	78,30,000
Direct Labour	9,00,000	43,20,000	52,20,000
Prime Cost	22,50,000	1,08,00,000	1,30,50,000
Add: Overheads:			
- Fixed (1:3)	7,50,000	22,50,000	30,00,000
- Variable	15,00,000	72,00,000	87,00,000
Semi Variable	$(\frac{₹20,00,000}{12} \times 3)$ = 5,00,000	$(\frac{₹28,00,000}{12} \times 9)$ = 21,00,000	26,00,000

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Total cost	50,00,000	2,23,50,000	2,73,50,000
Add: Desired Profit			20,00,000
Desired Sales			2,93,50,000

Average Selling Price = $\frac{₹2,93,50,000}{87,000 \text{ units}}$ = ₹337.356

Illustrations
Batch Costing

1. Illustration

Arnav Confectioners (AC) owns a bakery which is used to make bakery items like pastries, cakes and muffins. AC use to bake at least 50 units of any item at a time. A customer has given an order for 600 muffins. To process a batch of 50 muffins, the following cost would be incurred:

Particulars	Amount (Rs.)
Direct materials	500
Direct wages	50
Oven set- up cost	150

AC absorbs production overheads at a rate of 20% of direct wages cost. 10% is added to the total production cost of each batch to allow for selling, distribution and administration overheads. AC requires a profit margin of 25% of sales value.

Determine the selling price for 600 muffins.

Solution:

Statement of cost per batch and per order and Determination of Sales Price

(No. of batch = 600 units ÷ 50 units = 12 batches)

Particulars	Cost per Batch (₹)	Total Cost (₹)
Direct Material Cost	500.00	6,000
Direct Wages	50.00	600
Oven set-up cost	150.00	1,800
Add: Production Overheads (20% of Direct wages)	10.00	120
Total Production cost	710.00	8,520
Add: S&D and Administration overheads (10% of Total production cost)	71.00	852
Total Cost	781.00	9,372
Add: Profit (1/3rd of total cost)	260.33	3,124
Selling price	1,041.33	12,496
Selling Price per unit = 1041.33÷ 50 = **₹20.83**		

2. Illustration

A jobbing factory has undertaken to supply 200 pieces of a component per month for the ensuing six months. Every month a batch order is opened against which materials and labour hours are booked at actual.

Overheads are levied at a rate per labour hour. The selling price contracted for is

Rs. 8 per piece. From the following data present the cost and profit per piece of each batch order and overall position of the order for 1,200 pieces.

Month	Batch Output	Material cost	Direct wages	Direct labour
		(Rs.)	(Rs.)	(hours)
January	210	650	120	240
February	200	640	140	280
March	220	680	150	280
April	180	630	140	270

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May	200	700	150	300
June	220	720	160	320

The other details are:

Month	Chargeable expenses (Rs.)	Direct labour (hours)
January	12,000	4,800
February	10,560	4,400
March	12,000	5,000
April	10,580	4,600
May	13,000	5,000
June	12,000	4,800

Solution:

Particulars	Jan.	Feb.	March	April	May	June	Total
Batch output (in units)	210	200	220	180	200	220	1,230
Material cost (₹)	650	640	680	630	700	720	4,020
Direct wages (₹)	120	140	150	140	150	160	860
Chargeable expenses*	600	672	672	621	780	800	4,145
Total cost (₹)	**1,370**	**1,452**	**1,502**	**1,391**	**1,630**	**1,680**	**9,025**
Sale value (₹)	1,680	1,600	1,760	1,440	1,600	1,760	9,840
Profit per batch (₹)	310	148	258	49	(30)	80	815
Total cost per unit (₹)	6.52	7.26	6.83	7.73	8.15	7.64	7.34
Profit per unit (₹)	1.48	0.74	1.17	0.27	(0.15)	0.36	0.66

Therefore, **Overall position of the order for 1,200 units**

Sales value of 1,200 units @ ₹8 per unit ₹9,600
Total cost of 1,200 units @ ₹7.34 per unit ₹8,808
Profit ₹792

*Chargeable expenses × Direct labour hours for batch / Direct labour for the month

3. Illustration

Particulars	Amount (Rs.)
Monthly demand for a product	500 units
Setting-up cost per batch	60
Cost of manufacturing per unit	20
Rate of interest	10% p.a.

Determine Economic Batch Quantity.

Solution:

Optimum batch size or Economic Batch Quantity (EBQ)

$$EBQ = \sqrt{\frac{2AS}{C}} = \sqrt{\frac{2\times6,000\times60}{2}} = 600 \text{ units}$$

Annual Requirement (A) = 6,000 Units (500 x 12)
Set up cost (S) = ₹ 60 (Given)
Carrying Cost (C) = ₹ 2 per annum (₹ 20 x 10%)

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4. Illustration

M/s. KBC Bearings Ltd. is committed to supply 48,000 bearings per annum to M/s. KMR Fans on a steady daily basis. It is estimated that it costs Rs.1 as inventory holding cost per bearing per month and that the set-up cost per run of bearing manufacture is Rs. 3,200.

1. What would be the optimum run size of bearing manufacture?
2. What would be the interval between two consecutive optimum runs?
3. Find out the minimum inventory cost?

Solution:

Optimum batch size or Economic Batch Quantity (EBQ)

EBQ = $\sqrt{\frac{2AS}{C}} = \sqrt{\frac{2\times48,000\times3,200}{12}}$ = 5060 units

Annual Requirement = 48,000 Units
Set up cost = ₹3,200 per batch
Carrying Cost = ₹12 per annum (₹1 x 12)

(i) Optimum run Size
A = 48,000 Units
EBQ (Batch Size) = 5060 units
Number of Optimum runs = $\frac{48,000}{5,060 \text{ units}}$ = 9.49/10 Batches/runs

(ii) Interval between 2 runs (in days) = 365 days ÷ 10 = 36.5 days

(iii) Minimum Inventory Cost = Average Inventory × Inventory Carrying Cost per unit per annum
Average Inventory = 5,060 units ÷ 2 = 2,530 units
= Carrying Cost = ₹12 per annum (₹1 x 12)
Minimum Inventory Holding Costs = 2,530 units × ₹12 = ₹30,360

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UNIT 3 : PROCESS AND OPERATION COSTING

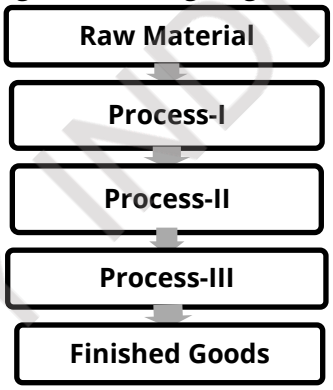
OVERVIEW

- Meaning of process and operation costing
- Treatment of process loss and gains in cost accounts
- Computation of equivalent completed production units
- Discuss the various methods of valuation of work in progress.
- Meaning and treatment of inter process profits.

1. PROCESS COSTING

- Process Costing is a method of costing which is used in the industries where the material must go through two or more processes due to the reason that o=it is being converted into the final product.
- It is defined as "a method of Cost Accounting in which costs are charged to processes or operations and averaged over units produced".
- A separate account for each process is opened and all expenditure relating to a process is charged to that process account.
- Such method of costing is useful in the manufacturing of products like steel, paper, medicines, soaps, chemicals, rubber, vegetable oil, paints, varnish etc. in which the production process is continuous and the output of one process becomes the input of the following process till completion.

This can be easily understood by using the following diagram:



Basic Features

In Industries, wherever process costing will be applied, have normally one or more of the subsequent features:

- Each plant or factory is split into several processes, cost centers or departments, and each such division is a stage of production or a process.
- Manufacturing activity is carried on regularly by means of one or more process run sequentially, selectively, or simultaneously.
- The output of one process will become the input of another process.
- The product which usually is of like units not distinguishable from one another.
- It is not possible to trace the identity of any lot of output from any lot of input materials.
- For example, in the sugar industry, it is impossible to trace any lot of sugar bags to a specific lot of sugarcane fed or vice versa.
- Production of a product might give rise to Joint and/or By-Products.

2. Costing procedure in process costing

a. Materials:

- Materials and supplies which are required for each process for drone against material requisitions note from the source.

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- Each process for which the materials are used are debited with the cost of material consumed based on information received from the cost accounting department.
- The finished product of first process generally become the raw materials of second process under such a situation the account of second process is debited with the cost of transfer from the first process and with the cost of any additional material used in the process.

b. Employee cost:

- Each process account must be debited with the labour cost or wages paid to labour to carry out the processing activities.
- Sometimes the wages paid or apportioned over the different processes after selecting appropriate basis.

c. Direct expenses

- Each process account must be debited with direct expenses such as depreciation, repairs, maintenance, insurance etc. associated with it.

Production overhead

- Expenses such as current power expenses lighting bills gas and water bills etc. are called as production overheads.
- This expense is unable to be allocated to a process.
- The suitable way out to recover them is by apportionment of them over different processes by using suitable basis.
- Usually, these expenses are estimated in advance and the process is debited with these expenses on pre-determined basis.

3. Meaning of Normal Loss / Gain & Abnormal Loss / Gain: -

- Loss of material is inherent during operation of the process.
- The loss of material under different processes arises due to reasons such as evaporation or a change in the moisture content etc.
- Process loss is defined as the material loss arising during a processing operation and it is equal to the difference between the input quantity of the material and its output.

Loss:

There are two types of material losses viz.
(i)Normal loss and (ii) Abnormal loss.

(I) Normal Process Loss:

- Normal loss is an unavoidable loss that occurs due to the inherent nature of the materials and production process under normal conditions.
- It is generally estimated based on experience of the industry.
- It may be in the form of normal wastage, normal scrap, normal spoilage, and normal defectiveness.
- If the normal loss units can be sold as a scrap, then the sale value is credited with process account.
- If some specification is required before the sale of the normal loss, then the coat of rectification is debited in the process account.
- The cost per unit of a process calculated after the adjustment of the normal loss.
- In case of normal loss, the cost per unit is calculated using the following formula.

$$\textbf{Cost of good unit} = \frac{\textbf{Total cost} - \textbf{scrap value}}{\textbf{Inpur} - \textbf{Normal loss units}}$$

(II) Abnormal Process Loss:

- Any loss caused due to unexpected abnormal condition such as plant breakdown substandard material carelessness accident etc. is termed as abnormal process loss.
- Such issues will be more than pre-determined normal issues.
- This loss is basically auditable.

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- This abnormal loss arrives when actual losses are more than the expected losses.
- Abnormal losses are calculated using the given formulae.

$$\textbf{Value of Abnormal Loss} = \frac{\textbf{Total cost} - \textbf{scrap value of Normal loss}}{\textbf{Input units} - \textbf{Normal loss in units}} \times \textbf{Units in abnormal loss}$$

- Abnormal process loss should not be allowed to affect the cost of production as it is caused by abnormal or unexpected conditions.
- Such loss which is representing the cost of materials, labour and overhead charges are called abnormal loss account.
- The sales value of the abnormal loss is credited to the abnormal loss account and the balance is written off to the costing P & L account.

Abnormal Process Gain/Yield:

- The margin which is allowed for normal loss is an estimate and mild differences are bound to occur between the actual output of a process and that anticipates.
- This difference may be positive or negative.
- If it is negative, it is called abnormal loss and if it is a positive it is abnormal gain.
- The value of the abnormal gain is calculated in the similar manner of abnormal loss.
- The process account under which abnormal gain arises is debited with the abnormal gain and it is credited to abnormal gain account which will be closed by transferring to the Costing Profit and Loss account.
- The cost of abnormal gain is computed based on the normal production.

4. Valuation of work in process

- Since in process industries production is continuous, there may be some incomplete production at the end of every accounting period.
- An incomplete unit means those units on which percentage of completion with regular to all elements of cost (i.e., material labour and overhead) is not 100%.
- Such in complete production units are called as work in progress.
- Such work in progress is valued in terms of equivalent for effective production units.

Equivalent unit

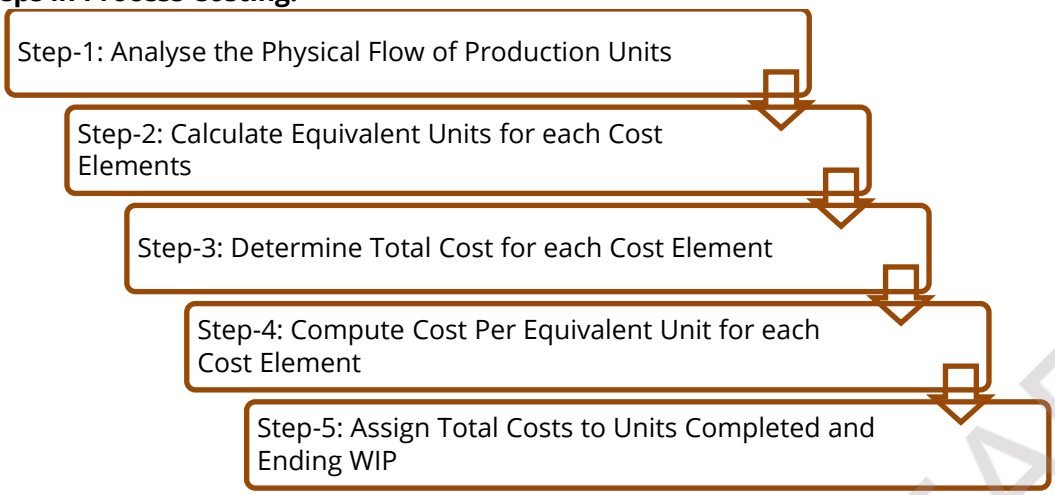
- This represents the production of process in the terms of complete units.
- In other words, it means converting the incomplete fraction into its equivalent of complete units.
- The term equivalent unit means a notional quantity of completed unit which is substituted for an actual quantity of incomplete physical units in progress when the aggregate work content of the incomplete units is deemed to be an equivalent to that of substituted quantity.
- The principle will apply when operation cost is apportioned between the work in progress and the completed units.

$$\textbf{Equivalent units of WIP} = \textbf{Actual no. of units x Percentage of work completed}$$

- Equivalent unit must be calculated separately for each element of cost (viz. material, labour, and overheads) due to the reason that the percentage of completion of the different cost component may be different.

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5. Steps in Process Costing: -



Step 1: Analysis of the physical flow of production units

- First step is to determine and analyze the number of physical units in the form of input (introduced fresh or transferred from previous process, beginning work-in-progress) and outputs (completed and work-in-process)

Step 2: Calculate equivalent units for cost element.

- Second step is to calculate equivalent units of production for each cost element that is for material, labour and overhead.
- It is calculated by taking the extent of work done in respect of each element. For example, if there are thousand units in working process at the end of the month.
- All materials are introduced at the beginning of production process. For labour and overhead 20% more work is required to get it completed.
- In this example the equivalent units of work in process in respect of material would be 1000(1000*100%complete) and for labour and overhead 800 units (1,000 units into 80% complete)

Step 3: Determination of total cost for each element

- Total cost of each cost element is collected and accumulated for the period.
- The process of cost collection has already been discussed above.

Step 4: Computation of cost per equivalent unit for each cost element

- Under this step the cost per equivalent unit for each cost element is calculated.
- The total cost is calculated in step 3 is divided by equivalent units as determined in step 2.

Step 5: Assignment of total cost to units completed and ending WIP.

- In this step the total cost for units completed, units transferred to next process, ending work in progress, abnormal loss etc. are calculated and posted in the process account and production costs report.

6. Process Costing Methods

Two methods which is used mainly for valuation of work-in-process are followed:

(i) First-in-First Out (FIFO) method.
(ii) Weighted Average (Average) method

First-in-First Out (FIFO) Method:

- Under this method the units completed and transferred include completed units of work-in-process and subsequently introduced units.
- Proportionate cost to complete the opening work-in-process and that to process the completely processed units during the period are derived separately.
- The cost of opening work-in-process is added to the proportionate cost incurred on the completion of the same to get the entire cost of such units.
- Complete cost of such units plus cost of units entirely processed, constitute the total cost of units transferred.
- In this method the closing stock of Work in process is valued at present cost.

Weighted Average (Average) Method:

- Under this method, the cost of opening work-in-process and cost of the current period are aggregated, and the aggregated cost is divided by the output in terms of the units completed.

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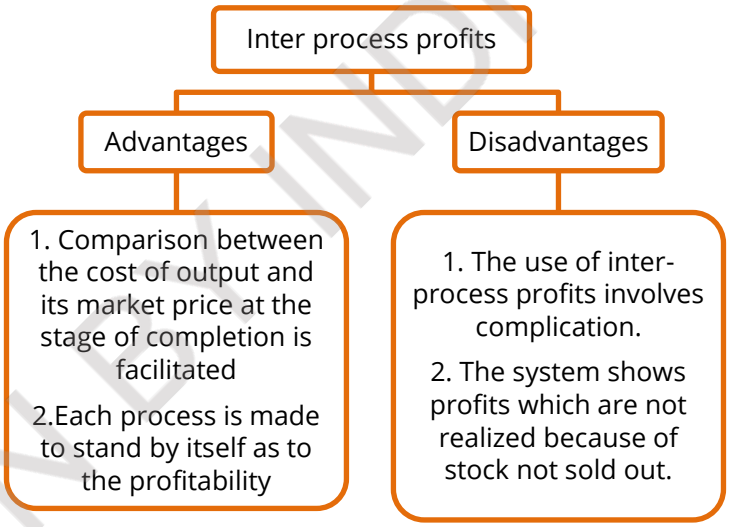
- The equivalent production in this case consists of the workload already included in opening work-in-process and workload of present period.

FIFO v/s Weighted Average Method:

The main difference between FIFO method and average method is that units of opening work in process and their cost are taken in full under average method while under FIFO method only the remaining work done now is considered.

7. Inter Process Profits:

- Generally, the output of one process is transferred to another process at cost but sometimes it is transferred at a price showing a profit to the transfer process.
- The transfer price may be made at a price corresponding to the current wholesale market price or at a cost Plus an agreed percentage.
- The advantage of this method is finding out whether the process is making profit or loss.
- This method will help the management whether to process the product or to buy the product from the market.
- If the transfer price is higher than that of the cost price, then the process account will show a profit.
- The complexity which is brought into the accounting arises from the fact that the inter process profits which is introduced will remain a part of the prices of process stocks, finished stocks and work in progress.
- The balance is unable to show the stock with profit. To avoid the complication of provision must be created to reduce the stock at actual cost prices.
- This problem arises only in respect of stock on hand at the end of the period because goods sold must have realized the internal prophets.
- The unrealized profit in the closing stock is eliminated by the creation of a stock reserve. Amount of stock reserve is calculated using the following formula.



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Illustrations

1. Illustration

From the following data, prepare process accounts indicating the cost of each process and the total cost. The total units that pass through each process were 240 for the period.

Particulars	Process I(Rs.)	Process II(Rs.)	Process III(Rs.)
Materials	1,50,000	50,000	20,000
Labour	80,000	2,00,000	60,000
Other expenses	26,000	72,000	25,000

Indirect expenses amounting to Rs.85,000 may be apportioned on the basis of wages. There was no opening or closing stock.

Solution:

Process- I Account

Particulars	Per unit (₹)	Total (₹)	Particulars	Per unit (₹)	Total (₹)
To Material	625	1,50,000	By Process -II A/c	1,150	2,76,000
To Labour	334	80,000	(Transfer to Process-II)		
To Other expenses	108	26,000			
To Indirect expenses*	83	20,000			
	1,150	**2,76,000**		**1,150**	**2,76,000**

Process- II Account

Particulars	Per unit (₹)	Total (₹)	Particulars	Per unit (₹)	Total (₹)
To Process -I A/c (Transfer From Process-I)	1,150	2,76,000	By Process -III A/c (Transfer to Process-III)	2,700	6,48,000
To Material	208	50,000			
To Labour	834	200,000			
To Other expenses	300	72,000			
To Indirect expenses*	208	50,000			
	2,700	**6,48,000**		**2,700**	**6,48,000**

Process- III Account

Particulars	Per unit (₹)	Total (₹)	Particulars	Per unit (₹)	Total (₹)
To Process -II A/c (Transfer From Process-II)	2,700	6,48,000	By Process -III A/c (Transfer to Process-III)	3,200	7,68,000
To Material	83	20,000			
To Labour	250	60,000			
To Other expenses	104	25,000			
To Indirect expenses*	63	15,000			
	3,200	**7,68,000**		**3,200**	**7,68,000**

* Apportionment of Indirect expenses among Process-I, Process-II and Process-III Total Wages to processes (I + II +III) = ₹80,000 + ₹2,00,000 + ₹60,000 = ₹3,40,000

Apportionment to:

Process- I = $\frac{₹85,000}{₹3,40,000}$ × ₹80,000 = ₹ 20,000

Process- II = $\frac{₹85,000}{₹3,40,000}$ × ₹2,00,000 = ₹ 50,000

Process- III = $\frac{₹85,000}{₹3,40,000}$ × ₹60,000 = ₹ 15,000

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2. Illustration

A product passes from Process- I and Process- II. Materials issued to Process- I amounted to Rs. 40,000, Wages Rs. 30,000 and manufacturing overheads were Rs. 27,000. Normal loss anticipated was 5% of input. 4,750 units of output were produced and transferred-out from Process-I. There were no opening stocks. Input raw material issued to Process I was 5,000 units. Scrap has no realisable value.

You are required to show –

- Process- I account,
- Value of normal loss and
- Units transferred to Process-II.

Solution:

Process- I Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Material	5,000	40,000	By normal loss	250	
To Labour		30,000	By Process -II A/c @20.42	4,750	97,000
To Overheads		27,000			
	5,000	**97,000**		**5,000**	**97,000**

*Value of Unit Transferred = $\frac{\text{Cost incurred in the Process} - \text{Realisable value of normal loss}}{\text{Input No.of Units} - \text{Normal loss}}$ x No. of Units Transferred

$= \frac{97,000-0}{5,000-250} \times 4,750$ Units $= \frac{97,000}{4,750} \times 4,750$ Units = ₹97,000

3. Illustration (Normal Loss)

A product passes from Process- I and Process- II. Materials issued to Process- I amounted to Rs. 40,000, Wages Rs. 30,000 and manufacturing overheads were Rs. 27,000. Normal loss anticipated was 5% of input. 4,750 units of output were produced and transferred-out from Process-I. There were no opening stocks. Input raw material issued to Process I was 5,000 units. Scrap has realisable value of Rs.2 per unit.

You are required to show –

- Process- I account,
- Value of normal loss and
- Units transferred to Process-II

Solution:

Process- I Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Material	5,000	40,000	By Normal Loss A/c	250*	500**
			(5% of 5,000)* (250 @₹2 per unit)**		
To Labour	--	30,000	By Process -II A/c	4750	96500
To Overheads	--	27,000	(Transfer to Process-II)		
	5,000	**97,000**		**5,000**	**97,000**

Cost of Good units = $\frac{\text{Cost incurred in the Process} - \text{Realisable value of normal loss}}{\text{Input No.of Units} - \text{Normal loss units}}$

$= \frac{97,000-500}{5,000-250} = \frac{96,500}{4,750}$ = 20.32 (approx.)

Value of Unit Transferred = 20.32 x 4,750 units = 96,520 (approx.)

(OR)

$= \frac{96,500}{4,750} \times 4,750$ Units = ₹96,500

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4. Illustration (Abnormal Loss)

A product passes from Process- I and Process- II. Materials issued to Process- I amounted to Rs. 40,000, Wages Rs. 30,000 and manufacturing overheads were Rs. 27,000. Normal loss anticipated was 5% of input. 4,550 units of output were produced and transferred-out from Process-I. There were no opening stocks. Input raw material issued to Process I was 5,000 units. Scrap has realisable value of Rs. 2 per unit.

You are required to show

- Process- I account
- value of normal loss
- abnormal loss and
- units transferred to Process-II.

Solution:

Process- I Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Material	5,000	40,000	By Normal Loss A/c	250*	500**
			(5% of 5,000)* (250 @₹2 per unit)**		
			By Abnormal Loss (Working Note 2)	200	4,063
To Labour	--	30,000	By Process -II A/c	4,550	92,437
To Overheads	--	27,000	(Transfer to Process-II)		
	5,000	**97,000**		**5,000**	**97,000**

Working Notes:

1. Cost of Good units = $\frac{\text{Cost incurred in the Process} - \text{Realisable value of normal loss}}{\text{Input No.of Units} - \text{Normal loss units}}$

$= \frac{97,000-500}{5,000-250} = \frac{96,500}{4,750}$ = 20.32 (approx.)

2. Value of Abnormal Loss Units

$= \frac{96,500}{4,750}$ × Abnormal Loss Units

$= \frac{96,500}{4,750}$ × 200 = ₹4,063

3. Value of goods transferred to Process II

$= \frac{96,500}{4,750}$ × No. of units transferred

$= \frac{96,500}{4,750}$ × 4,550 units = ₹92,437

5. Illustration (Abnormal Gain)

A product passes from Process- I and Process- II. Materials issued to Process- I amounted to Rs. 40,000, Wages Rs. 30,000 and manufacturing overheads were Rs. 27,000. Normal loss anticipated was 5% of input. 4,850 units of output were produced and transferred-out from Process-I. There were no opening stocks. Input raw material issued to Process I was 5,000 units. Scrap has realisable value of Rs. 2 per unit.

You are required to show

- Process- I account,
- value of normal loss,
- abnormal loss/ gain and
- units transferred to Process-II.

Solution:

Process- I Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)

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To Material	5,000	40,000	By Normal Loss A/c	250*	500**
To Abnormal Gain (Working Note 2)	100	2,032	(5% of 5,000)* (250 @₹2 per unit)**		
To Labour	--	30,000	By Process -II A/c	4,550	92,437
To Overheads	--	27,000	(Transfer to Process-II)		
	5,100	**99,032**		**5,100**	**99,032**

Working Notes:

1. Value of Unit Transferred = $\frac{\text{Cost incurred in the Process} - \text{Realisable value of normal loss}}{\text{Input No.of Units} - \text{Normal loss}}$ x No. of Units Transferred

$= \frac{97,000-500}{5,000-250} \times 4,850$ Units $= \frac{96,500}{4,750} \times 4,850 = 98,532$ (approx.)

2. Value of Abnormal Gain Units

$= \frac{\text{Cost incurred in the Process} - \text{Realisable value of normal los units}}{\text{Input No.of Units} - \text{Normal loss units}} = \frac{97,000-500}{5,000-250} \times 100 = ₹2,032$

Normal Loss Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Process I A/c	250	500	By Cash/Bank/Receivable Cost Ledger Control A/c	150	300
			By Abnormal Gain A/c	100	200
	250	**500**		**250**	**500**

Abnormal Gain Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Normal Loss	100	200	By Process I A/c	100	2,032
To Costing P&L	--	1,832			
	100	**2,032**		**100**	**2,032**

6. Illustration

A product passes through three processes. The output of each process is treated as the raw material of the next process to which it is transferred and output of the third process is transferred to finished stock.

Particulars	**Process I** (Rs.)	**Process-II** (Rs.)	**Process-III** (Rs.)
Materials issued	40,000	20,000	10,000
Labour	6,000	4,000	1,000
Manufacturing overhead	10,000	10,000	15,000

10,000 units have been issued to the Process-I and after processing, the output of each process is as under:

Process	**Output**	**Normal Loss**
Process-I	9,750 units	2%
Process-II	9,400 units	5%
Process-III	8,000 units	10%

No stock of materials or of work-in-process was left at the end. Calculate the cost of the finished articles.

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Solution:

Workings:

Process	Input	Actual Output	Actual Process Loss	Normal Loss (%)	Normal Loss (In Units)	Abnormal Loss	Abnormal Gain
I	10,000	9,750	250	2%	200	50	-
II	9,750	9,400	350	5%	488	-	138
III	9,400	8,000	1,400	10%	940	460	-

Process- I Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Material	10,000	40,000	By Normal Loss A/c	200	--
To Labour	--	6,000	(2% of 10,000)		
To Overheads	--	10,000	By Abnormal Loss A/c (₹5.7142 × 50 units)	50	286
			By Process -II A/c	9,750	55,714
			(Transfer to Process-II)		
	10,000	**56,000**		**10,000**	**56,000**

Cost of Good units (normal) = $\frac{\text{Cost incurred in the Process} - \text{Realisable value of normal loss}}{\text{Input No.of Units} - \text{Normal loss units}}$

$= \frac{56,000-0}{10,000-200} = \frac{56,000}{9,800}$ = ₹5.7142 per unit

Process- II Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Process-I A/c	9,750	55,714	By Normal Loss A/c	488	--
To Material	--	20,000	(5% of 9,750 units)		
To Labour	--	4,000	By Process -III A/c		
To Overheads		10,000	(Transfer to Process-III)	9,400	91,051
To Abnormal Gain (₹9.6862 ×138 units)	138	1,337			
	9,888	**91,051**		**9,888**	**91,051**

Cost of Good units (normal)= $\frac{\text{Cost incurred in the Process} - \text{Realisable value of normal loss}}{\text{Input No.of Units} - \text{Normal loss units}}$

$= \frac{89,714-0}{9,750-488}$ = ₹9.6862 per unit

Process- III Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Process-II A/c	9,400	91,051	By Normal Loss A/c	940	--
To Material	--	10,000	(10% of 9,400 units)		
To Labour	--	1,000	By Abnormal Loss A/c (₹13.8358 × 460 units)	460	6,364
To Overheads	--	15,000	By Finished Stock A/c (₹13.8358 × 8,000 units)	8,000	1,10,687
	9,400	**1,17,051**		**9,400**	**1,17,051**

Cost of Good units (normal) = $\frac{\text{Cost incurred in the Process} - \text{Realisable value of normal loss}}{\text{Input No.of Units} - \text{Normal loss units}}$

$= \frac{1,17,051-0}{9,400-940}$ = ₹13.8358 per unit

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7. Illustration

RST Limited processes Product Z through two distinct processes – Process- I and Process-II. On completion, it is transferred to finished stock. From the following information for the year 20X1-X2, prepare Process- I, Process- II and Finished Stock A/c:

Particulars	Process- I	Process- II
Raw materials used	7,500 units	--
Raw materials cost perunit	Rs. 60	--
Transfer to next process/ finished stock	7,050 units	6,525 units
Normal loss (on inputs)	5%	10%
Direct wages	Rs. 1,35,750	Rs. 1,29,250
Direct Expenses	60% of Direct wages	65% of Direct wages
Manufacturing overheads	20% of Direct wages	15% of Direct wages
Realisable value of scrapper unit	Rs. 12.50	Rs. 37.50

6,000 units of finished goods were sold at a profit of 15% on cost. Assume that there was no opening or closing stock of work-in-process.

Solution:

Process	Input	Actual Output	Actual Process Loss	Normal Loss (%)	Normal Loss (In Units)	Abnormal Loss	Abnormal Gain
I	7,500	7,050	450	5%	375	75	-
II	7,050	6,525	525	10%	705	-	180

Process- I Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Raw Material 60 × 7,500 units)	7,500	4,50,000	By Normal Loss A/c (5% of 7,500 x 12.5)	200	4,688
To Direct Wages	--	1,35,750			
To Direct Expenses (60% of Direct Wages)	--	81,450	By Abnormal Loss A/c (₹96.7947 × 75 units)	75	7,259
To Overheads (20% of Direct Wages)	--	27,150	By Process -II A/c (₹96.7947 × 7,050 units)	7,050	6,82,403
	7,500	**6,94,350**		**7,500**	**6,94,350**

Cost of Good units (normal) = $\frac{\text{Cost incurred in the Process} - \text{Realisable value of normal loss}}{\text{Input No.of Units} - \text{Normal loss units}}$

$= \frac{₹6,94,350 - ₹4,688}{7,500\text{units} - 375\text{units}} = \frac{₹6,89,662}{7,125 \text{ units}} = ₹96.7947$

Process- II Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process-I A/c	7,050	6,82,403	By Normal Loss A/c (10% of 7,050) × ₹37.5	705	26,438
To Direct wages	--	1,29,250			
To Direct expenses	--	84,013	By Finished Stock A/c (₹140.0496 × 6,525 units)	6,525	9,13,824

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To Overheads	--	19,387			
To Abnormal Gain (₹140.0496 ×180 units)	180	25,209			
	7,230	**9,40,262**		**7,230**	**9,40,262**

Cost of Good units (normal) = $\frac{\text{Cost incurred in the Process} - \text{Realisable value of normal loss}}{\text{Input No.of Units} - \text{Normal loss units}}$

$$= \frac{₹9,15,053 - ₹26,438}{7,050\text{units} - 705\text{units}} = \frac{₹8,88,615}{6,345\text{ units}} = ₹140.0496$$

Finished Stock Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Process II A/c	6,525	9,13,824	By Cost of Sales (₹140.0496 × 6,000 units)	6,000	8,40,298
			By Balance c/d (Closing stock of FG)	525	73,526
	6,525	**9,13,824**		**6,525**	**9,13,824**

Normal Loss Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Process I A/c	375	4,688	By Cash/Bank/Receivable Cost Ledger Control A/c	375	4,688
To Process II A/c	705	26,438	By Cash (₹37.5 x 525 units)	525	19,688
			By Abnormal gain (₹37.5 x 180 units)	180	6,750
	1,080	**31,126**		**1,080**	**31,126**

Abnormal Gain Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Normal Loss A/c (₹37.5 x 180 units)	180	6,750	By Process II A/c	180	25,029
To Costing P&L	--	18,459			
	180	**25,029**		**180**	**25,029**

Abnormal Loss Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Process I A/c	75	7,259	By Cash Account (₹12.5 x 75 units)	75	938
			By Costing P&L	105	6,321
	180	**7,529**		**180**	**7,529**

Costing P&L Account

Particulars	**Amount (₹)**	**Particulars**	**Amount (₹)**

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To Abnormal Loss A/c	6,321		
To Cost of Sales	8,40,298	By Abnormal Gain A/c	18,459
To Net Profit (Bal. fig.)	1,38,183	By Sales (₹8,40,298*115%)	9,66,343
	9,84,802		**9,84,802**

8. Illustration

A company produces a component, which passes through two processes.
During the month of April, 20X5, materials for 40,000 components were put into Process I of which 30,000 were completed and transferred to Process II.
Those not transferred to Process II were

1. 100% complete as to materials cost and
2. 50% complete as to labour and overheads cost.

The Process I cost incurred were as follows:

- Direct material Rs.15,000
- Direct wages Rs. 18,000
- Factory overheads Rs.12,000

Of those transferred to Process II, 28,000 units were completed and transferred to finished goods stores.
There was a normal loss with no salvage value of 200 units in Process II.
There were 1,800 units, remained unfinished in the process with

1. 100% complete as to materials and
2. 25% complete as regard to wages and overheads.

No further process material costs occur after introduction at the first process until the end of the second process, when protective packing is applied to the completed components.
The process and packing costs incurred at the end of the Process II were:

1. Packing materials Rs.4,000
2. Direct wages Rs.3,500
3. Factory overheads Rs.4,500

Required:

1. Prepare Statement of Equivalent Production, Cost per unit and Process I A/c.
2. Prepare Statement of Equivalent Production, Cost per unit and Process II A/c.

Solution:

(i) Statement Showing Equivalent No. of Units (Process I)

Particulars	**No. of Units**	**Material**		**Labour & Overheads**	
		% of Completion	Equivalent No. of Units	% of Completion	Equivalent No. of Units
Fully Completed Units	30,000	100%	30,000	100%	30,000
Closing WIP	10,000	100%	10,000	50%	5,000
	40,000		**40,000**		**35,000**

Statement showing Calculation of Cost Per unit

Particulars	**Material**	**Labour**	**Overhead**
Cost incurred (₹)	15,000	18,000	12,000
Equivalent No. of Units	40,000	35,000	35,000
Cost per Unit	0.375	0.514	0.343

Cost of fully Completed units (Transfer to Process II) = 0.375 + 0.514 + 0.343 = ₹1.232 x 30,000 = 36,960

Value of Closing WIP

Material = 10,000 x 0.375 = 3,750

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To Abnormal Loss A/c	6,321		
To Cost of Sales	8,40,298	By Abnormal Gain A/c	18,459
To Net Profit (Bal. fig.)	1,38,183	By Sales (₹8,40,298*115%)	9,66,343
	9,84,802		**9,84,802**

8. Illustration

A company produces a component, which passes through two processes.
During the month of April, 20X5, materials for 40,000 components were put into Process I of which 30,000 were completed and transferred to Process II.
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1. 100% complete as to materials and
2. 25% complete as regard to wages and overheads.

No further process material costs occur after introduction at the first process until the end of the second process, when protective packing is applied to the completed components.
The process and packing costs incurred at the end of the Process II were:

1. Packing materials Rs.4,000
2. Direct wages Rs.3,500
3. Factory overheads Rs.4,500

Required:

1. Prepare Statement of Equivalent Production, Cost per unit and Process I A/c.
2. Prepare Statement of Equivalent Production, Cost per unit and Process II A/c.

Solution:

(i) Statement Showing Equivalent No. of Units (Process I)

Particulars	**No. of Units**	**Material**		**Labour & Overheads**	
		% of Completion	Equivalent No. of Units	% of Completion	Equivalent No. of Units
Fully Completed Units	30,000	100%	30,000	100%	30,000
Closing WIP	10,000	100%	10,000	50%	5,000
	40,000		**40,000**		**35,000**

Statement showing Calculation of Cost Per unit

Particulars	**Material**	**Labour**	**Overhead**
Cost incurred (₹)	15,000	18,000	12,000
Equivalent No. of Units	40,000	35,000	35,000
Cost per Unit	0.375	0.514	0.343

Cost of fully Completed units (Transfer to Process II) = 0.375 + 0.514 + 0.343 = ₹1.232 x 30,000 = 36,960

Value of Closing WIP

Material = 10,000 x 0.375 = 3,750

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Labour = 5,000 x 0.514 = 2,570
Overhead = 5,000 x 0.343 = 1,715
Total WIP = ₹ 8,035

Process I A/c

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Material	40,000	15,000			
To Labour	--	18,000	By Process -II A/c	30,000	36,965
To Overheads	--	12,000	By Closing WIP	10,000	8,035
	40,000	**45,000**		**40,000**	**45,000**

(ii) Statement Showing Equivalent No. of Units (Process II)

Particulars	No. of Units	Material		Labour & Overheads	
		% of Completion	Equivalent No. of Units	% of Completion	Equivalent No. of Units
Fully Completed Units	28,000	100%	28,000	100%	28,000
Normal Loss	200	0%	-	0%	-
Closing WIP	1,800	100%	1,800	25%	450
	30,000		**29,800**		**28,450**

Statement Showing Calculation of Cost Per unit

Particulars	Material (other than Packing)	Labour	Overhead
Cost incurred (₹)	36,965	3,500	4,500
Equivalent No. of Units	29,800	28,450	28,450
Cost per Unit	1.240	0.123	0.158

Value of Closing WIP

Material = 1,800 x 1.240 = 2,232
Labour = 450 x 0.123 = 55
Overheads = 450 x 0.158 = 71
Total = **2,358**

Value of Finished Goods Transferred (Except Packing Cost) = 36965 + 3,500 + 4,500 – 2,358
= 42,609

Therefore, Value of Finished Goods transferred including Packing = 42,607 + 4,000
= **46,607**

Process II A/c

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process I A/c	30,000	36,965			
To Wages	--	3,500	By Normal Loss	200	--
To Overheads	--	4,500	By Finished Goods Transferred	28,000	46,607
To Packing	--	4,000	By Closing WIP	1,800	2,358
	30,000	**48,965**		**30,000**	**48,965**

9. Illustration

Opening work-in-process
1. 1,000 units (60% complete)
2. Cost Rs. 1,10,000.

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Units introduced during the period 10,000 units;
1. Cost Rs.19,30,000.
2. Transferred to next process - 9,000 units.

Closing work-in-process – 800 units (75% complete).
Normal loss is estimated at 10% of total input including units in process at the beginning.
Scraps realise Rs.10 per unit. Scraps are 100% complete.
Using FIFO method, compute equivalent production and cost per equivalent unit.
Also evaluate the output.

Solution:

Statement Showing Equivalent Number of Units (FIFO Method)

Particulars	**Input Units**	**Particulars**	**Output units**	**Equivalent Units**	
			No. of Units	**% of Completion**	
Opening W-I-P	1,000	Opening W-I-P Completion	1,000	40%	400
Units introduced	10,000	From fresh inputs	8,000	100%	8,000
	11,000	**Transferred to next process**	**9,000**		
		Normal Loss {10% (1,000 + 10,000 units)	1,100	0%	1,100
		Abnormal loss	100	100	100
		Closing W-I-P	800	75	600
	11,000		**11,000**		**9,100**

Computation of cost per equivalent production unit

Cost of the Process (for the period)	₹19,30,000
Less: Scrap value of normal loss (₹10 × 1,100 units)	(₹11,000)
Total process cost	₹19,19,000

Therefore, Cost per equivalent unit = (19,19,000/9,100 units) = 210.88

Statement of Evaluation

Particulars	**Equivalent Units**	**Cost per Equivalent Units ₹**	**Amount ₹**
(a) Opening WIP			
Cost of W-I-P at beginning	-	-	1,10,000
Add: Opening W-I-P completed during the period	400	210.88	84,352
Complete cost of 1,000 units of opening W-I-P	1,000	194.35	1,94,352
(b) Completely processed units	8,000	210.88	16,87,040
© Abnormal Loss	100	210.88	21,088

Process Explained: (Not a part of answer. Just for conceptual understanding sake)

(a) Total Units completed and Transferred is 9,000 units. Out of these 9,000 units, 1,000 units has been taken from opening WIP and the rest is from the fresh units introduced.

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(b) The opening WIP is 60% complete in respect of costs, hence, 40% more work is to be done during the period.
(c) Total cost for cost elements for the period (current period only) is accumulated.
(d) The realisable value of scrap (i.e. normal loss) is deducted from the total cost as accumulated above.
(e) Total cost less realisable value is divided by equivalent units to get cost per equivalent unit.
(f) The equivalent cost as calculated above is multiplied by the equivalent units of completely processed goods, abnormal loss and closing WIP to get the value.
(g) Cost of units completed and transferred is calculated separately for Opening WIP and fresh inputs.

(ii) Statement Showing Equivalent Number of Unts (Under Weighted Average Method)

Particulars	**Input Units**	**Particulars**	**Output units**	**Equivalent Units**	
			No. of Units	**% of Completion**	
Opening W-I-P	1,000	Opening W-I-P Completion	9,000	100	9,000
Units introduced	10,000	Normal Loss {10% (1,000 + 10,000 units)	1,100	0%	-
		Abnormal loss	100	100	100
		Closing W-I-P	800	75	600
	11,000		**11,000**		**9,100**

Computation of cost per Equivalent Units

Cost of Opening WIP	₹1,10,000
Cost of the Process (for the period)	₹19,30,000
	₹20,40,000
Less: Scrap value of normal loss (₹10 × 1,100 units)	(₹11,000)
Total Process cost	₹20,29,000

Therefore, Cost per equivalent unit = (₹2029000 / 9700 units) = ₹209.18

Statement of Evaluation

Particulars	**Equivalent Units**	**Cost per Equivalent Units ₹**	**Amount ₹**
(i) Units Completed and transferred to next process	9,000	209.18	18,82,620
(b) Abnormal Loss	100	209.18	20,918
© Closing W-I-P	600	209.18	1,25,508

Process Explained: (Not a part of solution. Just for conceptual understanding sake)

(i) Total Units completed and Transferred is 9,000 units. All the 9,000 units has been considered as equally complete in respected of cost.
(ii) Total cost for cost elements for the period and opening WIP is accumulated.
(iii) The realisable value of scrap (i.e. normal loss) is deducted from the total cost as accumulated above.
(iv) Total cost less realisable value is divided by equivalent units to get cost per equivalent unit.
(v) The equivalent cost as calculated above is multiplied by the equivalent units of completely processed goods, abnormal loss and closing WIP to get the value.

10. Illustration

Following information is available regarding Process-I for the month of February, 20X5:

Production Records

Particulars	**% Completion**	**Quantity**

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Units in process as on 1.2.20X5	All materials used, 25% complete for labour andoverhead	4,000
New units introduced	100% Complete	16,000
Units completed	100 % Complete	14,000
Units in process as on 28.2.20X5	All materials used, 33-1/3%complete for labour and overhead	6,000

Cost Records

Work-in-process as on 1.2.20X5	**Rs.**
Materials	6,000
Labour	1,000
Overhead	1,000
	8,000
Cost during the month	**Rs.**
Materials	25,600
Labour	15,000
Overhead	15,000
	55,600

Presuming that average method of inventory is used, prepare:

(i) Statement of equivalent production.
(ii) Statement showing cost for each element.
(iii) Statement of apportionment of cost.
(iv) Process cost account for Process-I

Solution:

(i) Statement Showing Computation of Equivalent No .of Units (Weighted Average Method)

Particulars	**Input Units**	**Particulars**	**Output Units**	**Equivalent Units**			
				Material		**Labour & OH**	
Opening WIP	4,000	Completed and transferred.	14,000	100	14,000	100	14,000
Finished Introduced	16,000	Closing WIP	6,000	100	6,000	33 – 1/3%	2,000
	20,000		**20,000**		**20,000**		16,000

(ii) Statement showing cost element wise

Particulars	**Material** (₹)	**Labour** (₹)	**Overhead** (₹)	**Total** (₹)
Cost of opening work-in-Process	6,000	1,000	1,000	8,000
Current Period Cost	25,600	15,000	15,000	55,600
Total Cost: (A)	31,600	16,000	16,000	63,600
Equivalent Units: (B)	20,000	16,000	16,000	
Cost Per Equivalent Units:C= (A÷B)	1.58	1	1	3.58

(iii) Statement of Evaluation (Apportionment of Cost)

Particulars	**Equivalent Units**	**Cost per Equivalent Units**	**Amount**
1. Completed & Transferred	14,000	3.58	50,120
2. Closing WIP: • Materials (6,000 units × ₹1.58)	9,480		

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• Labour (2,000 units × ₹1) • Over/heads (2,000 units × ₹1)	2,000 2,000		 13,480

(iv) **Process I A/c**

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Opening WIP	4,000	8,000			
To Material	16,000	25,600			
To Labour	--	15,000	By Process -II A/c	14,000	50,120
To Overheads	--	15,000	By Closing WIP	6,000	13,480
	20,000	**63,600**		**20,000**	**63,600**

11. Illustration

Following details are related to the work done in Process-I by XYZ Company during the month of March, 20X5:

Opening work in progress (2,000 units)	
Materials	Rs. 80,000
Labour	Rs. 15,000
Overheads	Rs. 45,000
Material introduced in Process – I (38,000 units)	
Material	Rs.14,80,000
Direct labour	Rs.3,59,000
Overheads	Rs.10,77,000

	Degree of completion
Units scrapped (3,000 units)	
Materials	100%
Labour and overheads	80%
Closing work-in process: 2,000 units	
Materials	100%
Labour and overheads	80%

Units finished and transferred to Process II: 35,000 units
Normal Loss: 5% of total input including opening work-in-process. Scrapped unit fetch Rs. 20 per piece.
You are required to prepare:
(i) Statement of equivalent production
(ii) Statement of cost
(iii) Statement of distribution cost; and
(iv) Process – I Account, Normal Loss Account and Abnormal Loss Account.

Solution:

(i) Statement Showing Computation of Equivalent No .of Units

Particulars	Input Units	Particulars	Output Units	Equivalent Units			
				Material		Labour & OH	
Opening WIP	2,000	Completed and transferred.	35,000	100	35,000	100	35,000
Fresh Introduced	38,000	Normal Loss (5% of 40,000)	2,000	-	-	-	-
		Abnormal Loss (Balancing figure)	1,000	100	1,000	80	800
		Closing WIP	2,000	100	2,000	80	1,600
	40,000		**40,000**		**38,000**		**37,400**

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(ii) Statement Showing Cost for Each Element

Particulars	**Material** (₹)	**Labour** (₹)	**Overhead** (₹)	**Total** (₹)
Cost of opening work-in-Process	80,000	15,000	45,000	1,40,000
Add: Current Period Cost	14,80,000	3,59,000	10,77,000	29,16,000
Less: Realisable value of Scrap	(40,000)	-	-	(40,000)
Process Cost: (A)	15,20,000	3,74,000	11,22,000	30,16,000
Equivalent Units: (B)	38,000	37,400	37,400	
Cost Per Equivalent Units:C= (A÷B)	₹40	₹10	₹30	₹80

(iii) Statement Showing Distribution of Cost

Particulars	**Equivalent Units**	**Cost per Equivalent Units (₹)**	**Amount (₹)**
1. Completed & Transferred	35,000	80.00	28,00,000
2. Abnormal Loss: 1000 units			
• Materials	1,000	40	
• Labour	8,00	10	
• OH	800	30	**72000**
3. Closing WIP:			
• Materials	2,000	40	
• Labour	1,600	10	
• Overheads	1,600	30	**1,44,000**

(iv) Process I A/c

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Opening WIP	2,000	1,40,000	By Normal Loss	2,000	40,000
To Material Introduced	38,000	14,80,000	By Abnormal Loss	1,000	72,000
To Labour	--	15,000	By Process -II A/c	35,000	28,00,000
To Overheads	--	10,77,000	By Closing WIP	2,000	1,44,000
	40,000	**30,56,000**		**40,000**	**30,56,000**

Normal Loss Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Process I A/c	2,000	40,000	By Cash/Bank/Cost Ledger Control		40,000
	2,000	**40,000**		**2,000**	**40,000**

Abnormal Loss Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Process I A/c	1,000	72,000	By Cash/Bank/Cost Ledger Control	1,000	20,000
			By Costing P&L		52,000
	1,000	**72,000**		**1,000**	**72,000**

12. Illustration

A Ltd. produces product 'AXE' which passes through two processes before it is completed and transferred to finished stock. The following data relate to October 20X8:

	Process-I (Rs.)	**Process- II (Rs.)**	**Finished Stock (Rs.)**
Opening stock	7,500	9,000	22,500

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Direct materials	15,000	15,750	--
Direct wages	11,200	11,250	--
Factory overheads	10,500	4,500	--
Closing stock	3,700	4,500	11,250
Inter-process profit included in opening stock	--	1,500	8,250

Output of Process- I is transferred to Process- II at 25% profit on the transfer price. Output of Process- II is transferred to finished stock at 20% profit on the transfer price. Stock in process is valued at prime cost. Finished stock is valued at the price at which it is received from process II. Sales during the period are Rs.1,40,000. Prepare Process cost accounts and finished goods account showing the profit element at each stage.

Solution:

Process - I Account

Particulars	**Total (₹)**	**Cost (₹)**	**Profit (₹)**	**Particulars**	**Total (₹)**	**Cost (₹)**	**Profit (₹)**
Opening stock	7,500	7,500	-	Process- II A/c*	54,000	40,500	13,500
Direct materials	15,000	15,000	-	Closing Stock	3,700	3,700	-
Direct wages	11,200	11,200	-				
Prime Cost	33,700	33,700					
Overheads	10,500	10,500	-				
Total Cost	44,200	44,200					
Profit**	13,500	-	13,500				
	57,700	**44,200**	**13,500**		**57,700**	**44,200**	**13,500**

*Transfer Price = $\frac{\text{Total Cost}-\text{Closing Stock}}{75\%} = \frac{44,200-3,700}{75\%}$ = ₹54,000

**Profit on Transfer = 54,000 x 25%

Process - II Account

Particulars	**Total (₹)**	**Cost (₹)**	**Profit (₹)**	**Particulars**	**Total (₹)**	**Cost (₹)**	**Profit (₹)**
To Opening stock	9,000	7,500	1,500	By Finished Stock A/c	1,12,500	75,750	36,750
Transferred from Process- I	54,000	40,500	13,500				
Direct materials	15,750	15,750	-				
Direct wages	11,250	11,250	-				
	90,000	75,000	15,000				
Less: Closing Stock*	(4,500)	(3,750)	(750)				
Prime Cost	85,500	71,250	14,250				
Overheads	4,500	4,500	-				
Total Cost	90,000	75,750	14,250				
Profit**	22,500	-	22,500				
	1,12,500	**75,750**	**36,750**		**1,12,500**	**75,750**	**36,750**

*Cost of closing stock = $\frac{75,000}{90,000}$ × ₹4,500 = ₹3,750

** Profit on Transfer = $\frac{90,000}{80\%}$ × 20% = 22,500

Therefore, Transfer Price = Total Cost + Profit = 1,12,500

Particulars	**Total (₹)**	**Cost (₹)**	**Profit (₹)**	**Particulars**	**Total (₹)**	**Cost (₹)**	**Profit (₹)**
To Opening stock	22,500	14,250	8,250	Sales	1,40,000	82,425	57,575
Transferred from Process- II	1,12,500	75,750	36,750				
	1,35,000	90,000	45,000				

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Less: Closing Stock*	(11,250)	(7,575)	(3,675)				
Cost Of Goods Sold	1,23,750	82,425	41325				
Profit (Balancing Figure)	16,250	-	16,250				
	1,40,000	**82,425**	**57,575**		**1,40,000**	**82,425**	**57,575**

*Cost of closing stock = $\frac{75,750}{1,12,500}$ × ₹11,250 = 7,575

13. Illustration (RTP Nov 22)

SM Pvt. Ltd. manufactures their products in three consecutive processes. The details are as below:

	Process A	**Process B**	**Process C**
Transferred to next Process	60%	50%	
Transferred to warehouse for sale	40%	50%	100%

In each process, there is a weight loss of 2% and scrap of 8% of input of each process. The realizable value of scrap of each process is as: Process A @ Rs. 2 per ton; Process B @ Rs. 4 per ton; Process C @ Rs. 6 per ton.
The following particulars relate to April, 2022:

	Process A	**Process B**	**Process C**
Materials used (in Tons)	1,000	260	140
Rate per ton	Rs. 20	Rs. 15	Rs. 10
Direct Wages	Rs. 4,000	Rs. 3,000	Rs. 2,000
Direct Expenses	Rs. 3,160	Rs. 2,356	Rs. 1,340

PREPARE Process Accounts- A, B and C & calculate cost per ton at each process.

Solution:

Process A Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Material	1,000	20,000	By Weight Loss	20	
To Wages	--	4,000	By Scrap	80	160
To Direct Expenses	--	3,160	By Process B A/c	540	16,200
			By Warehouse	360	10,800
	1,000	**27,160**		**1,000**	**27,160**

Cost per Tonne = $\frac{27,160-160}{1,000-20-80}$

= $\frac{27,000}{9,00}$ = ₹30 per ton

Process B Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Process A A/c	540	16,200	By Weight Loss	16	-
To Material	260	3,900	By Scrap	64	256
To Wages	--	3,000	By Process C A/c (50%)	360	12,600
To Direct Expenses	--	2,356	By Warehouse (50%)	360	12,600
	800	**25,456**		**800**	**25,456**

Cost per Tonne = $\frac{24,456-256}{800-16-64}$

= $\frac{25,200}{720}$ = ₹35 per ton

Process C Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Process B A/c	360	12,600	By Weight Loss	10	-
To Material	140	1,400	By Scrap @ ₹6	40	240
To Wages	--	2,000	By Warehouse (50%)	450	17,100

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To Direct Expenses	--	1,340			
	500	**17,340**		**500**	**17,340**

Cost per Tonne = $\frac{17,340-240}{500-10-40}$

= $\frac{17,100}{450}$ = ₹38 per ton

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UNIT 4 : JOINT PRODUCTS AND BY PRODUCTS

OVERVIEW

- Meaning of joint and by-products
- Apportionment of joint cost
- Methods of Apportionment of joint cost into joint products
- Differentiate between joint and by-products.
- Treatment of by-products cost in cost accounting

1. Meaning of Joint and by products

A. Joint products

- There are certain industries in the market where two or more products which is of equal importance are produced simultaneously, such products are termed as joint products.
- Join products does represent two or more products which is separated during the same processing operations, requiring further processing generally, each product meaning in such proportion that no single product can be designated as a major product.
- CIMA has defined it as "two or more product separated in processing, each having a sufficiently high saleable value to merit recognition as a main product".
- So joint products impose the following.
  A. Joint products are produced from same basic raw materials.
  B. They are comparatively of equal importance.
  C. They are produced by a common process simultaneously.
  D. It may require further processing after the point of separation.
- Examples of joint products are gasoline, kerosene, lubricants, tar, paraffin, diesel, and Asphalt obtained from crude oil.
- Different grades of lumber resulting from a lumbering operation are another example of joint product.

B. By-products

- By products may be defined as any "saleable or usable value which is incidentally produced in addition to the main product".
- By products means secondary or subsidiary products emerging while manufacturing the main products
- During the process of producing the main product, it frequently occurs that materials or other products emerge which are of smaller value.
- These are the by-products and even if subsequent processing improves their value, the rend result profit will be less than that from the main product; otherwise of course the by product would have become the main product and vice versa.
- For example, in oil refinery, crude oil is processed but the by-products that is the Bitumen, chemical fertilizer etc are obtained together with the main product i.e., refined oil.
- Similarly in Coke ovens, gas and tar are endlessly produced in addition to the main product coke. Therefore, Gas and tar are treated as the by-products of the coke.

C. Co products

- Co products are specific type of products which are produced in different varieties.
- These products may not necessarily emerge from the same operation or raw materials and it may be produced in different levels of quantities without any co-relation to the others as per their needs of the market.
- For example, in fan manufacturing industry, the number of co-products may be produced in different quantities for example- ceiling fan, table fan, pedestal fan, cabin fan etc.
- Similarly in automobile industry, the number co products may be produced are car, jeeps, trucks, buses etc.
- Co products are differentiated from joint products in as long as the quantities of joint products remain in the linear relationship between them.

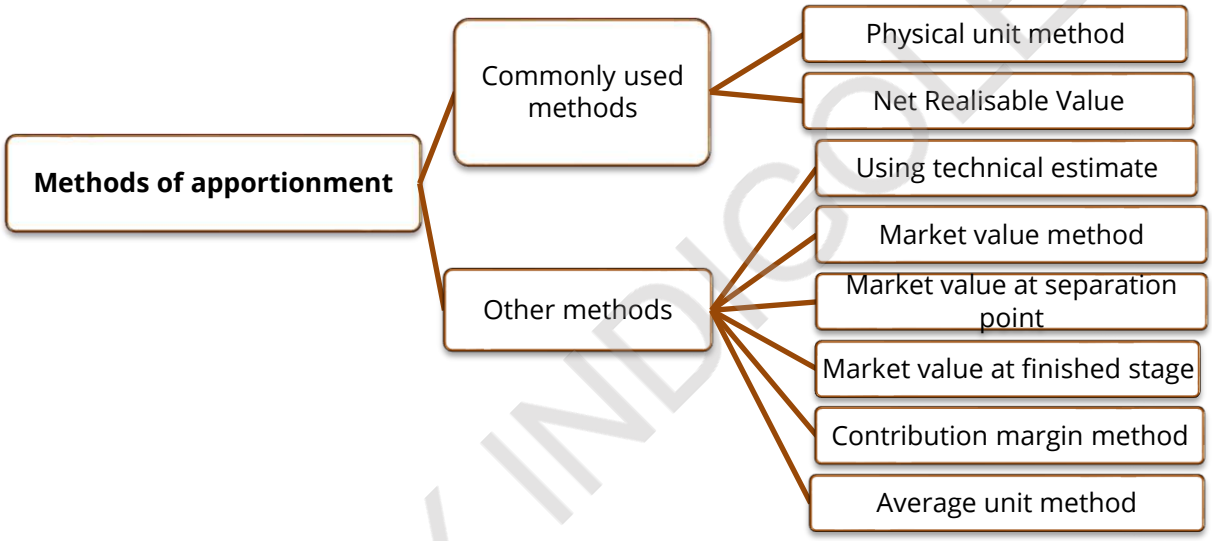
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- Whereas co products are not dependent ones and it may be produced in different quantities without any co-relationship with others.

2. Apportionment of joint cost

- Joint product costs occur in many industries such as petroleum oil refinery textiles dairy food processing and many other process industries.
- The management of business concerns requires accurate and reliable cost information related with the joint products to make managerial decisions such as to process further or to sell at split off stage.
- To arrive at either decision, it is necessary to know the share of join cause to be apportioned to the different join products.
- Joint costs are expenditures in cut off to the point of separation i.e., split off point.
- The main problem faced in the case of joint products / by product is the apportionment of this joint cost to joint products / or by products.
- For costs incurred after the split of point there is no problem as these costs can be directly allocated to individual joint products or by-products.

3. Methods of Apportionment of Joint cost to joint products



The commonly used methods of apportionment of total process cost up to the point of separation over the joint products as follows.

A. Physical unit method

- Physical base like raw materials weight or volume of products like kgs, tonnes, litres, gallons, bales, number of units etc is taken as a basis for apportioning the joint costs to products under this method.
- The process is borne by the joint products in the ratio of their output.

Advantages

- It is a simple and easy for application of the method and it is easily understandable.
- It is technically sound method.

Disadvantages

- It is equitable to allocate joint costs based on the physical weight of those without considering its sale value.
- If output is unable to be expressed in physical quantities, this method is not suitable to apply.
- Similar allocation will be made to all joint products without considering its quality.
- It is not logical to treat all products are of equal importance, desirable and valuable.

Example 1:

Joint products W, X, Y and Z are produced at a total joint production of RS 1,80,000.

Quantities produced: A – 32000 B – 25000 C – 15000 D – 18000

Product	Units	Joint production cost allocation

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A	32,000	32000×2=64,000
B	25,000	25000×2=50,000
C	15,000	15000×2=30,000
D	18,000	18000×2=36,000
	90,000	**90000×2=1,80,000**

$$\textbf{Cost per unit} = \frac{\textbf{Total joint production cost}}{\textbf{Total no of weighted units}} = \frac{1{,}80{,}000}{90{,}000} = \textbf{2 per unit}$$

B. Net Realizable Value at Split-off Point Method:

In this method of joint cost apportionment, the followings are deducted from the sales value of joint products at final stage i.e., after processing:

- Estimated profit margins,
- Selling and distribution expenses, if any, and
- Post-split- off costs.

The resultant figure so obtained is known as net realizable value of joint products. Joint costs are apportioned in the ratio of net realizable value.

Example 2:

An entity incurs a joint cost of RS 70,000 in producing 3 products A (300), B (300) and C (300) and earns a sales revenue of 90,000 by selling @ 100 per unit of product A, @ 80 per unit of B and @120 per unit of C. further processing cost for the products A and B are respectively, the joint cost can be apportioned to product A, B and C as follows

	Product A	**Product B**	**Product C**
Sale value	30000 (100×300)	24000 (80×300)	36000 (120×300)
Less: Further processing cost	8000	6000	16000
Net Realizable Value	22000	18000	20000
Apportionment of joint cost of 70,000 in the ratio (2.2:1.8:2)	31350	25650	28500

C. Using Technical Estimate:

- This method uses technical estimates to apportion the joint costs over the joint products.

D. Market value method

- In this method join costs will be apportioned to the products in the ratio of selling price of respective individual products.
- Rationale underlying this approach is that product with higher sales value should be allocated with a larger proportion of join cost than the product with lower sales value.
- This ability to absorb join costs is measured either by sale value or selling price.
- This method is advocated based on the argument that it is a convenient method for apportionment of joint cost based on the ability to observe that is if one product sales more, more cost should be allocated to it than the product with lower sale value.

E. Market value at separation point

- The market value of individual joint products at the split off point (point of separation) is ascertained and the apportionment of joint cost will be based on the ratio of market value ascertained as above.

F. Market value at finished stage

- In this method the common costs and join costs are apportioned to the joint products in the ratio of final selling price of individual products and costs incurred for further processing will be added to the respective join products for determination of product cost.

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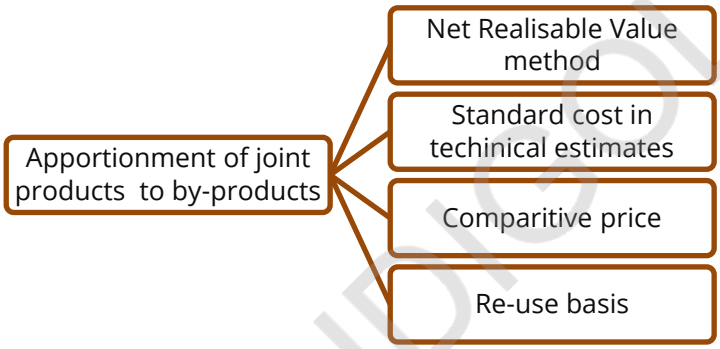
G. Contribution margin method

- Under this method the joint costs are divided into variable and fixed costs.
- The variable costs are applied to join products based on units produced or other physical quantities.
- In case the products are processed further after splitting off point then all variable cost incurred be added to the variable costs also find earlier.
- Then total variable cost will be applied to join products on the basis mentioned above and deducted from respective sales values to ask the time the contribution of each joint product.
- The fixed costs will be apportioned in the ratio of contribution made by individual products.

H. Average unit cost method

- Under this method total joint costs up to the point of separation or divided by the total units produced to get average cost per unit of production.
- This method is advocated where processes are common and in separable for the joint products and by the resultant products can be expressed in terms of common unit.

4. Methods of apportioning Joint Cost over by-products:



a. Net Realizable Value Method

- The realization on the disposal of the by-product may be deducted from the total cost of production to arrive at the cost of the main product.
- For example, the amount realized by sale of molasses in a sugar factory goes to reduce the cost of sugar produced in a factory.
- When the by-products require some additional processing and expenses are incurred in making it saleable to the best advantage of the concern, the expenses so incurred should be deducted from the total value realized from the sale of the by product and only the net realization should be deducted from the total cost of production of main product separate account should be maintained for collecting additional expenses incurred on
  - Further processing of the by products
  - Selling, distribution and administration expenses attributable to the by product.

b. Standard cost in technical estimates

- The standard may be determined by averaging costs recorded in the past and making technical estimates of the number of units of original raw material going into the main product and the number forming the by-product or by adopting some other consistent basis.
- This method may be adopted where the by-product is not saleable in the condition in which it emerges, or comparative prices of similar products are not available.

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c. Comparative price

- Value of the by-product is ascertained with reference to the price of a similar or an alternative material.
- Suppose in a large automobile plant, a blast furnace not only produces the steel required for the car bodies but also produces gas which is utilized in the factory.
- This gas can be valued at the price which would have been paid to a gas company if the factory were to buy it from outside sources.

d. Re-use basis

- In some cases, the by product may be of such a nature that it can be reprocessed in the same process as a part of the input of the process.
- In that case the value put on the by product should be same as that of materials introduced into the process.
- If, however the by product can be put into an earlier process only, the value should be the same as for the materials introduced into the process.

5. Treatment of By-Product Cost in Cost-Accounting

When they are of small total value:

- The sales value of the by-products may be credited to the Profit and Loss Account and no credit be given in the Cost Accounts.
- The credit to the Profit and Loss Account here is treated either as miscellaneous income or as additional sales revenue.
- The sale proceeds of the by-product may be treated as deductions from the total costs.
- The sale proceeds in fact should be deducted either from the production cost or from the cost of sales.

When the by-products are of considerable total value:

- The joint costs may be divided over joint products and by-products by using relative market values; physical output method (at the point of split off) or ultimate selling prices (if sold).
- If total sales value of by-products at split-off point is small, it may be treated as per the provisions discussed above under (i).
- In the contrary case, the amount realised from the sale of by-products will be.
- Considerable and thus it may be treated as discussed under (ii).

Illustrations

1. Illustration

A coke manufacturing company produces the following products by using 5,000 tons of coal @ 1,100/- per ton into a common process.

- Coke 3,500 tons
- Tar 1,200 tons
- Sulphate of ammonia 52 tons
- Benzol 48 tons

Apportion the joint cost amongst the products on the basis of the physical unit method.

Solution:

Particulars	Products					
	Coke	Tar	Sulphate of ammonia	Benzole	Wastage	Total
Output (in ton)	3,500	1,200	52	48	200	5,000
Wastage (in ton) (Refer Note-1)	146	50	2	2	-	(200)
Input (in ton)	3,646	1,250	54	50	-	5,000
Share of Joint Cost @ ₹ 1,100 per ton (₹)	40,10,600	13,75,000	59,400	55,000	-	55,00,000

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Note-1: Apportionment of wastage of 200 tons over the four products on the basis of physical weights (3,500:1,200:52:48) is as follows:

Coke: $\frac{200}{4,800}$ × 3,500 tons = 146 tons

Tar: $\frac{200}{4,800}$ × 1,200 tons = 50 tons

Sulphate of Ammonia: $\frac{200}{4,800}$ × 52 tons = 2 tons

Benzole : $\frac{200}{4,800}$ × 48 tons = 2 tons

2. Illustration (Market value at split off point)

An entity incurs a joint cost of 64,500/- in producing two products A (200 units), B (200 units) and earns a sales revenue of 86,000/- by selling product A @ 170/- per unit and product B @ 260/- per unit. Apportion the joint costs.

Solution:

Particulars	**Product – A Amount (₹)**	**Product – B Amount (₹)**
Sales Value	34,000 (₹170 × 200 units)	52,000 (₹260 × 200 units)
Appointment of Joint Cost of ₹64,500 in ratio of 34,000:52,000	25,500 $\left(\frac{34,000}{86,000} \times 64,500\right)$	39,000 $\left(\frac{52,000}{86,000} \times 64,500\right)$

3. Illustration (Market value after Further processing)

An entity incurs a joint cost of 64,500/- in producing two products A (200 units), B (200 units) and earns a sales revenue by selling @ Rs.200 per unit of product A and product B @ Rs.300 per unit. Apportion the joint costs.

Solution:

Particulars	**Product – A Amount (₹)**	**Product – B Amount (₹)**
Sales Value	40,000 (₹200 × 200 units)	52,000 (₹300 × 200 units)
Appointment of Joint Cost of ₹64,500 in ratio of 40000:60,000	25,500 $\left(\frac{40,000}{1,00,000} \times 64,500\right)$	38,700 $\left(\frac{60,000}{86,000} \times 64,500\right)$

4. Illustration (NRV Method)

An entity incurs a joint cost of 64,500/- in producing two products A (200 units), B (200 units) and earns a sales revenue of 86,000/- by selling product A @ 170/- per unit and product B @ 260/- per unit. Further processing costs for products A and B are 4,000/- and 32,000/- respectively the Joint cost can be apportioned to products A and B on the basis of Net realisable value method.

Solution:

Particulars	**Product – A Amount (₹)**	**Product – B Amount (₹)**	**Total**
Sales Revenue	34,000 (₹200 × 170 units)	52,000 (₹200 × 260 units)	86,000
Less: Post – split – off cost (Further Processing Costs)	4,000	32,000	36,000
Net Realisable Value	30,000	20,000	50,000
Appointment of Joint Cost of ₹64,500 in ratio of 30,000:20,000	38,700	25,800	64,500

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	$\left(\frac{30,000}{50,000} \times 64,500\right)$	$\left(\frac{20,000}{50,000} \times 64,500\right)$	

5. Illustration

Find out the cost of joint products A, B and C using average unit cost method from following data:

a. Pre-separation Joint Cost - 60,000/-

b. Production data:

Products	Units produced
A	500
B	200
C	300
Total	**1000**

Solution:

Average cost per Unit = $\frac{\text{Total joint costs}}{\text{Unit Produced}} = \frac{60,000}{1,000}$ = 60 per unit

The joint costs apportioned @ ₹60 are as follows:

Products	Units	Cost p.u. (₹)	Value (₹)
A	500	60	30,000
B	200	60	12,000
C	300	60	18,000
			60,000

6. Illustration

Find out the cost of joint products A and B using contribution margin method from following data:

Sales: A: 100 kg @ 60/- per kg. B: 120 kg @ 30/- per kg.

Joint costs:

- Marginal cost 4,400/-
- Fixed cost 3,900/-

Solution:

The marginal cost (variable cost) of ₹4,400 is apportioned over the joint products A and B in the ratio of their physical quantity i.e 100 : 120

- Marginal cost for Product A : (₹4,400 × $\frac{100}{220}$) = ₹2,000
- Marginal cost for Product B : (₹4,400 × $\frac{120}{220}$) = ₹2,400

The fixed cost of ₹3,900 is apportioned over the joint products A and B in the ratio of their contribution margin i.e. 40 : 12 (Refer to working note)

- Product A : ₹3,900 × $\frac{40}{52}$ = ₹3,000
- Product A : ₹3,900 × $\frac{12}{52}$ = ₹900

Particulars	Product – A (₹)	Product – B (₹)	Total (₹)
Variable	2,000	2,400	4,400
Fixed	3,000	900	3,900
Total	5,000	3,300	8,300

Working Note:

Computation of contribution margin ratio

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Products	Sales Revenue ₹	Marginal Cost ₹	Contribution ₹
A	6,000	2,000	4,000
B	3,600	2,400	12,00

Therefore, Contribution ratio is 40 : 12

7. Illustration

Inorganic Chemicals purchases salt and processes it into more refined products such as Caustic Soda, Chlorine and PVC. In the month of July, Inorganic Chemicals purchased Salt for 40,000/-. Conversion of 60,000/- were incurred up to the split off point, at which time two sealable products were produced. Chlorine can be further processed into PVC.

The July production and sales information are as follows:

	Production (in ton)	Sales Quantity (in ton)	Selling price per ton (₹)
Caustic Soda	1,200	1,200	50
Chlorine	800	—	—
PVC	500	500	200

All 800 tons of Chlorine were further processed, at an incremental cost of 20,000/- to yield 500 tons of PVC. There was no beginning or ending inventories of Caustic Soda, Chlorine or PVC in July.

There is active market for Chlorine. Inorganic Chemicals could have sold all its July production of Chlorine at 75/- per ton.

Required:

1. To calculate how joint cost of 1,00,000/- would be apportioned between Caustic Soda and Chlorine under each of following methods:

a. sales value at split- off point;
b. physical unit method, and
c. estimated net realisable value.

2. Lifetime Swimming Pool Products offers to purchase 800 tons of Chlorine in August at ₹ 75 per ton. This sale of Chlorine would mean that no PVC would be produced in August. How the acceptance of this offer for the month of August would affect operating income?

Solution:

1 (a) Sales value at split- off point method

Products	Sales (in Ton)	Selling Price per Ton (₹)	Sales Revenue (₹)	Joint Cost Apportioned (₹)
Caustic Soda	1,200	50	60,000	50,000
Chlorine	800	75	60,000	50,000
			1,20,000	1,00,000

Apportionment of joint cost

= Total joint cost × $\frac{\text{Sale revenue of each product}}{\text{Total sale value}}$ =

= Joint cost apportioned to Caustic Soda = $\frac{1,00,000}{1,20,000}$ × 60,000 = ₹50,000

= Joint cost apportioned to Chlorine = $\frac{1,00,000}{1,20,000}$ × 60,000 = ₹50,000

(b) Physical measure method

Products	Sales (in Ton)	Joint Cost Apportioned (₹)
Caustic Soda	1,200	60,000
Chlorine	800	40,000

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		100,000

Apportionment of joint cost

= Total joint cost × $\frac{\text{Physical units of each product}}{\text{Total physical value}}$

= Joint cost apportioned to Caustic Soda = $\frac{1,00,000}{2,000 \text{ tonnes}}$ × 1,200 tonnes = ₹60,000

= Joint cost apportioned to Chlorine = $\frac{1,00,000}{2,000 \text{ tonnes}}$ × 800 tonnes = ₹40,000

(c) Estimated net realisable value method:

	Caustic Soda (₹)	**Chlorine (₹) (PVC)**
Sales Revenue	60,000 (₹50 × 1,200 tons)	1,00,000 (₹200 × 500 tons)
Less: Post split-off cost (Further processing cost)	-	(20,000)
Net Realisable Value	60,000	80,000
Apportionment of Joint Cost of ₹1,00,000 in ratio of 3:4	42,857	57,143

2 Analysis of two options are as under

Option 1	**Option 2**
Accept the offer and sell Chlorine @₹75 = 800 tons @₹75 = 60,000	Reject the offer and convert chlorine into PVC: 500 tons PVC @₹200 = ₹1,00,000 Less: Further processing = (20,000) =80,000

Therefore, we can infer that there is an Incremental cost of further processing of Chlorine into PVC ₹20,000 Incremental operating income from further processing ₹20,000.
The operating income of Inorganic Chemicals will be reduced by ₹20,000 in August if it sells 800 tons of Chlorine to Lifetime Swimming Pool Products, instead of further processing of Chlorine into PVC for sale.
Therefore: Rejecting the offer is beneficial for Lifetime Swimming Pool Products.

8. Illustration

Sun-moon Ltd. produces and sells the following products:

Products	**Units**	**Selling price at split-off point (Rs.)**	**Selling price after further processing (Rs.)**
A	2,00,000	17	25
B	30,000	13	17
C	25,000	08	12
D	20,000	10	-
E	75,000	14	20

Raw material costs 35,90,000/- and other manufacturing expenses cost 5,47,000/- in the manufacturing process which are absorbed on the products on the basis of their 'Net realisable value'. The further processing costs of A, B, C and E in Rs. are 12,50,000/-; 1,50,000/-; 50,000/- and 1,50,000/- respectively. Fixed costs are 4,73,000/-.
You are required to prepare the following in respect of the coming year:
a. Statement showing income forecast of the company assuming that none of its products are to be further processed.
b. Statement showing income forecast of the company assuming that products A, B, C and E are to be processed further.

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Can you suggest any other production plan whereby the company can maximise its profits? If yes, then submit a statement showing income forecast arising out of adoption of that plan.

Solution:

Working Note:

Statement showing Apportionment of joint costs on the basis of Net Realisable Value method

Particulars	A (₹)	B (₹)	C (₹)	D (₹)	E (₹)
Sales	50,00,000 (2,00,000 units x ₹25)	5,10,000 (30,000 units x ₹17)	3,00,000 (25,000 units x ₹12)	2,00,000 (20,000 units x ₹10)	15,00,000 (75,000 units x ₹20)
Less: Further Processing Cost	(12,50,000)	(1,50,000)	(50,000)	-	(1,50,000)
Net Realisable Value	37,50,000	3,60,000	2,50,000	2,00,000	13,50,000
Apportioned Cost (₹)	26,25,000	2,52,000	1,75,000	1,40,000	9,45,000

Total joint cost = Raw material costs + Manufacturing expenses = ₹35,90,000 + ₹5,47,000 = ₹41,37,000

Apportioned Joint Cost

$$= \frac{\text{Total joint cost}}{\text{Total Net Realisable Value}} \times \text{Net Realisable Value of each Product}$$

Apportioned Joint Cost of Product A

$$= \frac{41,37,000}{59,10,000} \times 37,50,000 = ₹26,25,000$$

Apportioned Joint Cost of Product B

$$= \frac{41,37,000}{59,10,000} \times 3,60,000 = ₹2,52,000$$

Apportioned Joint Cost of Product C

$$= \frac{41,37,000}{59,10,000} \times 2,50,000 = ₹1,75,000$$

Apportioned Joint Cost of Product D

$$= \frac{41,37,000}{59,10,000} \times 2,00,000 = ₹1,40,000$$

Apportioned Joint Cost of Product E

$$= \frac{41,37,000}{59,10,000} \times 13,50,000 = ₹9,45,000$$

(a) Statement showing profits of the company assuming that everything is sold at split – off point without further processing

Particulars	A (₹)	B (₹)	C (₹)	D (₹)	E (₹)	Total (₹)
Sales	34,00,000 (₹17 × 2,00,000)	3,90,000 (₹13 × 30,000)	2,00,000 (₹8 × 25,000)	2,00,000 (₹10 × 20,000)	10,50,000 (₹14 × 75,000)	52,40,000
Less: Apportioned Joint Costs **(Refer Working note)**	26,25,000	2,52,000	1,75,000	1,40,000	9,45,000	41,37,000
	7,75,000	1,38,000	25,000	60,000	1,05,000	11,03,000
Less: Fixed Cost						(4,73,000)
Profit						6,30,000

(b) Statement showing income forecast of the company: assuming that products A, B, C and E are further processed (Refer to working note)

Particulars	A (₹)	B (₹)	C (₹)	D (₹)	E (₹)	Total (₹)
Sales	50,00,000	5,10,000	3,00,000	2,00,000	15,00,000	75,10,000

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Less: Apportioned Joint Costs **(Refer Working note)**	26,25,000	2,52,000	1,75,000	1,40,000	9,45,000	41,37,000
Further processing cost	12,50,000	1,50,000	50,000	-	1,50,000	16,00,000
	11,25,000	1,08,000	75,000	60,000	4,05,000	17,73,000
Less: Fixed Cost						(4,73,000)
Profit						13,00,000

Suggested production plan for maximising profits:

On comparing the figures of excess of revenue over cost of manufacturing in the above statements one observes that the concern is earning more after further processing of A, C and E products but is loosing a sum of ₹30,000 in the case of product B (if it is processed further). Hence the best production plan will be to sell A, C and E after further processing and B and D at the point of split off.

The profit statement based on this suggested production plan is as below:

Particulars	**A (₹)**	**B (₹)**	**C (₹)**	**D (₹)**	**E (₹)**	**Total (₹)**
Sales	50,00,000	3,90,000	3,00,000	2,00,000	15,00,000	73,90,000
Less: Apportioned Joint Costs **(Refer Working note)**	26,25,000	2,52,000	1,75,000	1,40,000	9,45,000	41,37,000
Further processing cost	12,50,000	-	50,000	-	1,50,000	14,50,000
	11,25,000	1,38,000	75,000	60,000	4,05,000	18,03,000
Less: Fixed Cost						(4,73,000)
Profit						13,30,000

Hence the profit of the company has increased by ₹30,000.

85,714

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UNIT 5 : SERVICE COSTING

OVERVIEW

- Discuss the cost accounting method for service sectors.
- State the units used in different service sectors.
- Calculate the costs for different service industries.

INTRODUCTION – SERVICE COSTING

- Service costing or operation costing is generally used in the service sector.
- When the service is not completely standardized, it is the cost of producing and monitoring a service.
- It is one type of method of costing applied to undertakings which provide service rather than production of commodities.
- Service can either be performed internally or externally.
- When Services are performed on inter departmental basis in factory itself then it is termed as internal. E.g., power houses services, canteen services etc.
- When the services are rendered to outside parties it is termed as external. Public utility services like transport, water supply, electricity supply, hospitals are best example of service costing.
- Thus, service costing is one of the methods of cost accumulations which are designed to determine the cost of services.
- Service costing is simply a variant of unit or output costing.
- Like process costing, Service costs is collected periodically.
- The cost of rendering the service for the specific period is related to quantum of services rendered during the specific period to arrive at cost per unit of service rendered.
- Therefore, the principal of unit costing is used in service costing.

Application of Service Costing:

- The service costing is applied to the operations concerned in an organisation which are used to provide services to the production departments.
- Examples of support services are Canteen and hospital for the staffs, Boiler house for supplying steam to production departments, Captive Power generation unit, operation of fleet of vehicles for transport of raw material to factory or distribution of finished goods to the market outlets, IT department services used by other departments, research & development, quality assurance, laboratory etc.
- When services are offered to outside customers as a profit centre in consonance with organizational objectives as an output like goods or passenger transport service provided by a transporter, hospitality services provided by a hotel, provision of services by financial institutions, insurance, and IT companies etc.
- All costs incurred are collected, accumulated for a certain period or volume, recorded in the cost accounting system, and then expressed in terms of a cost unit of service.

Service Costing versus Product Costing:

- Service costing differs from product costing (such as job or process costing) in the following ways due to some basic and peculiar nature.
- Unlike products, services are intangible and cannot be stored, hence, there is no inventory for the services.
- Use of Composite cost units for cost measurement and to express the volume of outputs.
- Unlike a product manufacturing, employee (labour) cost constitutes a major cost element than material cost.
- Indirect costs like administration overheads are generally have a significant proportion in total cost of a service as unlike manufacturing sector, service sector heavily depends on support services and traceability of costs to a service may not economically feasible.

1. Service cost unit And

- All the cost incurred during the period are collected and analysed and then they are expressed in terms of cost per unit of service.

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- The cost unit to be applied needs to be defined carefully and it is frequently a composite figure such as 10 kilometre per kilowatt-hour patient day etc.
- The costing should be comprehensive enough to show the effects like off season and peak season demand full-time part-time etc.
- The service costs are usually collected under the following headings.
    - standard charges (fixed cost)
    - running expenses (variable cost)

Cost per service unit = Total cost for the period ÷ Number of service units in the period

- Price for the service is fixed by adding a mark up to the cost per unit.
- The cost per unit of service is used for control of cost by comparing it month by month or period because period etc.
- Any discrepancies over the normal are investigated for corrective action.
- Operating costing is similar to output costing.
- All costs are suitably classified under fixed and variable.
- These costs are then collected, analyse and express in terms of appropriate cost unit.
- The classification of cost into fixed and variable is very important as it draws management's attention to the fixture gods to which they are committed regardless of the units of services ultimately given.
- It also indicates the change in the cost structure in the operating level.

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

Key Performance Indicator (KPI):-

Key Performance Indicators (KPIs) are the quantitative and qualitative factors which are commonly used to assess the performance of an organization which are important to achieve its goal. Like calculation of cost for a cost unit, calculation of cost or revenue per KPI helps to the performance against industry standards. For example, in case of Telecom industry Average Return per User (ARPU) is a key indicator, shows average revenue generated from a user of its services. The list below shows few important KPIs for some Service Industries:

Industry	**KPI**	**Meaning**
Transportation	Number of Shipments	This logistics metric monitors the number of orders that are shipped out of the warehouse
	Truck Turnaround Rate (Truck Turning),	The time from when a delivery truck enters the warehouse to collect or deliver products to when it exits the facility.

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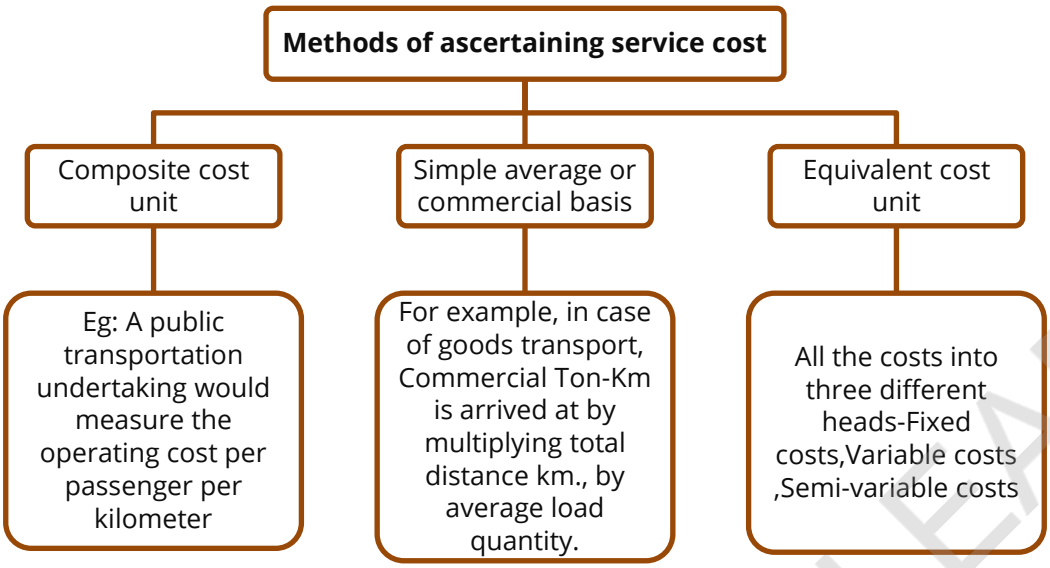
	Lead Time (Order Cycle Time)	The amount of time in between order placement by customer and receipt of order
	On-Time and In-Full (OTIF)	The number oforders delivered according to the schedule and quantity specified.
Hotel Industry	Cost per Occupied Room (CPOR)	The average cost per occupied room.
	Occupancy Rate	The ratio of rented or used rooms to the total amount of available rooms.
	Revenue per available room (RevPAR)	The average revenue per available room days.
Hospitals/ Health care Industry	Bed Occupancy Rate	The proportion of hospital beds in use at any one time.
	Staff-To-Patient Ratio	The number of staff resources present to attend to the patients in a hospital over a certain period of time.
	Average Treatment Charge	The average amount that a facility charges a patient for a treatment.
IT & ITES sector	Gross Burn Rate	The rate at which the company uses up its available cash to cover operating expenses
	Customer Acquisition Cost (CAC)	The amount it takes to attract new customers.
	Customer Lifetime Value (CLV)	The typical net profit a company generates over the entire life cycle of a single customer
	Monthly Recurring Revenue (MRR)	The amount earned each month through subscription renewals, new sales, upsells, and fluctuations on a monthly basis.
	Churn Rate	The percentage of customers that cancel their recurring subscriptions over a given time period

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	Cost Per Feature	How much a specific feature costs your business, based on usage and cloud costs.
Telecom	Average return per user (ARPU)	How much money a company is making for each person using its service.
	Subscriber acquisition cost (SAC)	Costs involved with gaining new subscribers.
	Network Operating Cost	Expenditure incurred, continual upkeep to telecom's network.
	Gross Revenue Retention (GRR)	How well a company is retaining its customers based on factors such as sales price increases, organic customer growth, and more.
Education Sector	Instructional Costs	The cost of part-time and full-time faculty members
	Tuition Costs	How much an institution is spending on administrative services on a per- student basis
	Student-to-Faculty Ratio	The number of students per faculty member, on a campus-wide basis or by department.
Insurance Sector	Average Cost Per Claim	The average cost of each claim made.
	Components of Claim Costs (CCC)	Costs which are associated with a claim like legal fees, time to settle, administration costs, and report delays.
	Cost Per Quote	The costs that the company incurs in order to get a quote in front of a potential client.
	Administrative Costs Per Policy	The cost of the policy administration to number of policies outstanding.
	Average Policy Size	The total amount of premium collected by the number of policies issued for a given time period.

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2. Methods of ascertaining service cost:



Composite Cost Unit:

- Sometime two measurement units are merged to know the cost of Service/operation.
- These are known as composite cost units. For example, a public transportation undertaking would measure the operating cost per passenger per kilometre.

Composite unit may be done in two ways.

1. Absolute (Weighted Average) basis.
2. Commercial (Simple Average) basis.

- Weighted Average or Absolute basis –It is sum of the products of qualitative and quantitative factors.
- For example, for the calculation of absolute Ton-Kilometre for a goods transport is calculated as follows.

$$\sum (\text{Weight Carried} \times \text{Distance})_1 + (\text{Weight Carried} \times \text{Distance})_2 + \ldots + (\text{Weight Carried} \times \text{Distance})_n$$

Simple Average or Commercial basis

- It is the product of average qualitative and total quantitative factors.
- For example, in case of goods transport, Commercial Ton-Km is arrived at by multiplying total distance km., by average load quantity.

Equivalent Cost Unit/ Equivalent service Unit:

- To calculate cost or pricing of two more different grades of services which uses common resources, each grade of service is assigned a weight and converted into equivalent units.
- Converting services into equivalent units make different grade of services equivalent and comparable.
- For preparing a statement of cost or a cost sheet for service sector, costs are usually collected and accumulated for a specified period viz. A month, quarter, or a year, etc.
- The cost statement for services may be prepared either based on functional classification as done for product costing or based on variability.
- Cost sheet based on variability is prepared classifying all the costs into three different heads:

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

Treatment of Depreciation- fixed or variable?

- If related to effluxion of time or calculated on time basis, will be treated as fixed.

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- However, if the depreciation is calculated based on activity level or usage, it will be treated as variable cost.

Treatment of Interest:

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

3. Costing of transport services

- In transport undertakings most of the data required for finding the cost are obtained from the logbooks and other incidental records.
- The costs are classified into fixed cost and running cost.
- The more the kilometres a vehicle travels the cheaper the cost per kilometre travelled.
- This is due to the reason that spreading of fixed cost over the number of kilometres run.
- More the number of kilometres travelled lesser will be the fixed cost per kilometre travelled.
- However, the variable cost per kilometre will not change.

Composition of costs

- Standing charges
- Running charges
- Maintenance charges

Standing charges

- License duty and insurance
- Garage cost and administrative expenses
- Wages of drivers and conductors
- Depreciation
- Tax etc.

Running (variable) cost

- Petrol or diesel
- Oil
- Greece etc.

Maintenance charges (semi variable cost)

- Repairs and maintenance
- Cost of tyres, tubes, batteries etc.
- Garage charges
- Overhauling or vehicles

Number of cost units is calculated as follows in transport costing.

Number of vehicles x capacity X distance travel x days X passengers (or weight carried)

Cost per passenger kilometre formula is,

Cost per passenger kilometre = total costs ÷ total passenger kilometres

4. Costing of hotels and lodges

- Service costing is an effective tool in respect of hotel industry.
- Hotel are run on commercial hence it is necessary to compute the cost-to fix the price of various services provided by the hotel and to find out the profit or loss at the end of a particular period.
- In this case the cost associated with the different services offered should be identified and cost per unit should be worked out.
- Cost unit may be guest -day or room day. For calculation of cost per guest day or room day, estimated occupancy rate-at different point of time for example-peak season for lien season, are considered.

5. Hospital costing

The main purpose of hospital costing is to ascertain the cost of providing medical services. For purpose of costing of hospital services can be divided into following categories:

- Outpatient department
- Casualty or emergency
- Wards

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- Medical service departments such as radiotherapy, x ray, pathology etc.
- General service departments such as power, heating, lighting, catering, laundering, medical records, and administration

Unit of cost

- Outpatient department-for outpatient
- Casualty- patient
- Wards- per patient-bed per day
- Radiotherapy-per course of treatment per day or per person
- Laundry-per 100 articles laundered.
- For ascertaining cost figures a hospital operating cost sheet is prepared

Cost segregation

- The cost of hospital can be divided into fixed costs and variable costs.
- Irrespective of the services provided, fixed costs are based on timelines.

  For example, staff salaries, depreciation on building and equipment, etc.
- Variable cost changes with the level of services rendered.

  For example, laundry charges, cost of food supplied to patients, power, etc.

Parameters in computation of total cost

Hardware and software costs involved.

- If they are identifiable with the project, then they are directly allocated to the project.
- If they are not directly identifiable with the project or not fully allocable to a project, then they are treated as service overhead.

6. Costing for IT & ITES

- Information Technology (IT) and Information Technology Enabled Services (ITES) organisations provide their customers with services or intangible products. These organisations are highly labour intensive.
- In this sector employee (labour) cost constitutes a significant portion of the total operating costs. The direct employee cost is traceable to services rendered.
- In addition to employee cost, significant overhead costs for offering the services are incurred and are classified as service overhead.

Travel and training costs

- When they are incurred for a project, then the costs are directly allocated to the project.
- If the costs are not directly identifiable with project or unable to be allocated over a number of projects, then they are treated as service overhead.

Effort costs

- Effort costs are normally identified with the project.
- They can be classified as direct cost unless otherwise specified.
- Effort costs are not simply the salaries of the software engineer or programmers who are all involved in the project.
- Organization computes the effort cost in terms of overhead costs when they take up the total cost of running the organisation and divide this by the number of productive staff.
- Therefore, the following costs are all part of the total effort cost.
  I. Cost of providing heating and lighting office space.
  II. Cost of support staff such as accountant administrator system manages cleaners and technicians.
  III. Cost of networking and communications
  IV. Cost of Central facilities such as library or recreational facilities
  V. Cost of social security and employee benefits such as pensions and health insurance etc.

7. Costing for Toll Roads

Cost Involved:

The project cost consists of following two main components:

Capital Costs:

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- The capital cost consists of cost incurred during the construction period.
- The total cost includes the cost of construction of road and other structures and consultancy charges. In addition to this cost, it also includes the cost of construction of tollbooths.

Construction expenses can be broadly classified as follows:

- Preliminary and pre-operative expenses
- Land Acquisition
- Materials
- Labour
- Overheads incurred during actual construction.
- Contingency allowance
- Interest during construction period

Operating and Maintenance Cost:

- Routine maintenance cost would be incurred once the Toll road is operational.
- Maintenance cost includes the cost of annual maintenance (routine) and periodic maintenance.
    - Annual maintenance cost includes primary maintenance of wearing surface, railings, roadside furniture, etc.
    - Periodic maintenance cost includes the cost of overlays (wearing coats), painting of railings, etc.
- Operating and Maintenance expenses can be broadly classified as follows:
    - Toll collection expenses
    - Administrative expenses for day-to-day operation.
    - Maintenance expenses, which include routing and periodic maintenance.
    - Interest expenses incurred for servicing term loans.

Build – Operate – Transfer (BOT) Approach:

- BOT is an option for the Government to outsource public projects to the private sector.
- With BOT, the private sector designs, finances, constructs and operate the facility and eventually, after specified concession period, the ownership is transferred to the Government.

Toll Rate:

- The toll rate should have a direct relation with the benefits that the road users would gain from its improvements.
- The benefits to road users are likely to be in terms of fuel savings, improvement in travel time and Good riding quality.
- To compute the toll rate following formula with rounding off to nearest multiple of five has been adopted: **User Fee = Total Distance × Toll Rate per km.**

8. Costing of educational institutions

- Educational institutions like school's colleges technical institutes for education and training are run to impact education and training to students.
- The objective of running these institutions may be not for profit or for profit.
- Like other business entities cost and management accounting is also inevitable for the sector.
- The government local body of any other organisation which provides education and training to students with an objective to benefit and upliftment of society.
- They also need cost and management accounting system for cost social benefit analysis allocation of funds and budgeting (zero based budgeting) performance measurement and evaluation etc.

Income of educational institutions

The source of income of an institute may be classified on basis of a recurrence as follows.

One-time fees

- These are the fees which are collected once in a course period or for a definite period like admission fee, development fee, annual fee etc.

Recurring fees

- Tuition fee, laboratory, computer and internet fee, library fee, training fee, amenities fee, sports, extracurricular activities fee, etc.

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- The government and other aided institutes may not be permitted to call various fees like capitation fee and development fees etc. Further, unlike the trading and manufacturing organizations, these are not free to determine fees beyond prescribed limit.

Other incomes:

- That indirect income like transport, hostel, mess and canteen for the students and staff are provided by the educational institutions normally on no profit no loss basis.

Expenditures of educational institutions

Operational costs

- The salary of teaching and non-teaching staff, laboratory maintenance charges, computer maintenance and internet charges, building maintenance, repairs and maintenance of equipment, administrative expenses, finance charges etc.

Cost centres and basis of cost allocation

- Primary or direct cost centres (like civil engineering department, mechanical engineering department etc.), Service cost centres (like laboratory, library, sports etc.), Students self-supporting service (like transport, hostel, and mess etc) administration cost centres (like research and improvement examination)

Research and development cost

- Educational institutions undertake academic research on various fields of specializations. The costs of such research including personal cost books etc. are to be collected through a cost centre approach.
- All cost incurred in that cost centre are collected and set off against the revenue generated from such research projects.
- If any balance is left out as undistributed then such balance costs can be collectively distributed to all other course cost centres as a separate cost element namely "research costs"

Cost of publication of research in other materials

- In an educational institution there will be a separate department for conducting research publication related exercise.
- The cost incurred would be directly allocated to that department.

9. Costing in insurance companies

- Insurance auto insurance industry operates in providing social security to the persons who subscribe for the policy.
- Insurance companies are broadly classified as life insurance and non-Life insurance (general insurance providers).
- Life insurances provide and to the policyholder's life for the insured value.
- The non-Life insurance is providing insurance policy holder for actual loss up to insured value for the policy.
- Insurance companies are needed to analyse it various insurance product for profitability.
- The product offered by companies may include.
  - Life insurance policy-with or without maturity benefit
  - General insurance - health, fire, property, travel insurance etc
  - other services-reinsurance, fund management-pension gratuity and other etc

Income of insurance companies

- Premium on policy (periodic or one time)
- Commission on reinsurance
- Fund administration fee and return on investment of funds etc.

Expenditure of insurance companies

- Commission paid to agents.
- Claim settlement.
- Cost of valuation
- Premium for insurance
- Legal or other costs

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- Actuarial fees
- Market and product development costs
- Administration costs
- Asset management costs etc

Method of costing in an insurance company

In ancient company, the cost object may be a product, or policy, a department, or region, and agent etc.

Activity based costing in insurance companies.

- Activity based costing (ABC) is generally used for analysing cost benefit of a product (direct product profitability), policy profitability (customer profitability analysis) etc.
- Costs which occur in insurance companies are to be identified with related activities which have caused it occurrence.
- After that costs should be reassigned from the activities to the cost objects (insurance, contracts and policies, customers, delivery channels) based on identified cost drivers.
- To identify the activities and assigning the costs are the most critical one for implementation of activity-based costing. The activities may be divided into two part i.e.
  1. Pre product development activities
  2. Post product development activities

Pre product development activities:

- These are the activities which are used to be carried out before a product is made.
- It contains of market research, product development like specification of coverage, conditions, amount of premium, insurance contract, policy forms and provision for sales channel etc.

Post product development activities:

- This activity is further classified into two parts i.e., selling of policy and processing of claims.
- Selling of policy means appointment of distribution of sales channel (direct selling or through agencies) soliciting for policy processing of applications etc processing of climb includes climb inception climb estimation claim settlement and legal actions.
- These activities costs are assigned to the products based on appropriate cost drivers.
- The cost in drivers may include no of hours spent on processing of an application and claim processing, no of application, no of policy, no of claim etc.

10. Other services-costing for powerhouses

- Engaged area in steam generation or electricity generation are commonly known as Power houses. Those power houses use the concept of service costing i.e., powerhouse costing. Service cost statement can be prepared by identifying the cost associated with the power generation or steam generation.
- Electricity generation and steam generation have different cost unit.
- Cost unit for electricity generation organization is cost per kilowatt hour - that means cost of generating 1 kilowatt of power per hour. Kwh is commonly known as a unit.

The costs are shown under the following heads.

Standing charges or fixed cost:

These are the fixed costs that remained constant irrespective of the power or steam generated. These costs include the following.

- Rent rates and taxes.
- Insurance
- Depreciation
- Salaries if paid on time (monthly) basis.
- Administration expenses etc

Variable costs or running costs:

Variable costs are generally associated with the power or steam generated. This cost includes the following.

- Fuel charges
- Water charges

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- Wages / labour charges if paid based on production.
- Any other variable costs identified.

Variable costs or maintenance costs:

These costs include the following.

- Metres
- Furnaces
- Service materials
- Tools etc.

Illustrations

1. Illustration

1. A Lorry starts with a load of 20 MT of goods from Station "A".
2. It unloads 8 MT in Station "B" and balance goods in Station "C".
3. On return trip, it reaches from Station "A" with a load of 16 MT, loaded at Station "C".

The distance between A to B, B to C and C to A are 80kms, 120 kms and 160 kms, respectively.

Compute

i. "Absolute MT-kilometre" and

ii. "Commercial MT-kilometre.

Solution:

(i) Weighted Average or Absolute basis – MT – Kilometer:

= (20 MT × 80 Kms) + (12 MT × 120 Kms) + (16 MT × 160 Kms)

= 1,600 + 1,440 + 2,560 = 5,600 MT–Kilometer

(ii) **Simple Average or Commercial basis – MT – Kilometer:**

= (80Kms + 120 Kms + 160 Kms) × $\left[\frac{20\text{MT}+12\text{MT}+16\text{MT}}{3}\right]$

= 360 Kms × 16MT = 5,760 MT–Kilometer

2. Illustration

A hotel has three types of suites for its customers, viz.,

1. Standard,
2. Deluxe
3. Luxurious

Following information is given:

Type	No. of Rooms	Room Tariff
Standard	100	-
Deluxe	50	2.5 times standard
Luxurious	30	Twice the deluxe

Compute the Room Tariff. Assume that there are 360 days a year.

Solution:

We need to convert room days into equivalent standard / deluxe / luxurious room days which can then used be used for calculation of room tariff based on actual cost & profit

(i) **Making All Rooms Equivalent to Standard Room:**

Type of Room	No. of Room Days (Occupancy Days) [360 Days/year]	Equivalent Standard Room Days
a) Standard	36,000 (100 Rooms × 360 days)	36,000
b) Deluxe	18,000 (50 Rooms × 360 days)	45,000 (18,000 × 2.5)

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c) Luxurious	10,800 (30 Rooms × 360 days)	54,000 (10,800 × 2 × 2.5)
	64,800	1,35,000

(ii) **Making All Rooms Equivalent to Luxurious Room:**

Type of Room	**No. of Room Days (Occupancy Days) [360 Days/year]**	**Equivalent Luxurious Room Days**
a) Standard	36,000 (100 Rooms × 360 days)	7,200 (36,000 × 1/5)
b) Deluxe	18,000 (50 Rooms × 360 days)	9,000 (18,000 × 1/5)
c) Luxurious	10,800 (30 Rooms × 360 days)	10,800
	64,800	27,000

3. Illustration

AXA Passenger Transport Company is running 5 buses between two towns, which are 40 kms apart. Seating capacity of each bus is 40 passengers.

Following details are available from their books, for the month of April 20X8:

Salary of Drivers, Cleaners and Conductors	24,000
Salary to Supervisor	10,000
Diesel and Other Oil	40,000
Repairs and Maintenance	8,000
Taxation and Insurance	16,000
Depreciation	26,000
Interest	20,000
	1,44,000

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

Calculate cost per passenger-kilometre.

Solution:

Working Note:

Total Passenger Kilometres = Number of Buses × Distance × Seating Capacity × Used Capacity × Number of days in the month × Number of trips.

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

= 3,60,000 Passenger-Kms

Cost per Passenger-Km = Total costs ÷ Total Passenger Kilometers

Statement of Cost per Passenger – Kilometers

Particulars	**Cost Per Month**	**Cost per Passenger – Km**
A. Standing Charges:		
Wages of Drivers, Cleaners and Conductors	24,000	
Salary to Supervisor	10,000	
Tax and Insurance	16,000	
Depreciation	26,000	
Interest	20,000	
Total Standing Charges	96,000	0.267
B. Operating Charges /Running Charges:		
Diesel and other Oil	40,000	0.111
C. Maintenance Charges		
Repairs and Maintenance	8,000	0.022

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Total	1,44,000	0.400

Cost per Passenger-Km = ₹ 0.40

4. Illustration

A Transport company has been given a 40 k.m. long route to run a bus.

1. The bus costs the company a sum of Rs. 10,00,000
2. It has been insured @ 3% per annum.
3. Annual taxes will amount to Rs. 20,000.
4. Garage Rent is Rs. 2,000 p.m.
5. Annual Repairs will be Rs. 20,000
6. The bus will be used for 5 years.
7. The driver's salary will be Rs. 3,000 p.m. and the conductor's salary will be Rs. 2,000 p.m. in addition to 10% of taking as commission (to be shared by the driver and conductor equally)
8. Cost of stationary will be Rs.1,000 per month,
9. Manager cum accountant's salary is Rs. 7,000 per month.
10. Petrol and oil will be Rs.500 per 100 kilometres
11. The bus will make 3 up and down trips carrying on an average 40 passengers on each trip
12. The bus will run on an average 25 days in a month.

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

Solution:

Working Note:

(1) Total Kilometres run per annum:

= Number of Buses × Distance × Number of days in the Month × Number of trips × 12 months

= 1 Bus × 40 kms × 25 Days × 6 Single trips (3 Trips × 2 ways) × 12 months = 72,000 kms.

(2) Total Passenger Kilometres per annum:

Total Kilometres run per annum × No. of Passengers per trip

= 72,000 Kms × 40 Seats = 28,80,000 Passenger-Kms.

(3) Petrol & oil Cost

Total Kilometres run per annum × Petrol Consumption per KM

= 72,000 Kms × $\frac{₹500}{100}$ = ₹3,60,000

(4) Loading Factor

If taking is ₹100, Then, Profit is 15% i.e ₹15

Commission is 10% i.e, ₹10

Therefore, Cost = ₹75 (Balancing fig.)

Loading = 25% on takings.

Statement of Cost per Passenger – Km

Particulars	**Cost Per Month (₹)**	**Per Passenger – Kilometer (₹)**
A. Standing Charges:		
Insurance @ 3% on ₹10,00,000	30,000	
Annual Tax	20,000	
Manager cum-accountant's salary	84,000	
Depreciation $\frac{10,00,000}{5 \text{ Years}}$	2,00,000	
Stationary	12,000	
Garage rent @2,000 per month	24,000	
	3,70,000	0.12847
B. Operating Charges /Running Charges:		
Diesel/Petrol and other Oil Charges (WN-3)	3,60,000	
Salary of Driver @₹3,000 per month	36,000	

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Salary of Conductor @₹2,000 per month	24,000	
	4,20,000	0.14583
C. Maintenance Charges		
Repairs	20,000	0.0069
Total (75%)	8,10,000	0.28125
Loading @ 25% $\left(\frac{0.28125}{75\%} \times 25\%\right)$		0.09375
Total fare per passenger - kilometer		0.37500

5. Illustration

SMC is a public school having five buses each plying in different directions for the transport of its school students. In view of a large number of students availing of the bus service, the bus works two shifts daily both in the morning and in the afternoon.

The buses are garaged in the school. The workload of the students has been so arranged that in the morning, the first trip picks up the senior students and the second trip plying an hour later picks up the junior students. Similarly, in the afternoon, the first trip drops the junior students and an hour later the second trip takes the senior student's home.

The distance travelled by each bus one way in 8 kms. The school works 25 days in a month and remains closed for vacation in May, June and December. Bus fee, however, is payable by the students for all the 12 months of the year.

The details of expenses for a year are as under:

Driver's Salary	Rs. 4,500 per month per drive
Cleaner's salary (Salary Payable for all 12 month One cleaner is employed for all the five buses	Rs. 3,500 per month
License fee, taxes etc.	Rs.8,600 per bus per annum
Insurance	Rs.10,000 per bus per annum
Repairs and maintenance	Rs. 35,000 per bus per annum
Purchase price of bus (Life of each bus - 12 years)	Rs.15,00,000 each
Scrap value	Rs.3,00,000
Diesel cost	Rs.45 per litre

Each bus gives an average mileage of 4kms per litre of diesel. Seating capacity of each bus is 50 students. The seating capacity is fully occupied during the whole year. Students picked up and dropped within a range up to 4 kms. of distance from the school are charged half fare and 50% of the students travelling in each trip are in this category. Ignore interest.

Since the charges are to be based on average cost; you are required to:

a. Prepare a statement showing the expenses of operating a single bus and the fleet of five buses for a year.
b. Work out the average cost per student per month in respect of:
    (i) Students coming from a distance of up to 4 kms. from the school and
    (ii) Students coming from a distance beyond 4 kms. from the school.

Solution:

Working Notes:

1. Equivalent No. of Students per Bus per Trip

Types of Students	**No. of Students**	**Equivalent Full fare Students**
(a) Within 4 Kms	25 (50% of 50 seats)	12.50 (25 × 50%)
(b) Beyond 4 Kms	25 (50% of 50 seats)	25 (25 × 100%)
Per bus / Per trip	50	37.50
Total number of students	100	75

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per bus (2 trips)	(50 × 2)	(37.50 × 2)

2. Calculation of Diesel cost per bus:

Distance travelled in a year = (8 round trip × 8 km. × 25 days × 9 months p.a.)

= Distance travelled p.a. = 14,400 km per bus p.a.

Therefore, No. of diesel required = $\frac{14{,}400\ \text{Kms}}{4\text{kmpl}}$ = 3,600 ltrs.

Therefore, Diesel Cost = 3,600 ltrs. × ₹45 = ₹1,62,000 per bus per annum

(a) Statement Showing cost per bus p.a. and for the entire fleet p.a.

Particulars	**Cost per bus per Annum (₹)**	**Cost for a fleet of 5 buses p.a. (₹)**
A. Standing Charges:		
Driver's salary (4,500 p.m.)	54,000	2,70,000
Cleaner's salary (3,500 p.m.)	8,400	42,000
Licence fee, taxes etc. (8,600 p.a.)	8,600	43,000
Insurance (10,000 p.a.)	10,000	50,000
Depreciation $\left(\frac{15{,}00{,}000 - 3{,}00{,}000}{12\ \text{yrs}}\right)$ 1,00,000 p.a.	1,00,000	5,00,000
B. Maintenance Charges:		
Repairs & maintenance (35,000 p.a.)	35,000	1,75,000
C. Operating Charges:		
Diesel (Working Note 2)	1,62,000	8,10,000
Total cost p.a.	3,78,000	18,90,000
Cost per month	31,500	1,57,500

(b) Equivalent no. of full fare students	75
Cost per month per equivalent full fare student	₹ 420 (31,500/75)
Therefore, average cost per student per month beyond 4 kms (full fare)	**₹ 420**
Average cost per student per month within 4 kms (half fare)	**₹ 210 (420/2)**

6. Illustration

Global Transport Ltd. charges Rs. 90 per ton for its 6 tons truck lorry load city 'A' to city 'B'. The charges for the return journey are Rs. 84 per ton. No concession or reduction in these rates is made for any delivery of goods at intermediate station 'C'.

In January 2019 the truck made 12 outward journeys for city 'B' with full load out of which 2 tons were unloaded twice in the way at city 'C'. The truck carried a load of 8 tons in its return journey for 5 times but once caught by police and Rs.1,200 was paid as fine. For the remaining trips the truck carried full load out of which all the goods on load were unloaded once at city 'C'.

The distance from city A' to city 'C' and city 'B' are 140 kms and 300 kms respectively.

Annual fixed costs and maintenance charges are Rs. 60,000 and Rs. 12,000 respectively. Running charges spent during January, 20X9 are Rs. 2,944.

You are required to find out the cost per absolute ton-kilometer and the profit for January 20X9.

Solution:

Working Notes:

1. Absolute ton Kms.

Outward Journey

10 trips × 6 tons × 300 Kms (A to B)	18,000 Ton - Kms
2 trips × 6 tons × 140 Kms (A to C)	1,680 Ton - Kms
2 trips × 4 tons × 160 Kms (C to B)	1,280 Ton - Kms

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	20,960

Return Journey

5 trips × 8 tons × 300 Kms (B to A)	12,000 Ton - Kms
6 trips × 6 tons × 300 Kms (B to A)	10,800 Ton - Kms
1 trip × 6 tons × 160 Kms (C to B)	960 Ton - Kms
	23,760

Total ton Kms (Absolute) = 44,720 Ton – Kms

Note: ₹1,200 paid as fine is an abnormal item and hence will be taken only into Profit and Loss A/c

Calculation of Total monthly cost and cost per ton – Kms

Particulars	**Amount Per month**
(i) Standing charges @ 60,000 p.a.	5,000
(ii) Running Charges	2,944
(iii) Maintenance Charges @ 12,000 p.a.	1,000
Total Cost	8,944

Therefore, Cost per absolute ton – Kms = $\frac{₹8,944}{44,720\ \text{ton–Km}}$ = ₹0.20 / ton Km

Calculation of Profits:

Particulars	**Amount (₹)**
Revenue:	
(a) Outward Journey (₹90/ton × 6 ton × 12 trips)	6,480
(b) Return Journey (₹84/ton × 8 ton × 5 trips) (₹84/ton × 6 ton × 7 trips)	3,360 3,528
	13,368
Less: Total Cost	8,944
Fine	1,200
Profit	**3,224**

7. Illustration

Mr. X owns a bus which runs according to the following schedule:

(i) Delhi to Chandigarh and back, the same day.
- Distance covered: 250 kms. one way.
- Number of days run each month: 8
- Seating capacity occupied: 90%

(ii) Delhi to Agra and back, the same day.
- Distance covered: 210 kms. one way.
- Number of days run each month: 10
- Seating capacity occupied: 85%

(iii) Delhi to Jaipur and back, the same day.
- Distance covered: 270 kms. one way.
- Number of days run each month: 6
- Seating capacity occupied: 100%

(iv) Following are the other details:

Cost of the bus	Rs. 12,00,000
Salary of the Driver	Rs. 24,000 p.m.
Salary of the Conductor	Rs, 21,000 p.m.
Salary of the part-time Accountant	Rs, 5,000 p.m.
Insurance of the bus	Rs, 4,800 p.a.

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Diesel consumption 4 km. per litre at	Rs, 56 per litre
Road tax	Rs, 15,915 p.a.
Lubricant oil	Rs, 10 per 100 km.
Permit fee	Rs, 315 p.m.
Repairs and maintenance	Rs, 1,000 p.m.
Depreciation of the bus	@ 20% p.a.
Seating capacity of the bus	50 persons.

Passenger tax is 20% of the total takings.
Calculate the bus fare to be charged from each passenger to earn a profit of 30% on total takings.
The fares are to be indicated per passenger for the journeys:

(i) Delhi to Chandigarh
(ii) Delhi to Agra and
(iii) Delhi to Jaipur

Solution:

Working Notes:

1. Calculation of Distance (in Kms)

Distance one ways × 2 ways × No. of days per month = Total Km. per month
(i) Delhi to Chandigarh = 250 Kms × 2 ways × 8 days = 4,000 Kms
(ii) Delhi to Agra = 210 Kms × 2 ways × 10 days = 4,200 Kms
(iii) Delhi to Jaipur = 270 Kms × 2 ways × 6 days = 3,240 Kms
Total No. of Kms =11,440 Kms

2. No. of Passenger Kms

No of Kms × No. of Trips × Occupancy

(i) Delhi to Chandigarh = 4,000 Kms × 50 seats × 90% = 1,80,000 Passenger Kms
(ii) Delhi to Agra = 4,200 Kms × 50 seats × 85% = 1,78,500 Passenger Kms
(iii) Delhi to Jaipur = 3,240 Kms × 50 seats × 100% = 1,62,000 Passenger Kms
Total Passenger Kms = 5,20,500

3. Statement Showing cost

Particulars	**Amount (₹)**	**Amount (₹)**
A. Standing Charges:		
Salary to driver	24,000	
Salary to conductor	21,000	
Salary of part-time accountant	5,000	
Insurance (₹ 4,800 ÷12)	400	
Road tax (₹ 15,915 ÷12)	1,326.25	
Permit fee	315	
Depreciation {(₹ 12,00,000 × 20%) ÷ 12}	20,000	72,041.25
(B) Running Cost		
Diesel {(11,440 km ÷ 4 km) × ₹ 56}	1,60,160	
Lubricant oil {(11,440 km ÷ 100) × ₹ 10}	1,144	1,61,304
(C) Maintenance Costs:		
Repairs & Maintenance		1,000
Total costs (Other than Passenger Tax)		2,34,345.25

*Let, total takings be X then,
X = Total costs per month before passenger tax + 0.2 X (passenger tax) + 0.3 X (profit)
X = ₹ 2,34,345.25 + 0.2 X + 0.3 X

0.5 X = ₹ 2,34,345.25 or, X = ₹4,68,690.50 $\left(\frac{₹\ 2,34,345.25}{.50}\right)$

Therefore, Passenger Tax = 20% of ₹4,68,690.50 = ₹ 93,738.10

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Profit = 30% of ₹4,68,690.50 = ₹ 1,40,607.15

Therefore, Takings per Passenger per Kms = $\frac{\text{Total Takings}}{\text{No.of Passenger Kms}}$

$= \frac{₹4,68,690.5}{5,20,500}$ = ₹ 0.90

Bus fare to be charged per passenger

(i) Delhi to Chandigarh = ₹ 0.90 × 250 km = ₹ 225.00

(ii) Delhi to Agra = ₹ 0.90 × 210 km = ₹ 189.00

(iii) Delhi to Jaipur = ₹ 0.90 × 270 km = ₹ 243.00

8. Illustration

A company runs a holiday home. For this purpose, it has hired a building at a rent of Rs.10,000 per month along with 5% of total taking. It has three types of suites for its customers, viz., single room, double rooms and triple rooms.

Following information is given:

Type of Suite	Number	Occupancy (%)
Single Rooms	100	100
Double Rooms	50	80
Triple Rooms	30	60

The rent of double rooms suite is to be fixed at 2.5 times of the single room suite and that of triple rooms suite as twice of the double rooms suite.

The other expenses for the year 2013 are as follows:

	Rs.
Staff salaries	14,25,000
Room attendants' wages	4,50,000
Lighting, heating and power	2,15,000
Repairs and renovation	1,23,500
Laundry charges	80,500
Interior decoration	74,000
Sundries	1,53,000

Provide profit @ 20% on total taking and assume 360 days in a year. You are required to calculate the rent to be charged for each type of suite.

Solution:

Working Notes:

1. Calculation of Occupancy (No. of Room Days)

Single Room suites = 100 rooms × 360 days × 100% Occupancy = 36,000 Room days

Double Rooms suites = 50 rooms × 360 days × 80% Occupancy = 14,400 Room days

Triple Rooms suites = 30 rooms × 360 days × 60% Occupancy = 6,480 Room days

2. Equivalent single room suites (Room-days)

Type of Room	Normal Occupancy Room Days	Factor	Equivalent single room days
Single Room suites	36,000	1	36,000
Double rooms suites	14,400	2.5 times	36,000
Triple rooms suites	6,480	5 times (2 × 2.5 times)	32,400
			1,04,400

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3. Statement Showing Total Cost (Except for variable Building Rent)

	(₹)
Staff Salaries	14,25,000
Room attendant's Wages	4,50,000
Lighting Heating and Power	2,15,000
Laundry Charges	80,500
Interior Decoration	74,000
Sundries	1,53,000
Building Rent (Other than 5% of takings) (10,000 × 12 months)	1,20,000
Total Cost	26,41,000

Given, Profit is 20% of total takings
∴ Total takings = ₹26,41,000 + 25% (5% +20%) of total takings
Assume taking per single room day to be 'X'
Then 1,04,400 X = 26,41,000 + (0.25 × 1,04,400 X)
∴ 1,04,400 X = 26,41,000 + 26,100 X => 78,300 X = 26,41,000
∴ X = ₹33.73
i.e., Rent to be charged for single room suite = ₹33.73

Rent to be Charged:
Single room = X = ₹33.73
Double Rooms = 33.73 × 2.5 X = ₹84.33
Triple Rooms Suites = ₹33.73 × 5X = ₹168.65

9. Illustration

A lodging home is being run in a small hill station with 100 single rooms. The home offers concessional rates during six off- season months in a year. During this period, half of the full room rent is charged. The management's profit margin is targeted at 20% of the room rent.
The following are the cost estimates and other details for the year ending on 31st March 20X9. [Assume a month to be of 30 days].

1. Occupancy during the season is 80% while in the off- season it is 40% only.
2. Total investment in the home is Rs.200 lakhs of which 80% relate to buildings and balance of furniture and equipment
3. Expenses:
    - Staff salary [Excluding room attendants] Rs.5,50,000
    - Repairs to building Rs.2,61,000
    - Laundry and linen Rs.80,000
    - Interior and tapestry Rs.1,75,000
    - Sundry expenses Rs.1,90,800
4. Annual depreciation is to be provided for buildings @ 5% and on furniture and equipment @ 15% on straight-line basis.
5. Room attendants are paid Rs. 10 per room day on the basis of occupancy of the rooms in a month.
6. Monthly lighting charges are Rs.120 per room, except in four months in winter when it is Rs.30 per room and this cost is on the basis of full occupancy for a month.

You are required to work out the room rent chargeable per day both during the season and the off-season months on the basis of the foregoing information.

Solution:

Working Notes:

1. No. of room days in a year

Season = 100 Rooms × 80% × 6 months × 30 days in a month = 14,400 Room Days
Off-season = 100 Rooms × 40% × 6 months × 30 days in a month = 7,200 Room Days
Total Room Days = 14,400 + 7,200 = 21,600 Room Days

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2. Equivalent Full Room days

Type of Room	Normal Occupancy Room Days	Factor	Equivalent Full room days
Season	14,400	1	14,400
Off-season	7,200	0.50	3,600
			18,000

3. Statement Showing Total Costs

	(₹)
Staff salary	5,50,000
Repairs to building	2,61,000
Laundry & Linen	80,000
Interior	1,75,000
Sundries Expenses	1,90,800
Depreciation:	
- Building (₹200 Lakhs × 80% × 5%)	8,00,000
- Furniture & Equipment (₹200 Lakhs × 20% × 15%)	6,00,000
Room attendant's charges (₹10 × 21,600 Room Days)	2,16,000
Lighting Charges:	
Non – winter - Season (6 months) 100 rooms × 80% × 6 months × ₹120 per month	57,600
- Off-season (2 months) 100 rooms × 40% × 2 months × ₹120 per month	9,600
Winters - off season (4 months) 100 rooms × 40% × 4months × ₹30 per month	4,800
Total Cost (80%)	29,44,800
Profit (20% on sales) $\frac{₹\ 29,44,800}{80\%}$ × 20%	7,36,200
Sales (100%) $\frac{₹\ 29,44,800}{80\%}$ × 100%	36,81,000

Therefore, Room Rent per day:

Total Cost / Equivalent Full Room days

Full Room days (Season) = $\frac{₹\ 36,81,000}{18,000}$ = ₹204.50

Off season = 50% = ₹204.50 × 50% = ₹102.25

10. Illustration

ABC Hospital runs a Critical Care Unit (CCU) in a hired building. CCU consists of 35 beds and 5 more beds can be added, if required.

Rent	Rs.75,000 per month
Supervisors – 2 persons	Rs.25,000 per month each
Nurses – 4 persons	Rs.20,000 per month each
Ward boys – 4 persons	Rs.5,000 per month each

Doctors paid Rs. 2,50,000 per month – paid on the basis of number of patients attended and the time spent by them.

Other expenses for the year are as follows:

Repairs (Fixed)	Rs.81,000
Food to Patients (Variable)	Rs.8,80,000
Other Services to patients (Variable)	Rs.3,00,000
Laundry Charges (Variable)	Rs.6,00,000
Medicines (Variable)	Rs.7,50,000

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Other Fixed Expenses	Rs.10,80,000
Administrative expenses allocated	Rs.10,00,000

It was estimated that for 150 days in a year 35 beds are occupied and for 80 days only 25 beds are occupied. The hospital hired 750 beds at a charge of Rs.100 per bed per day, to accommodate the flow of patients. However, this does not exceed more than 5 extra beds over and above the normal capacity of 35 beds on any day.

You are required to –

a. Calculate profit per Patient day, if the hospital recovers on an average Rs.2,000 per day from each patient
b. Find out Breakeven point for the hospital.

Solution:

Working Notes:

1. Calculation of No. Of Patient Days

35 Beds × 150 days = 5,250 Patient Days
25 Beds × 80 days = 2,000 Patient Days
Extra beds = 750 Patient Days
Total = 8,000 Patient Days

2. Statement Showing Cost

Particulars	**Amount (₹)**	**Amount (₹)**
Variable Costs:		
Doctor Fees (₹2,50,000 per month × 12)	30,00,000	
Food to Patients (Variable)	8,80,000	
Other services to patients (Variable)	3,00,000	
Laundry charges (Variable)	6,00,000	
Medicines (Variable)	7,50,000	
Bed Hire Charges (₹100 × 750 Beds)	75,000	
Total Variable costs		56,05,000
Fixed Costs:		
Rent (₹75,000 per month × 12)	9,00,000	
Supervisor (2 persons × ₹25,000 × 12)	6,00,000	
Nurses (4 persons × ₹20,000 × 12)	9,60,000	
Ward Boys (4 persons × ₹5,000 × 12)	2,40,000	
Repairs (Fixed)	81,000	
Other fixed expenses	10,80,000	
Administration expenses allocated	10,00,000	
Total Fixed Costs		48,61,000
Total Cost		1,04,66,000
Collection from Patients (₹2,000 per patient per day × 8,000 patient days)		1,60,00,000
Profit		55,34,000

Therefore, Profit per Patient Day = $\frac{₹\ 55,34,000}{8,000}$ = 671.75

2. Breakeven Point per patient day

Contribution = Sales – Variable Cost
= 1,60,00,000 - 56,05,000
= ₹1,03,95,000

Therefore, Contribution per patient day = $\frac{₹\ 1,03,95,000}{8,000}$
= ₹1,299.375

Therefore, Break – Even Point = $\frac{\text{Fixed Cost}}{\text{Contribution per Patient day}}$

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$$= \frac{₹48,61,000}{₹1,299.375} = 3{,}741 \text{ patient days}$$

11. Illustration

Following are the data pertaining to Infotech Pvt. Ltd, for the year 20X8-X9:

	Amount (Rs.)
Salary to Software Engineers (5 persons)	15,00,000
Salary to Project Leaders (2 persons)	9,00,000
Salary to Project Manager	6,00,000
Repairs & maintenance	3,00,000
Administration overheads	12,00,000

The company executes a Project XYZ, the details of the same as are as follows:

1. Project duration – 6 months
2. One Project Leader and three Software Engineers were involved for the entire duration of the project, whereas Project Manager spends 2 months' efforts, during the execution of the project.
3. Travel expenses incurred for the project – Rs. 1,87,500
4. Two Laptops were purchased at a cost of Rs. 50,000 each, for use in the project and the life of the same is estimated to be 2 years.

Prepare Project cost sheet.

Solution:

Project Cost Sheet

Particulars	**Amount (₹)**
Salary of Software Engineers $\left(\frac{₹\ 15,00,000}{5\ \text{Persons}} \times 3\ \text{Persons} \times \frac{6}{12}\right)$	4,50,000
Salary of Project Leaders $\left(\frac{₹\ 9,00,000}{2\ \text{Persons}} \times 1\ \text{Persons} \times \frac{6}{12}\right)$	2,25,000
Salary of Project Manager $\left(6,00,000 \times \frac{6}{12}\right)$	1,00,000
Travel Expenditure	1,87,500
Laptop Cost (Depreciation) ₹50,000 × 2 Laptops × $\frac{6}{24\ \text{Months}}$	25,000
Overheads:	
- Repairs & Maintenance $\left(3,00,000 \times \frac{7,75,000}{30,00,000}\right)$	77,500
- Administration Expenses $\left(2,00,000 \times \frac{7,75,000}{30,00,000}\right)$	3,10,000
Total Project Cost	**13,75,000**

12. Illustration

BHG Toll Plaza Ltd built a 60 km. long highway and now operates a toll plaza to collect tolls from passing vehicles using the same. The company has invested Rs.600 crore to build the road and has estimated that a total of 60 crore vehicles will be using the highway during the 10 years toll collection tenure.

Toll Operating and Maintenance cost for the month of April 2019 are as follows:

Salary to –

i. Collection Personnel (3 Shifts and 4 persons per shift) – Rs.150 per day per person
ii. Supervisor (2 Shifts and 1 person per shift) – Rs.250 per day per person
iii. Security Personnel (3 Shifts and 2 persons per shift) – Rs.150 per day per person
iv. Toll Booth Manager (2 Shifts and 1 person per shift) – Rs.400 per day per person

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Other Expenses -

- Electricity – Rs. 80,000
- Telephone – Rs.40,000
- Maintenance cost – Rs.30 lakhs

The company needs 25% profit over total cost to cover interest and other costs. Required:

a. Calculate cost per kilometer.
b. Calculate the toll rate per vehicle (assume there is only one type of vehicle).

Solution:

Statement Showing Cost

Particulars	**Amount (₹)**
Capital Cost $\left(\frac{600\ \text{Crores}}{10\ \text{Years}} \times \frac{1}{2}\ \text{months}\right)$	**5,00,00,000**
Operating Cost	
- Salary to Collection Personnel (3 Shifts × 4 Per shift × ₹150 per day)	54,000
- Salary to Supervisor (2 Shifts × 1 persons per shift × 30 days × ₹250 per day)	15,000
- Salary to Security Personnel (3 Shifts × 2 persons per shift × 30 days × ₹150 per day)	27,000
- Salary to Toll Booth Manager (2 Shifts × 1 persons per shift × 30 days × ₹400 per day)	24,000
Electricity	80,000
Telephone	40,000
	2,40,000
Maintenance Cost	**30,00,000**
Total Cost	**5,32,40,000**

(i) Cost per Km = $\frac{\text{Total Cost}}{\text{Total Km}} = \frac{₹5,32,40,000}{60\ \text{Km}}$ = ₹8,87,333.33 Per Km

(ii) **Toll Rate Per Vehicle**

(a) Total Cost for April 19 = ₹5,32,40,000

Profit Mark – up of 25% on cost = 1,33,10,000

Total Revenue Required = 6,65,50,000

No. of vehicles using the road in April 2019 = $\frac{60\ \text{Crores}}{10\ \text{Years}} \times \frac{1}{12}$ = 50,00,000 Vehicles

Toll Rate per Vehicle = $\frac{\text{Total Cost+25\% profit}}{\text{Vehicles per Month}}$

= $\frac{₹6,65,50,000}{50,00,000\ \text{Vehicles}}$ = ₹13.31/ Vehicle

13. Illustration

The loan department of a bank performs several functions in addition to home loan application processing task. It is estimated that 25% of the overhead costs of loan department are applicable to the processing of home-loan application.

The following information is given concerning the processing of a loan application:

	Rs.
Direct professional labour: Loan processor monthly salary: (4 employees @ Rs.20,000 each)	80,000
Loan department overhead costs (monthly) Chief loan officer's salary	5,000

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Telephone expenses	750
Depreciation Building	2,800
Legal advice	2,400
Advertising	400
Miscellaneous	650
Total overhead costs	**12,000**

You are required to compute the cost of processing home loan application on the assumption that one hundred home loan applications are processed each month.

Solution:

Statement Showing computation of processing of a Home Loan Application

Particulars	Amount
Direct Cost:	
4 employees @ ₹20,000 each)	80,000
Add: Overheads (25% of 12,000)	3,000
Total Cost towards home loan Processing application	83,000
No. of applications processed per month	100
Cost / Application (83,000/100)	830

14. Illustration

From the following data pertaining to the year 20X8-X9 prepare a cost statement showing the cost of electricity generated per kwh by Chambal Thermal Power Station.

Total units generated 10,00,000 kWh.

Expenses:

	Rs.
Operating labour	15,00,000
Repairs & maintenance	5,00,000
Lubricants, spares and stores	4,00,000
Plant supervision	3,00,000
Administration overheads	20,00,000

5 kWh. of electricity generated per kg. of coal consumed @ Rs.4.25 per kg. Depreciation charges @ 5% on capital cost of Rs.2,00,00,000.

Solution:

Statement Showing Cost

Particulars	**Amount (₹)**
Operating labour	15,00,000
Repairs & maintenance	5,00,000
Lubricants, spares and stores	4,00,000
Plant supervision	3,00,000
Administration overheads	20,00,000
Coal cost $\left(\frac{10,00,0000\ \text{kwhs}}{5\ \text{Years}} \times 4.25\ \text{per kg}\right)$	8,50,000
Depreciation (5% on 2,00,00,000)	10,00,000
Total Cost	65,50,000

Therefore, Cost per kwh generated = $\frac{₹65,50,000}{10,00,000\text{kwh}}$ = ₹6.55/kwh

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15. Illustration

GTC has a lorry of 6-ton carrying capacity. It operates lorry service from city A to city B. It charges Rs. 2,400 per ton from city 'A' to city 'B' and Rs. 2,200 per ton for the return journey from city 'B' to city 'A'. Goods are also delivered to an intermediate city 'C', but no concession or reduction in rates is given. Distance between the city 'A' to 'B' is 300 km and distance from city 'A' to 'C' is 140 km.

In January 2020, the truck made 12 outward journeys for city 'B'. The details of journeys are as follows

Outward journey	**No. of journeys**	**Load (in ton)**
'A' to 'B'	10	6
'A' to 'C'	2	6
'C' to 'B'	2	4
Return journey	**No. of journeys**	**Load (in ton)**
'B' to 'A'	5	8
'B' to 'A'	6	6
'B' to 'C'	1	6
'C' to 'A'	1	0

Annual fixed costs and maintenance charges are Rs. 6,00,000 and Rs. 1,20,000 respectively. Running charges spent during January 2020 are Rs. 2,94,400 (includes Rs. 12,400 paid as penalty for overloading).

You are required to:

- CALCULATE the cost as per
  - Commercial ton-kilometre.
  - Absolute ton-kilometre
- CALCULATE Net Profit/ loss for the month of January 2020.

Solution:

Working Notes:

1) Calculation of Absolute ton – Km

Particulars	**Ton-km.**
Outward Journeys:	
- From city A to city B ⇒ 10 journey × 300 km. × 6 ton	18,000
- From city A to city C ⇒ 2 journeys × 140 km. × 6 ton	1,680
- From city C to city B ⇒ 2 journeys × 160 km. × 4 ton	1,280
Return journeys:	
- From city B to city A ⇒5 journeys × 300 km. × 8 ton ⇒6 journeys × 300 km. × 6 ton	12,000 10,800
- From city B to city C ⇒1 journey × 160 km. × 6 ton	960
- From city C to city A ⇒ 1 journey × 140 km. × 0 ton	0
Total Absolute Ton-km	44,720

2) Calculation of Commercial Ton-km:

Total Distance (kms) × Average weight carried per journey (in ton)

= Total Distance = 300 km × 2× 12 trips = 7,200 kms

Average weight per journey

$$\left(\frac{\textbf{No.of Journey} \times \textbf{No.of Ton}}{\textbf{No.of Journeys}}\right)$$

Outward Journeys:

A to B = 10 × 6 tons = 60

A to C = 2 × 6 tons = 12

C to B = 2 × 4 tons = 8

Return journeys:

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B to A = 5 × 6 tons = 40
B to A = 6 × 6 tons = 36
B to C = 1× 6 tons = 6
Total weight = 162 Ton-km
Total Journeys = 26
Therefore, Average weight (in ton) (162÷26) = 6.23 tons
Total Commercial Ton-km = 7,200 km × 6.23 tons = 44,856 Ton-km

3) Revenue:

Particulars	**₹**
Outward journey (12 trips × 6 ton × ₹2,400)	1,72,800
Return Journey:	
- 5 trips × 8 ton × ₹2,200 - 7 trips × 6 ton × ₹2,200	1,80,400
Total Revenue	3,53,200

4) Calculation of cost for the month of Jan 2020:

Particulars	**Amount**
(i) Standing Charges:	
Annual fixed costs (6,00,000 /12)	50,000
(ii) Maintenance Charges: (1,20,000/12)	10,000
(iii) Running Cost:	
Running charges 2,94,400	
Less: Penalty (12,400)	2,82,000
Total monthly cost	**3,42,000**

(a) Cost per commercial ton-km. = $\frac{₹3,42,000}{44,856\text{ton}-\text{km}}$ = ₹7.62 / ton - km

(b) Cost per absolute ton-km = $\frac{₹3,42,000}{44,720\text{ton}-\text{km}}$ = ₹7.65 / ton – km

(ii) Calculation of Net Profit/Loss for the month of January 2020:

Revenue	3,53,200
Less: Costs	3,42,000
Operating profit	11,200
Less: Penalty paid for overloading	(12,400)
Net Loss for the month	(1,200)

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CHAPTER 5 – COST ACCOUNTING TECHNIQUES
UNIT 1 : MARGINAL COSTING

OVERVIEW

- Meaning and characteristics of marginal costing
- Meaning of CVP analysis and the application of the same
- Meaning of the breakeven point, margin of safety, angle of incidence and application of the same
- Formulas used in CVP Analysis.
- Concept of marginal costing and CVP analysis in short term decision making.
- Differentiate between marginal costing and absorption costing.
- Advantages and limitations of marginal costing

INTRODUCTION

- Marginal Costing is one of the important tools in management accounting which help the management in decision making.
- It gives management with information related to the behaviour of costs and the incidence of such costs on the profitability of an undertaking. Marginal costing is defined as "the ascertainment of marginal costs and of the result on profit of changes is not a separate costing.
- It is only a technique used by the accountants to aid management decision.
- It is also known as "Direct Costing" in U.S.A.
- This technique of costing is also called as variable costing, differential costing, or Out-of-pocket costing.

Characteristics of marginal cost

- Costs are divided into the fixed and variable elements and semi-variable costs are differentiated likewise.
- Only the variable costs are considered for computing the value of stocks of work-in-progress and finished products.
- Fixed costs are changed off to revenue entirely during the period in which they are incurred and not considered for valuing product costs/inventories.
- Prices will be based on marginal costs and contribution but in normal situations the prices would cover the costs in total.
- It is the combination of the techniques of cost recording and cost reporting.
- Profitability of departments or the products is determined based on the marginal contribution.
- The unit cost of a product means the average variable cost of manufacturing the product.

1. Facts about marginal costing

A. Not a distinct method:

- Marginal costing is not a distinct method of costing like job costing, process costing, operating costing, etc., but a special technique used for managerial decision making.
- It can, therefore, be used in conjunction with the different methods of costing such as job costing, process costing, etc., or even with other techniques such as standard costing or budgetary control.

B. Cost Ascertainment:

- In marginal costing, cost ascertainment is made based on the nature of cost**.**

C. Decision Making:

- In the total cost method, other things being equal, the total cost per unit will remain constant only when the level of output or mixture is the same from period to period.
- Since, these factors are continually fluctuating; the actual total cost will vary from one period to another.
- Thus, it is possible for the costing department to say per day that an item costs ₹ 20 and the next day it costs ₹ 18. Such fluctuating manufacturing activity, and consequently the variations in the total cost from

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period to period or even from day to day, poses a serious problem to the management in taking sound decisions.

- Hence, the application of marginal costing has been given wide identification in the field of decision making.

2. Determination of cost and profit under marginal costing

- For the determination of cost of the product or service under marginal costing. Costs are classified into variable and fixed.
- All the variable costs are part of product and services while fixed costs are charged against contribution margin.

Cost and Profit Statement under Marginal Costing:

	Amount (₹)	Amount (₹)
Revenue (A))		XXX
Product Cost:	XX	
- Direct Materials	XX	
- Direct employee (labour)	XX	
- Direct expenses	XX	
- Variable manufacturing overheads	XX	XXX
Product (Inventoriable) Costs (B)	XX	XXX
Product Contribution Margin {A–B}		XXX
- Variable Administration overheads	XX	XXX
- Variable Selling & Distribution overheads	XX	
Contribution Margin (C)		XXX
Period Cost: (D)		
Fixed Manufacturing expenses	XX	
Fixed non-manufacturing expenses	XX	XXX
Profit/ (loss) {C – D}		XXX

Product (Inventorial) Costs:

- These are the costs which are combined with the purchase and sale of goods (in the case of merchandise inventory).
- In the production scenario, such costs are related with the acquisition and conversion of materials and all other manufacturing inputs into finished product for sale.
- Therefore, under the marginal costing, variable manufacturing costs add up to inventoriable or product costs.
- Finished goods are determined at product cost.
- Work-in-process (WIP) inventories are also determined at product cost based on percentage of completion (Please refer Process & Operation costing chapter).

Contribution:

- Contribution or contribution margin is the difference between sales revenue and total variable costs without consideration of manufacturing or non-manufacturing.

Contribution (C) = Sales Revenue (S) – Total Variable Cost (V)

- It can also be determined as excess of sales revenue over the variable costs.
- The contribution forms a fund for fixed expenses and profit as illustrated below:

Example:

Variable Cost = ₹ 50,000, Fixed Cost = ₹ 20,000, Selling Price = ₹ 80,000

Contribution = Selling Price – Variable Cost

= ₹ 80,000 - ₹ 50,000 = ₹ 30,000

Profit = Contribution – Fixed Cost

= ₹ 30,000 – ₹ 20,000 = ₹ 10,000

- Since, contribution exceeds fixed cost; the profit is of the magnitude of ₹ 10,000.
- Suppose the fixed cost is ₹40,000 then the position shall be:

Contribution – Fixed cost = Profit

= ₹30,000 – ₹ 40,000 = - ₹ 10,000

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- The amount of ₹10,000 mean extent of loss since the fixed costs is more than the contribution. At the level of fixed cost of ₹ 30,000, there shall be no profit and no loss.

Period Cost:

- These are the costs, which are not imputed to the products but are charged as expenses against the revenue of the period in which they are incurred.
- All fixed costs either manufacturing or non-manufacturing are appreciated as period costs in marginal costing.

3. Advantages and limitations of marginal costing:

Advantages:

- The cost volume profit relationship is totally examined to disclose efficiency of products, processes, and departments. Breakeven point and Margin of safety are two important approaches helpful in profit planning.
- The profit for a period is not forced by changes in absorption of fixed expenses resulting from building or reducing inventory. Other things remaining equal (e.g., selling prices, costs, sales mix).
- Manufacturing cost and income statement in the direct cost form follow management`s realizing more closely than does the absorption cost form for these statements. For this reason, management finds it simple to understand and use direct cost reports.
- The effect of fixed costs on profits is maintained because the total amount of such costs for the period appears in the income statement.
- Marginal income figures promote relative appraisal of products, territories, classes of customers, and other segments of the business without having the results complicated by allocation of joint fixed costs.
- Marginal costing lies in with such sufficient plans for cost control as standard costs and flexible budgets.
- Marginal costing presents a better and more logical basis for the fixation of sales prices as well as tendering for contracts when business is at low ebb.
- Break-even point can be calculated only based on marginal costing.

Disadvantages

- It is difficult to separate fixed and variable costs clearly.
- There are semi-variable costs. They are not observed in the analysis.
- It ignores time element. In the long run, all costs including fixed costs change. Therefore, differentiation of performance between two periods based on contribution is not possible.
- Since variable overheads are scheduled on estimated basis, problem of under or over-recovery cannot be eliminated.
- Price fixation and differentiation between two jobs cannot be concluded without considering fixed costs.
- The stock is appreciated at marginal cost. Hence in the case of loss due to fire, full loss cannot be recovered from the insurance company.
- Valuation of inventories and profit estimations based on marginal costing are criticized to by tax authorities.
- In controlling costs, marginal costing is not useful in concerns where fixed costs are great in similar to variable costs.
- It is found inadmissible in industries like ship building, contract etc., where the value of work-in-progress is high in correlation of turnover. If fixed expenses are ignored in the valuation of work-in-progress, losses may happen every year till the contract is completed. On completion there may be huge profit. It may create income tax problems.
- The systems of budgetary control and standard costing avail the purpose better than marginal costing. Hence, this technique is not required.

4. Cost – Volume – Profit (CVP) Analysis:

Meaning:

It is a managerial tool showing the relationship between various components of profit planning viz., cost, selling price and volume of activity. As the name implies, cost volume profit (CVP) analysis is the analysis of three variables cost, volume, and profit. Such an analysis explores the relationship between costs, revenue, activity levels and the resulting profit. It strives at measuring variations in cost and volume.

Assumptions:

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- Alternate in the levels of revenues and costs arise only because of changes in the number of product (or service) units produced and sold. The number of output units is the only revenue driver and the only cost driver. Just as a cost driver is any factor that affects costs, a revenue driver is a variable, such as volume, that accidentally affects revenues.
- Total costs can be differentiated into two components; a fixed component that does not vary with output level and a variable component that changes with respect to output level.
- Selling price, variable cost per unit, and total fixed costs (within a suitable range and time) are known and constant.
- Changes in the levels of revenues and costs arise only because of changes in the number of product (or service) units produced and sold. The number of output units is the only revenue driver and the only cost driver. Just as a cost driver is any component that affects costs, a revenue driver is a variable, such as volume, that informally affects revenues.
- Total costs can be distinguished into two components; a fixed portion that does not vary with output level and a variable portion that changes with respect to output level.
- Selling price, variable cost per unit, and total fixed costs (within a relevant range and period) are known and constant.
- The analysis either covers a single product or figure that the proportion of different products when multiple products are sold will remain constant as the level of total units sold changes.
- All revenues and costs can be added, subtracted, and compared without taking consider the time value of money.

Importance:

- It furnishes the information about the following matters:
- The exploits of cost in relation to volume.
- Volume of production or sales, where the business will break-even.
- Sensitivity of profits because of variation in output.
- Amount of profit for a projected sales volume.
- The aggregate of production and sales for a target profit level.

Marginal Cost Equation:

Marginal Cost Equation = Sales – Variable Cost = Contribution = Fixed Cost ± Profit

Where,

S = Selling price per unit,

V = Variable cost per unit,

C = Contribution,

F = Fixed Cost,

P = Profit/Loss

Marginal Cost Statement:

Particulars	**(₹)**
Sales	XX
Less: Variable Cost	XX
Contribution	XX
Less: Fixed Cost	XX
Profit	XX

Contribution to sales ratio (Profit Volume Ratio or P/V Ratio)

This ratio shows the volume of sales obtainable to cover fixed costs and profit. Contribution act for the sales revenue after subtracting variable costs. This ratio is usually expressed in percentage.

A higher contribution to sales ratio implies that the rate of growth of contribution is faster than that of sales. This is due to, once the breakeven point is achieved, profits shall grow at a faster rate when differentiated to a product with a lesser contribution to sales ratio.

By conversion, we have derived the following equations:

(i) C = S × P/V ratio

(ii) S= C/P/v ratio

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Break – Even – Analysis

The study of cost-volume-profit relationship is frequently mentioned to as Break-Even –Analysis. The term is explained in two senses. In its narrow sense, it is treated with finding out the BEP. BEP is the point at which total revenue is equal to total cost. It is the point of no profit, no loss. In its broad sense, it means a system of interpretation that may be used to calculate the expected profit at any level of production.

5. Methods of Break – Even – Analysis

Break even analysis could also be directed by the subsequent two methods:

- Algebraic computations
- Graphic presentations

1. Algebraic computations:

Breakeven Point:

- This is the point where neither profits nor losses have been made is known as a break-even point.
- This signifies that to break even the amount of contribution generated should be accurately equal to the fixed costs incurred.

Break - even point in units = Fixed costs / Contribution per unit

Cash Break – even point:

- When break- even point is calculated only with those fixed costs which are payable in cash, such a break-even point is known as cash break-even point.
- This means that depreciation and other non -cash fixed costs are eliminated from the fixed costs in computing cash break-even point. Its formula is –

  Cash break-even point= Cash fixed costs/contribution per unit

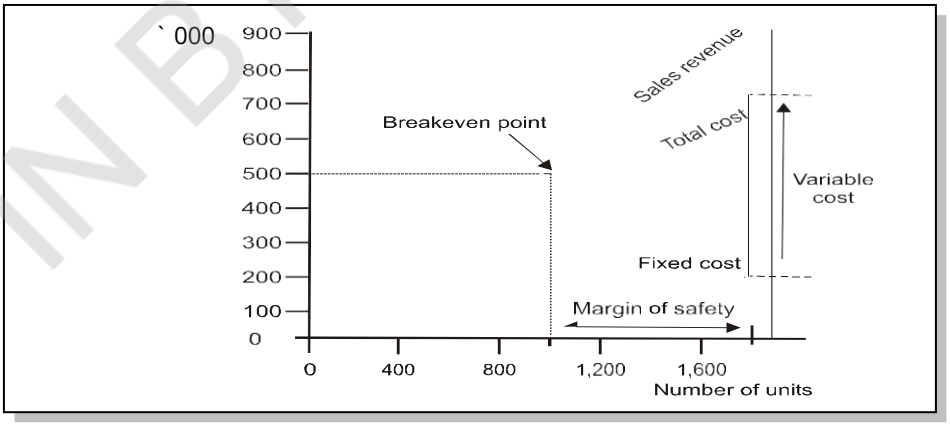
Multi – Product Break – even Analysis:

- In a multi-product environment, where more than one product is manufactured by using a common fixed cost, the break-even point formula needs some adjustments.
- The contribution is calculated by taking weights for the products.
- The weights may be of sales mix quantity or sales mix values.

2. Graphical presentation of Break-Even Chart:

(i)Break-Even chart:

- According to the Chartered Institute of Management Accountants, London the break-even chart means "a chart which shows profit or loss at various levels of activity, the level at which neither profit nor loss is shown being termed as the break-even-point".
- It is a graphic relationship between costs, volume, and profits.
- It shows not only the BEP but also the effects of costs and revenue at varying levels of sales.
- This break-even chart can, therefore, be more appropriately called the cost-volume profit graph.

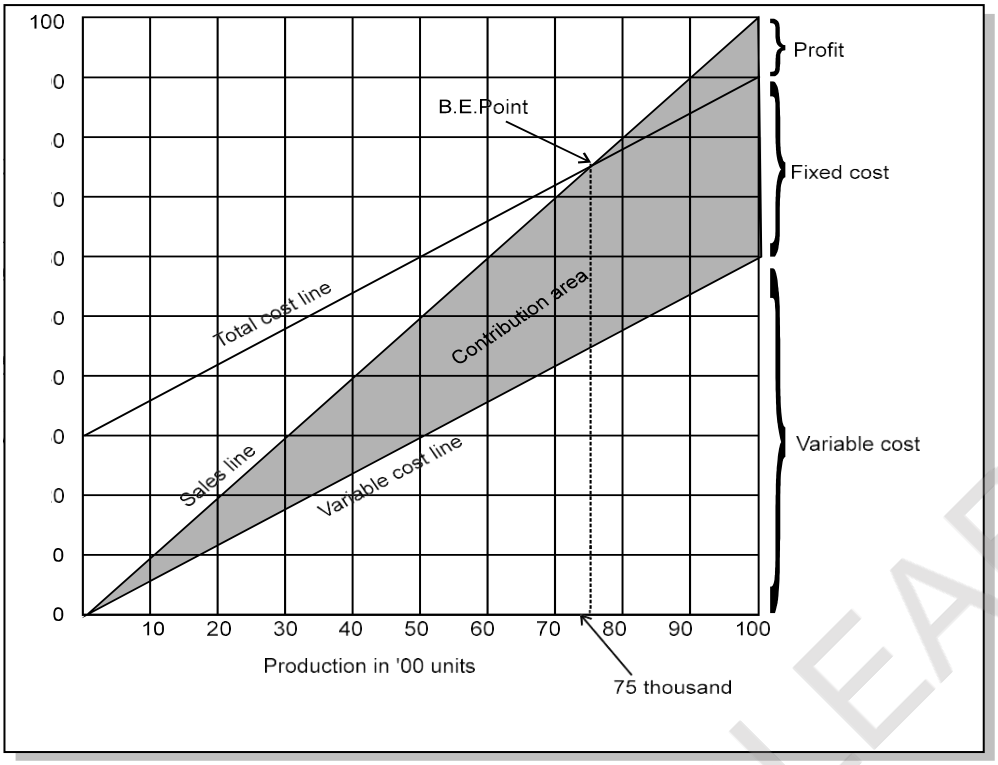


(ii)Contribution Break even chart:

- The making of a contribution breakeven chart which is based on the same principles as a conventional breakeven chart except for that it shows the variable cost line as against of the fixed cost line.
- Lines for Total cost and Sales revenue remain the same.
- The breakeven point and profit can be read off in the same way as with a conventional chart.
- However, it is also possible to read the contribution for any level of activity.

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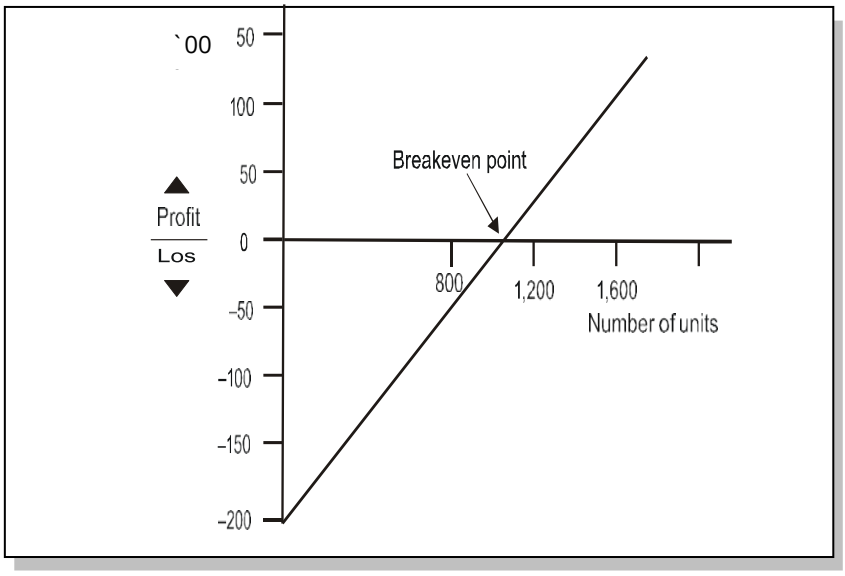
- The contribution can be read as the distinguish between the sales revenue line and the variable cost line.



(iii)Profit-volume Graph:

- Profit Volume graph is the graphical representation of the relationship between profit and volume.
- Separate lines for costs and revenues are eliminated from the P/V graph as only profits are plotted.
- It is based on the same information as is required for the traditional break-even chart and is characterised by the same limitations.
- The steps in the construction of profit volume graph are as follows:
    - Profit and fixed costs are represented on the vertical axis.
    - Sales are shown on the horizontal axis.
    - The sale line divides the graph into two parts both horizontally and vertically. The area above the horizontal line is the profit area and that below the sale line and profits on the same axis above the sale line.
    - Profits and fixed costs are plotted for corresponding sales volume and the points are joined by a line which is the profit line

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Advantages of the profit-volume chart.

- The biggest advantage of the profit-volume chart is its capability of clearly depicting the effect on profit and breakeven point of any changes in the variables.

6. Limitations of breakeven analysis:

- Fixed costs do not always remain constant.
- Variable costs do not always vary proportionately.
- Sales revenue does not always change proportionately.
- The horizontal axis cannot measure the units sold in as much as many unlike type of products are sold by the same enterprise.
- Break-even analysis is of doubtful validity when the business is selling many products with different profit margins.
- Break-even analysis assumes that income is influenced by changes in sales that changes in inventory would not directly affect income. If marginal costing is used, that assumption would hold good but in other cases, changes in inventory will affect income because, absorption of fixed costs will depend on production rather than sales.
- Condition of growth or expansion in an organisation is not assumed under break even analysis. In actual life of any business organisation the operation undergoes a continuous process of growth and expansion.

7. Margin of safety:

- It represents a buffer sale more than Break-even sale.
- The margin of safety can be defined as the difference between the expected level of sale and the breakeven sales.
- The larger the margin of safety, the higher is the chances of making profits.
- It also can be calculated as:
  Margin of Safety= Profit/ Pv ratio

Variations of basic marginal cost equation and other formulae:

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- Sales-variable cost=Fixed cost+-profit/loss
  By multiplying and dividing L.H.S. by S
- S(S-V)/S=F+P
- S*P/V ratio=F+P or Contribution [P/V ratio=S-V/S]
- BES=Fixed cost/PV ratio
- P/v ratio=Fixed cost/BES
- S*P/v ratio= Contribution (refer to iii)
- P/v ratio= contribution/Sales
- (BES+MS) *P/V ratio=Contribution (total sales=BES+MS)
- (BES*P/V ratio) + (MS*P/V ratio) = F+P
  By deducting (BES*P/V ratio) from L.H.S. and F from R.H.S. in(x) above, we get:
- M.S.*P/V ratio =P
- P/V ratio=change in profit/change in sales
- P/V ratio=change in contribution/change in sales
- Profitability= contribution/key factor
- Margin of Safety=Total Sales-BES or Profit/PV ratio
- BES=Total sales-MS
  Margin of Safety=Total sales-BES/Total sales

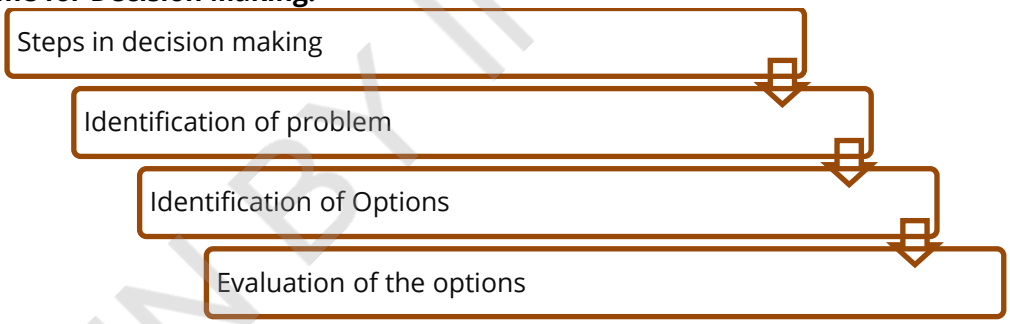
8. Angle of incidence:

- This angle is formed by the intersection of sales line and total cost line at the break-even point.
- This angle shows the rate at which profit is earned once the break-even point is attained.
- The wider the angle the greater is the rate of earning profits.
- A large angle of incidence with a high margin of safety specifies extremely favourable position.

9. Application of CVP analysis in decision making:

- As studied earlier CVP analysis is used as an evaluation tool for managerial decision.
- In this chapter we will discuss the use of CVP Analysis for short term decision making.
- Before going into illustration let us discuss the decision-making framework.

10. Frame for Decision Making:



STEP1. Identification of problem

- Every organisation has its own objectives, and goals are set to accomplish these objectives.
- To reach at the goal, actions are to be taken, for example, if an organisation wants to be a cost leader in the industry it operates, in must achieve 3Es in its all activities.
- 3Es means economy in inputs, efficiency in process and operations and effectiveness in output.
- Arnav Ltd, a manufacturer of Steel products at lower cost than its rival.
- Here the goal should be (problem area) low-cost production.

STEP2: Identification of Options:

- After identification of problems the next step is recognition of options to reach the goal to answer the problem.
- Every feasible option needs to be explored.
- In the above example, the Arnav Ltd. May have the following options for low-cost production:
  a) Purchase of inputs from specialised market-local vs import

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b) Make the input in its own factory- Make or Buy.
c) Bulk purchase to avail discount offer- How much to purchase.
d) Make in house Make vs outsource.
e) Bulk Processing- How much to produce.
f) Using efficient machine for manufacturing- Old machine vs New machine
g) Optimisation of key resources- Product mix decisions etc.

STEP-3: Evaluation of the options

- After identification of options, each option is to be evaluated in opposition to the objective criteria.
- An entity with objective of forming profit may evaluate options based on financial measures like impact of profit or loss, market share, overall effect on profitability, return on investment etc.
- Non-financial factors like customer satisfaction, results on existing market/customer, and ethics of decision are also evaluated.
- This step is a very important and may be grouped into two tasks.
  a. Identification of Cost and Benefits of each options
  b. Estimation of amount of each option

After evaluation of the options, the best option is selected and implemented.

Principle for identification of cost and benefits for measurement:

Controllability:

- Those cost and benefits which stand up due to choice of an option.
- In other words, benefits received, and cost incurred is directly related with considered for measurement for making decisions.

Relevance:

- The cost which are controllable need to be appropriate for decision making.
- This means all controllable costs are not relevant for decision making unless it differs under the two options.
- Thus, **a cost is treated is relevant only if (a)it is a future cost and (b)it differs under two options under consideration.**
- Hence for decision making motive only those cost and benefits are identified for measurement which are both Controllable and Relevant. **Below is an analysis of few costs for its relevance:**

Cost	Relevance	Reason
(i)Historical cost	Irrelevant	The cost has already been incurred and do not affect the decision. E.g., Book value of machinery etc.
(ii)Sunk Cost	Irrelevant	The cost which are already paid either for goods or services availed or to be availed. E.g., Raw material purchased and held in store without having replacement cost, cost of drawing, blueprint etc.
(iii)Committed cost	Irrelevant	The committed costs are the pre-agreed cost which cannot be revoked under the normal circumstances. This is also a sunk cost. E.g., Cost of materials as per rate agreement, Salary cost to employees etc.
(iv)Opportunity cost	Relevant	The Opportunity cost is represented by the forgone potential benefit from the best rejected course of action. Had the option under consideration not chosen, the benefit would come to the organisation.
(v)Notional or imputed cost	Relevant	Notional costs are applicable for the decision making only if company is forgoing benefits by employing its resources to alternative course of action. For e.g., Notional interest on internally generated fund is treated as relevant notional cost only if company could earn interest from it.

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Shut-down cost	Relevant	When an organisation suspends its manufacturing operations, certain extra fixed expenses may be incurred depending upon the nature of the industry. By closing the manufacturing, the organization will save variable cost of production as well as some discretionary fixed costs. This discretionary cost is known as shut-down cost.

Principle of estimation of costs and benefits:

- After recognition of the costs and benefits it is now needed to be quantified i.e., the cost and benefit should be measured and estimated.
- The estimation is done by following the two principles as discusses below:
  - (i) **Variability:** Variability means by how much a cost or benefit increased or decreased because of the choice of the option. Variable costs are the cost which varies under the different volume or activities. On the other hand, fixed costs continue to the same irrespective of volume and activities.
  - (ii) **Traceability:** Traceability of cost means degree of relationship between the cost and the choice of the option. Direct costs are directly allocated to the option on the other hand indirect costs require to be apportioned to the option on some reasonable basis.

Hence the cost and benefits of an option is measured at directly traceable and variable costs.

Short – term decision making using concepts of CVP analysis:

- Management uses marginal costing and CVP concepts for making various decisions.
- In this chapter we will learn how the concepts of marginal costing and CVP are concerned for analysis of identified options for short-term decision making.
- Generally short-term decisions are associated with provisional gaps between demand and supply for attainable resources.
- The areas of short-term decision may be classified into two broad categories.
  - (i) **Decisions related with excess supply, such as:**
    a. Processing of Special Order
    b. Determination of price for encouraging demand
    c. Local vs Export sale
    d. Determination of minimum price for price quotations
  - (ii) **Decisions related with excess demand, such as:**
    a. Make or Buy/In house processing or Outsourcing.
    b. Product mix decision under resources constraints (limiting factors)
    c. Sales mix decisions
    d. Sale or forward processing etc.

What is Limiting Factor?

- Limiting factor is anything which limitation the activity of an entity. The factor is a key to calculate the level of sale and production, thus it is also known as key factor.
- From the supply side the limiting factor may either be Men(employees), Materials (raw material or supplies), Machine (capacity), or Money (availability of fund or budget) and from demand side it may be demand for the product, alternative factors like nature of product, regulative and environmental requirement etc.
- The management, while making decisions, has intention to enhance the key resources up to maximum possible proportion.

11. Distinction between marginal and absorption costing:

S.No	Marginal Costing	Absorption Costing
1.	Only variable costs are evaluated for product costing and inventory valuation	Both fixed and variable costs are considered for product costing and inventory valuation.
2.	Fixed costs are regarded as period costs. The Profitability of various products is decided by their P/V ratio.	Fixed costs are expected to the cost of production. Each product bears a reasonable share of fixed cost and thus the profitability of a product is modified by the apportionment of fixed costs.

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3.	Cost data presented highlight the total contribution of each product.	Cost data are furnished in conventional pattern. Net profit of each product is calculated after subtracting fixed cost along with their variable costs.
4.	The difference in the size of opening stock and closing stock does not influence the unit cost of production.	The difference in the magnitude of opening stock and closing stock affects the unit cost of production due to the impact of related fixed cost.
5.	In case of marginal costing the cost per unit remains the same, whatever the production as it is valued at variable cost	In case of absorption costing the cost per unit decreases, as the production increases as it is fixed cost which reduces, whereas the variable cost remains the same per unit.

Difference in profit under marginal and absorption costing:

The above two approaches will calculate the various profit because of the difference in the stock valuation. This difference is clarified as follows in numerous circumstances.

A. No opening and closing stock:

- In this case, profit / loss under absorption and marginal costing going to be equal.

B. When opening stock is equal to closing stock:

- In this case, profit / loss under two approaches will be equal if the fixed cost element in both the stocks is same amount.

C. When closing stock is more than opening stock:

- In other words, when production throughout a period is more than sales, then profit as per absorption approach will be more than that by marginal approach.
- The reason beyond this contrast is that a part of fixed overhead included in closing stock value is carried forward to following accounting period.

D. When opening stock is more than the closing stock:

- In other words, when production is less than the sales, profit shown by marginal costing will be more than that shown by absorption costing.
- This is because a part of fixed cost from the previous period is added to the current year's cost of goods sold in the form of opening stock.

Income Statement (Absorption costing)

Sales	XXX
Production Costs:	
Direct material consumed.	
Direct labour cost	XXX
Variable manufacturing overhead	XXX
Fixed manufacturing overhead	XXX
Cost of Production	XXX
Add: Opening stock of finished goods (Value at cost of previous period's production)	XXX
Less: Closing stock of finished goods (Value at production cost of current period).	XXX
Cost of Goods Sold	XXX
Add: (or less) Under (or over) absorption of fixed	XXX
Add: Manufacturing overhead	XXX
Administration costs	XXX
Selling and distribution costs	XXX
Total Cost	XXX
Profit (Sales – Total cost)	XXX

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Income Statement (Marginal costing)

Sales		XXX
Variable manufacturing Costs:		
Direct material consumed.	XXX	
Direct labour cost	XXX	
Variable manufacturing overhead	XXX	
Cost of Production	XXX	
Cost of Goods Sold	XXX	
Add: Variable administration, selling and dist. Overhead	XXX	
Total Variable Cost	XXX	
Add: Selling and distribution costs	XXX	
	XX	
Contribution (Sales – Total variable costs)	XXX	
Less: Fixed costs (Production, admin., selling and dist.)	XXX	
Net Profit	XXX	

- It is clear from the above that under marginal costing technique the contribution of various products is pooled along, and the fixed overheads are met out of such total contribution.
- The total contribution is additionally called gross margin or profit margin.
- The contribution minus fixed expenses gives net profit. In absorption costing technique, cost carries fixed overheads as well.

Illustrations

1. Illustration

Arnav Limited produces 10,000 units of product Z by incurring the total cost of Rs. 3,50,000. The break-up of costs are as follows:

1. Direct Material @ Rs.10 per unit , Rs.1,00,000
2. Direct employee (labour) Cost @ Rs.8 per unit, Rs.80,000
3. Variable overheads @ Rs.2 per unit, Rs.20,000
4. Fixed Overheads Rs.1,50,000 (up to a volume of 50,000 units)

Compute the marginal cost of producing one extra unit from the current production.

Solution:

Particulars	10000 Units	10,001 Units	Incremental
Direct Material @ Rs.10 Per Unit	1,00,000	1,00,010	10
Direct Labour @ Rs.8 Per Unit	80,000	80,008	8
Variable Overhead @ Rs.2 Per Unit	20,000	20,002	2
Fixed Overhead	1,50,000	1,50,000	-
Total Cost	**3,50,000**	**3,50,020**	**20**

Therefore, Marginal Cost = Rs.20

2. Illustration

Arnav Ltd. produces 10,000 units of product Z by incurring a total cost of Rs.4,80,000. Break-up costs are as follows:

1. Direct Material @ Rs.10 per unit, Rs.1,00,000
2. Direct employee (labour cost) @ Rs.8 per unit, Rs.80,000
3. Variable Overheads @ Rs.2 per unit, Rs.20,000
4. Machine set up cost @ Rs.1,200 for a production run (100 units can be manufactured in a run)
5. Depreciation of a machine specifically used for production of Z Rs.10,000
6. Apportioned fixed overheads Rs.1,50,000

Solution:

Particulars	10,000 Units	10,001 Units	Incremental
Direct Material @ Rs.10 Per Unit	1,00,000	1,00,010	10

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Direct Labour @ Rs.8 Per Unit	80,000	80,008	8
Variable Overhead @ Rs.2 Per Unit	20,000	20,002	2
Machine Set-up cost @ Rs.1200 per run	12,000 (10000/100 x 1200)	1,21,200 (101x 1200)	1,200
Depreciation	10,000	10,000	-
Apportioned Fixed Overhead	1,50,000	1,50,000	-
Total Cost	**4,80,000**	**4,81,220**	**1,220**

Therefore, Marginal Cost = Rs.20

Note: Rs.1200 is an Incremental cost, not a Marginal cost since it is not variable upon per unit change.

3. Illustration

WONDER LTD. manufactures a single product, ZEST. The following figures relate to ZEST for a one-year period:

Activity Level	**50%**	**100%**
Sales and production (units)	400	800
Other Details	**Amount (Rs.)**	**Amount (Rs.)**
Sales	8,00,000	16,00,000
Production costs:		
- Variable	3,20,000	6,40,000
- Fixed	1,60,000	1,60,000
Selling and distribution costs:		
- Variable	1,60,000	3,20,000
- Fixed	2,40,000	2,40,000

The normal level of activity for the year is 800 units. Fixed costs are incurred evenly throughout the year, and actual fixed costs are the same as budgeted. There were no stocks of ZEST at the beginning of the year.
In the first quarter, 220 units were produced, and 160 units were sold. Required:
(a) What would be the fixed production costs absorbed by ZEST if absorption costing is used?
(b) What would be the under/over-recovery of overheads during the period?
(c) What would be the profit using absorption costing?
(d) What would be the profit using marginal costing?

Solution:

a) Budgeted Fixed Production Overheads = Rs.1,60,000
Budgeted no. of units = 800 Units

$$\text{Fixed Overhead Recovery rate} = \frac{\text{Budgeted Fixed Overhead}}{\text{Budgeted no. of units}}$$

= 1,60,000 / 800 = Rs.200 Per Unit

Therefore, The Fixed production overhead to be absorbed during the 1st Quarter = 220 Units
Hence, the fixed production overhead to be absorbed during the 1st Quarter = 220 units x Rs.200
= Rs.44,000

b) Planned Absorption

Budgeted no. of units in the 1st Quarter = 800 Units / 4 Quarters = 200 Units
Fixed overhead recovery rate per unit = Rs. 200 Per Unit
Budgeted Fixed Overhead = Rs.200 * 200 Units = Rs.40,000
Therefore, Actual Fixed overhead incurred = Rs.40,000
Hence, Fixed overhead absorbed – Fixed overhead incurred = nil

c) Profit under Absorption Costing

Particulars		**Amount (Rs.)**
Sales Revenue (160 Units * 2,000)		3,20,000
Less: Production cost	1,76,000	
Variable Cost (220 Units * Rs.800)	44,000	2,20,000

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Fixed production overhead (220 Units * Rs.200)		
Add: Opening Stock		-
Less: Closing Stock (2,20,000/220 * 60)	(60,000)	
Cost of Goods Sold		**1,60,000**
Less: Adjusted for overabsorption of fixed production OH		(4,000)
Adjusted Cost of Goods Sold		**1,56,000**
Less: Selling and distribution overhead	64,000	
Variable (160 Units * Rs.400)	60,000	1,24,000
Fixed (240000/4)		
Profit		**4,00,000**

d) Profit under Marginal Costing

Particulars	Amount Rs.	Amount Rs.
Sales Revenue (160 Units * Rs.2,000)		3,20,000
Less: Product cost	1,76,000	
Variable Cost (220 Units * Rs.800)		
Add: Opening Stock		-
Less: Closing Stock (1,76,000/220 * 60)	(48,000)	(1,28,000)
Product Contribution Margin		**1,92,000**
Less: Variable selling expense (160 Units * Rs.400)		(64,000)
Contribution Margin		**1,28,000**
Less: Period Cost (Fixed Cost)	40,000	
Fixed Production cost	60,000	(1,00,000)
Fixed Sales & distribution Cost		
Profit		**28,000**

4. Illustration

XYZ Ltd. has a production capacity of 2,00,000 units per year. Normal capacity utilisation is reckoned as 90%. Standard variable production costs are Rs.11 per unit. The fixed costs are Rs.3,60,000 per year. Variable selling costs are Rs.3 per unit and fixed selling costs are Rs.2,70,000 per year. The unit selling price is Rs.20.

In the year just ended on 30th June 2014, the production was 1,60,000 units and sales were 1,50,000 units. The closing inventory on 30th June was 20,000 units. The actual variable production costs for the year were Rs. 35,000 higher than the standard.

1. Calculate the profit for the year
   a. by absorption costing method and
   b. by marginal costing method.
2. Explain the difference in the profits.

Solution:

i. A) Profits under Absorption Costing

Particulars	Amount Rs.
Sales Revenue (1,50,000 @ Rs.2 per unit)	30,00000
Less: Cost of production	20,20,625
Less: Period Cost	
Variable selling cost (1,50,000*3)	4,50,000
Fixed selling cost	2.70,000
Profit	**2.59,375**

B) Profits under Marginal Costing

Particulars	Amount Rs.
Sales Revenue (1,50,000 @ Rs.2 per unit)	30,00,000
Less: Product Cost	(16,80,625)
Product Contribution Margin	**13,19,375**

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Less: Variable Selling Expenses (1,50,000 * 3)	(4,50,000)
Contribution Margin	**8,69,375**
Less: Fixed Cost	
Production	3,60,000
Selling	2,70,000
Profit	**2,39,375**

ii. Reasons for Difference (Reconciliation)

Profits as per Absorption Costing	259375
Add: Opening stock under-valued under marginal costing (130000-110000)	20000
Less: Closing stock under-valued in marginal costing (264375-224375)	(40000)
Profits under Marginal Costing	**239375**

Working Notes:

1. Calculation of Opening Stock

Production during the Year = 1,60,000 Units
Sales = 1,50,000 Units
Closing Stock = 20,000 Units
Opening Stock = (Sales + Closing Stock) – Production
= (1,50,000 + 20,000) – 1,60,000 = 10,000 Units

2. Calculation of Fixed Overhead Recovery Rate (Absorption Rate)

Budgeted Fixed overhead = Rs.3,60,000
Budgeted No. of Units = 2,00,000 * 90% = 1,80,000 Units

Therefore,

$$\textbf{Fixed Overhead Recovery Rate} = \frac{\textbf{Budgeted Fixed Overhead}}{\textbf{Budgeted No. of units}} = \frac{\textbf{3,60,000}}{\textbf{1,80,000}} = \textbf{Rs.2 per unit}$$

3. Valuation of Opening Stock

Particulars	Absorption Costing	Marginal Costing
No. of Units (WN.1)	10,000	10,000
Variable production Cost @ Rs.11	1,10,000	1,10,000
Add: Fixed production Overhead (10,000 @ Rs.2 per unit)	20,000	-
Opening Stock Value	**1,30,000**	**1,10,000**

4. Statement showing Cost of Production

Particulars	Absorption Costing	Marginal Costing
Variable Production Cost		
Standard (1,60,000 * Rs.11)	17,60,000	17,60,000
Additional cost	35,000	35,000
Add: Fixed Overhead (Absorb) (160000 * Rs.2 per unit)	3,20,000	-
Cost of Production	**21,60,000**	**17,95,000**
Add: Opening Stock (10,000 Units)	1,30,000	1,10,000
Less: Closing Stock (20,000 Units)	(2,64,375)	(2,24,375)
	21,15,000 * 20,000 / 1,60,000	17,95,000 * 20,000 / 1,60,000
Cost of Goods Sold	**19,80,625**	**16,80,625**

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5. Illustration

ABC Ltd. manufacturing a single product, incurring variable costs of Rs. 300 per unit and fixed costs of Rs. 2,00,000 per month. If the product sells for Rs. 500 per unit. What is the breakeven point in units and break-even point in rupee value of sales?

Solution:

S.No.	Particulars	Amount (Rs.)
a)	Selling Price Per Unit	500
b)	Variable Cost Per Unit	300
c)	Contribution Per Unit (a-b)	200
d)	Fixed Cost Per Month	2,00,000
e)	**BEP (units) (d/c)**	**1,000**
f)	**BEP (Sales Value) (1000 * 500)**	**Rs.5,00,000**

6. Illustration

S.No.	Particulars	Amount (Rs.)
a)	Selling Price/unit	100
b)	Variable Cost/unit	90
c)	Fixed Cost	1,00,000

Find BEP Sales Value.

Solution:

S.No.	Particulars	Amount (Rs.)	%
a)	Selling Price Per Unit	100	100
b)	Variable Cost Per Unit	90	90
c)	Contribution Per Unit/PV Ratio (a-b)	10	10
d)	Fixed Cost	1,00,000	
e)	Contribution Required	1,00,000 (10% of Sales)	
f)	**BEP (Sales Value)**	**10,00,000** **(1,00,000)** **10%**	

7. Illustration

S.No.	Particulars	Amount(Rs.)
a)	Total Sales	2,00,000
b)	Variable Cost	1,50,000
c)	Fixed Cost	2,00,000

Find BEP Sales Value.

Solution:

S.No.	Particulars	Amount (Rs.)	%
a)	Total Sales	2,00,000	100
b)	Variable Cost	1,50,000	75
c)	Contribution	50,000	25
d)	Fixed Cost	2,00,000	
e)	PV Ratio	25%	
f)	**BEP (Sales Value) (d/e)**	**8,00,000**	

8. Illustration

MNP Ltd sells goods at Rs. 37.50 per unit. Variable costs are Rs. 17.50 per unit (manufacturing costs of Rs. 14 and selling cost Rs. 3.50 per unit). Fixed costs are incurred uniformly throughout the year and amount to Rs. 35,00,000 (including depreciation of 15,00,000). There is no beginning or ending inventories.

Required: Estimate breakeven sales level quantity and cash breakeven sales level quantity.

Solution:

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BEP = $\frac{\text{Total Fixed Cost}}{\text{Contribution/unit}}$

S.No.	Particulars	Amount (Rs.)
a)	Selling Price	3,750
b)	Variable Cost	1,750
c)	Contribution Per Unit (a-b)	20
d)	Fixed Cost	35,00,000
e)	**BEP (units) (d/c)**	**1,75,000 Units**

Cash Break Even Point: -

Cash Fixed Cost = Total Fixed Cost – Non-Cash Expense

= 35,00,000-15,00,000

= 20,00,000

Cash BEP = $\frac{\text{20,00,000}}{\text{20}}$

= 1,00,000 Units

Non-cash expense amounts to Rs.15,00,000 (Depreciation)

9. Illustration

S.No.	Particulars	Amount(Rs.)
a)	Selling Price/unit	10
b)	Variable Cost/units	8
c)	Fixed Cost	75,000
d)	Sales	1,00,000 units
e)	Profit	-
f)	Contribution	-
g)	BEP sales	-
h)	MOS sales	-

Solution:

S.No.	Particulars	Amount (Rs.)
a)	Selling Price/unit	10
b)	Variable Cost/unit	8
c)	Contribution/unit	2
d)	Sales	1,00,000 Units
e)	Contribution (d * c)	2,00,000
f)	Fixed Cost	75,000
g)	Profit (e-f)	1,25,000
h)	BEP (f/c)	**37,500 Units**
i)	Margin of Safety (MOS) (d-h)	**62,500 Units**
j)	Contribution generated on BES (c * h)	**75,000**
k)	Contribution generated on MOS	**1,25,000**

10. Illustration

A company earned a profit of Rs. 30,000 during the year 20X4. If the marginal cost and selling price of the product are Rs. 8 and Rs. 10 per unit respectively, find out the amount of margin of safety.

Solution:

S.No	Particulars	Amount (Rs.)
a)	Profit	30,000
b)	Contribution on MOS	30,000
c)	Selling Price/unit	10

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d)	Variable Cost/unit	8
e)	Contribution	2
f)	MOS (Sales) – Units (b/e)	**15,000**
g)	MOS (Sales Value) (f * c)	**1,50,000**

Alternatively,
PV Ratio = Contribution / Sales

S.No	Particulars	Amount (Rs.)
a)	Contribution/unit	2
b)	Selling price/unit	10
c)	PV Ratio (a/b)	20%
d)	Profit	30,000
e)	MOS (sales) (d/c)	**1,50,000**

11. Illustration

A company can make any one of the 3 products X, Y or Z in a year. It can exercise its option only at the beginning of each year.

Relevant information about the products for the next year is given below.

	X	Y	Z
Selling Price (` / unit)	10	12	12
Variable Costs (`/ unit)	6	9	7
Market Demand (unit)	3000	2000	1000
Production Capacity (unit)	2000	3000	900
Fixed Costs (`)	30,000		

Required

COMPUTE the opportunity costs for each of the products.

Solution:

	X	**Y**	**Z**
I. Contribution per unit (`)	4	3	5
II. Units (Lower of Production / Market Demand)	2000	2000	900
III. Possible Contribution (`) [I × II]	8000	6000	4500
IV. Opportunity Cost* (`)	6000	8000	8000

(*) Opportunity cost is the maximum possible contribution forgone by not producing alternative product i.e. if Product X is produced then opportunity cost will be maximum of (` 6,000 from Y, ` 4,500 from Z).

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12. Illustration

If P/V ratio is 60% and the Marginal cost of the product is Rs. 20. What will be the selling price?

Solution:

Particulars	Rs. Per Unit	% of Sales
Selling Price Per Unit	Rs.50 (20/40%)	100%
Less: Variable Price Per Unit	Rs.20	40% (Bal.Fig) (100-60)
Cost Per Unit	**Rs.30**	**60%**

Variable Cost as a % of Sales = (1 – PV Ratio) = (1 – 0.60) = 0.40 = 40%
Therefore,
Selling price Per Unit = $\frac{\text{Rs.20}}{40\%}$ = Rs.50 Per Unit

13. Illustration

The ratio of variable cost to sales is 70%. The break-even point occurs at 60% of the capacity sales. Find the capacity sales when fixed costs are Rs. 90,000. Also compute profit at 75% of the capacity sales.

Solution:

Sales	100%
Variable Cost	70%
Contribution	**30% (PV Ratio)**

Total Sales 100% (Rs.5,00,000)			
BEP Sales (Rs.3,00,000) 60%		**MOS Sales (Rs.2,00,000) 40%**	
Contribution on BEP Sales	Rs.90,000 (Fixed Cost)	Contribution on MOS Sales	2,00,000 * 30% =Rs.60,000
BEP Sales (in Rs.)	$\frac{\text{Fixed Cost}}{\text{PV Ratio}} = \frac{90,000}{30\%}$ = Rs.3,00,000	Profit	2,00,000 * 30% =Rs.60,000

Total Capacity Sales = $\frac{3,00,000}{60\%}$ = Rs.5,00,000

Operated Level = 75%
Sales (in Rs.) = 500000 * 75% = Rs.375000
PV Ratio = 30%
Therefore, Total contribution = 375000 * 30% = Rs.112500
Hence Profit = Contribution – Fixed expenses = 112500 – 90000 = Rs.22500

Total Sales 100% (Rs.5,00,000) Operated Level = 75% = Rs.3,75,000			
BEP Sales (Rs.3,00,000) 80%		**MOS Sales (Rs.75,000) (Bal.fig) 20%**	
Contribution on BEP Sales	Rs.3,00,000 * 30% = Rs.90,000	Contribution on MOS Sales	75,000 * 30% = Rs.22,500
BEP Sales (in Rs.)	$\frac{\text{Fixed Cost}}{\text{PV Ratio}} = \frac{90,000}{30\%}$ = Rs.3,00,000	Profit	75,000 * 30% = Rs.22,500

14. Illustration

1. Ascertain Profit when

Sales	Rs.2,00,000
Fixed Cost	Rs.40,000

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BEP	Rs.1,60,000

2. Ascertain Sales, when

Fixed Cost	Rs.20,000
Profit	Rs.10,000
BEP	Rs.40,000

Solution:

i. At BEP Contribution = Fixed Cost
Therefore,
Contribution at BEP = Rs.40,000
PV Ratio = $\frac{\text{Contribution at BEP}}{\text{BEP Sales}} = \frac{40,000}{1,60,000} * 100 = 25\%$
Therefore, Contribution on MOS = 40,000 * 25% = Rs.10,000

ii. At BEP Contribution = Fixed Cost
Therefore,
Contribution at BEP = Rs.40,000
PV Ratio = $\frac{\text{Contribution at BEP}}{\text{BEP Sales}} = \frac{20,000}{40,000} * 100 = 50\%$

At Contribution on MOS = Profit
Also, Profit = MOS * PV Ratio
Therefore, 10000 = MOS * 50%

$$\text{MOS} = \frac{10,000}{50\%} = \text{Rs.}20,000$$

Sales = BEP + MOS = 40,000 + 20,000 = Rs.60,000

15. Illustration

An Indian soft drink company is planning to establish a subsidiary company in Bhutan to produce mineral water. Based on the estimated annual sales of 40,000 bottles of the mineral water, cost studies produced the following estimates for the Bhutanese subsidiary:

	Total Annual Costs	**Variable %**
Material	**2,10,000**	**100%**
Labour	**1,50,000**	**80%**
Factory Overheads	**92,000**	**60%**
Administration Expenses	**40,000**	**35%**

The Bhutanese production will be sold by manufacturer's representatives who will receive a commission of 8% of the sale price. No portion of the Indian office expenses is to be allocated to the Bhutanese subsidiary.

You are required to:

1. Compute the sale price per bottle to enable the management to realize an estimated 10% profit on sale proceeds in Bhutan.
2. Calculate the break-even point in terms of sales as also in number of bottles for the Bhutanese subsidiary on the assumption that the sale price is Rs.14 per bottle.

Solution:

i. Let us assume the Selling Price per unit to be 'X'
Sales = 40,000X

Cost	**Amount Rs.**
Material	2,00,000
Labour	1,50,000
Factory OH	92,000
Admin OH	40,000
Total	**4,92,000**

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Commission = 8% of 40,000X = 3,200X
Total Cost = 4,92,000 + 3,200X
Profit = 10% of Sales = 10% of 40,000X = 4,000X
Sales = Cost + Profit
40,000X = 4,92,000 + 3,200X + 4,000X
Therefore, 40,000X – 7,200X = 4,92,000
3,28,000X = 4,92,000
X = 4,92,000 = Rs.15 Per Unit
32,800
Therefore, Selling Price = Rs.15 Per Unit

ii.

Particulars	% of Variable Cost	Total Cost	Variable Cost	Fixed Cost (Bal. fig)
Material	100%	2,10,000	2,10,000	-
Labour	80%	1,50,000	1,20,000	30,000
Factory OH	60%	92,000	55,200	36,800
Admin OH	35%	40,000	14,000	26,000
Sales Commission	100%	44,800 (40,000 * Rs.14 * 8%)	44,800	-
Total		**5,36,800**	**4,44,000**	**92,800**

Selling Price Per Unit = Rs.14
Variable Cost Per Unit = 4,44,000 = Rs.11.1
40,000
Therefore, Contribution Per Unit = 14 – 11.1 = Rs.2.9 Per Unit
Therefore, BEP (in Units) = Fixed Cost = 92,800 = 32,000 Units
Contribution Per Unit 2.9
BEP (in Value) = 32,000 * Rs.14 = Rs.4,48,000

16. Illustration

Mr. X has Rs. 2,00,000 investments in his business firm. He wants a 15% return on his money. From an analysis of recent cost figures, he finds that his variable cost of operating is 60 % of sales, his fixed costs are Rs. 80,000 per year.
Show computations to answer the following questions:
1. What sales volume must be obtained to break even?
2. What sales volume must be obtained to get 15% return on investment?

Mr. X estimates that even if he closed the doors of his business, he would incur Rs. 25,000 as expenses per year. At what sales would he be better off by locking his business up?

Solution:

i. BEP at Contribution = Fixed Cost
Hence BEP Contribution Cost = Rs.80,000
BEP = Fixed Cost = 80,000 = Rs.2,00,000
PV Ratio 40%
If, Variable Cost Ratio = 60%

Sales	100%
Less: Variable Cost	60%
Contribution (PV Ratio) (Bal.fig)	40%

ii. Investment = Rs.2,00,000
Desired Return = 15%

Desired Profit (2,00,000 * 15%)	Rs.30,000
Add: Fixed Cost	Rs.80,000

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Desired Contribution	Rs.1,10,000

Therefore, Desired Sales = Desired Contribution = 1,10,000 = Rs.2,75,000
PV Ratio 40%

iii.

Fixed Cost of Operating	Rs.80,000
Less: Cost incurred even after shutdown	Rs.25,000
Avoidable Fixed Cost	Rs.55,000

Sales to recover Avoidable Fixed Cost = 55,000 = Rs.1,37,500
40%

Therefore, Minimum Sales required to justify business = Rs.1,37,500
If sales is less than Rs.1,37,500 we better off locking down the business

Sales	1,00,000	1,37,500	1,50,000	20,0000
Contribution (40%)	40,000	55,000	60,000	80,000
Less: Fixed Cost	(80,000)	(80,000)	(80,000)	(80,000)
Profit/Loss	**(40,000)**	**(25,000)**	**(20,000)**	**-**

17. Illustration

An automobile manufacturing company produces different models of Cars. The budget in respect of model 007 for the month of March, 20X8 is as under:
Budgeted Output 40,000 Units

	Rs. In lakhs	**Rs. In lakhs**
Net Realization		**700.00**
Variable Costs		
Materials	264.00	
Labour	52.00	
Direct Expenses	124.00	**440.00**
Fixed Costs	90.00	
Specific Fixed Expenses	112.50	**202.50**
Allocated Fixed Costs		
Total Costs		642.60
Profits		**57.50**

Calculate:
(i) Profit with 10% increase in selling price with a 10% reduction in sales volume.
(ii) Volume to be achieved to maintain the original profit after a 10% rise in material costs, at the originally budgeted selling price per unit.

Solution:

i. Existing Selling Price Per Unit = 7,00,00,000 = Rs.1,750 Per Unit
40,000

Revised Selling Price Per Unit = 1,750 + 10% of 1,750
= Rs.1,925 Per Unit

Existing No of Units = 40,000 Units
Revised No of Units = 40,000 – 10% of 40,000
= 36,000 Units

Revise Profitability Statement

Particulars	**Amount**
Sales Revenue (36,000 @ Rs.1,925 Per Unit)	6,93,00,000

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Less: Variable Cost 4,40,00,000 * 36,000 40,000	3,96,00,000
Contribution	**2,97,00,000**
Less: Fixed Cost	2,02,50,000
Revised Profit	**94,50,000**

ii. Contribution Per Unit (Revised)

Selling Price Per Unit (7,00,00,000/40,000)	Rs.1,750
Less: Variable Cost Per Unit	
Material [2,64,00,000/40,000 = Rs.660Per Unit * 110%]	Rs.726
Labour [52,00,000/40,000]	Rs.130
Direct Exp [1,24,00,000/40,000]	Rs.310
Contribution Per Unit	**Rs.584 Per Unit**

Calculation of Desired Volume

Let the Volume be 'X'

Therefore,

Sales = Cost + Profit

Sales – Variable Cost = Contribution = Fixed + Profit

Therefore,

584X = Fixed Cost + Profit

584X = 2,02,50,000 + 57,50,000

= 2,60,00,000

$X = \frac{2,60,00,000}{584} = 44,521$ Units

18. Illustration

A single product company sells its product at Rs. 60 per unit. In 20X8, the company operated at a margin of safety of 40%. The fixed costs amounted to Rs. 3,60,000 and the variable cost ratio to sales was 80%.

In 20X9, it is estimated that the variable cost will go up by 10% and the fixed cost will increase by 5%.

(i) Find the selling price required to be fixed in 20X9 to earn the same P/V ratio as in 20X3.

(ii) Assuming the same selling price of Rs. 60 per unit in 20X9, find the number of units required to be produced and sold to earn the same profit as in 20X8.

Solution:

i. Selling Price Per Unit = Rs.60 (in 20X8)

Variable Cost to Sales Ratio = 80% = Variable Cost = 60 * 80% = Rs.48 Per Unit (in 20X8)

Contribution to Sales Ratio = 20% = Contribution Per Unit = 60 * 20% = Rs.12 (in 20X8)
(PV Ratio)

Therefore, Variable Cost in 20X9 Per Unit = 48 * 110% = Rs.52.80 Per Unit

Desired PV Ratio in 20X9 = PV Ratio = 20%

Variable Cost as a % of Sales = 80%

$\text{Selling Price Per Unit} = \frac{\text{Variable Cost Per Unit}}{80\%} = \frac{52.80}{80\%} = \text{Rs.66 Per Unit}$

Therefore, The Revised Selling Per Unit = Rs.66 Per Unit

ii. **In 20X8**

PV Ratio = 20%

Fixed Cost = Rs.36,00,000

MOS = 40%

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Therefore BEP = 60%
At BEP Cost = Fixed Cost
Therefore, BEP Sales = $\frac{\text{Fixed Cost}}{\text{PV Ratio}} = \frac{3,60,000}{20\%}$ = Rs.18,00,000
Therefore, Total Sales = $\frac{18,00,000}{60\%}$ = Rs.30,00,000
Therefore, MOS Sales = 30,00,000 * 40% =Rs.12,00,000
Profit = Contribution on MOS = 12,00,000 * 20% = Rs.2,40,000
Profit in 20X8 = Rs.2,40,000

Calculation of Desired Sales Volume

Particulars	Amount (Rs.)
Selling Price Per Unit	60
Less: Variable Cost Per Unit (revised)	52.8
Revised Contribution Per Unit	**7.2**

Particulars	Amount (Rs.)
Desired Profit in 20X9	2,40,000
Add: Revised Fixed Cost in 20X9 (3,60,000*105%)	3,78,000
Desired Contribution	**6,18,000**

Therefore, Desired Sales Volume = $\frac{\text{Desired Contribution}}{\text{Revised Contribution Per Unit}} = \frac{6,18,000}{7.2}$ = 85,834 Units

19. Illustration

A company has made a profit of Rs.50,000 during the year 20X8-X9.
If the selling price and marginal cost of the product are Rs.15 and Rs.12 per unit respectively.
Find out the amount of margin of safety.

Solution:

Selling Price Per Unit	Rs.15
Less: Variable Cost Per Unit	Rs.12
Contribution Per Unit	**Rs.3**

Since Contribution on MOS Sales = Profit = Rs.50,000 (Given)
Therefore, MOS Sales (in Units) = $\frac{\text{Contribution on MOS Sales}}{\text{Contribution Per Unit}} = \frac{50,000}{3}$ = 16,666.67 Units
MOS Sales (in Value Rs.) = 16,666.67 * 15 = Rs.2,50,000

Alternatively,

Selling Price Per Unit	Rs.15	100%
Less: Variable Cost Per Unit	Rs.12	80%
Contribution Per Unit	**Rs.3**	**20%**

Therefore, PV Ratio = 20%
Since Contribution on MOS Sales = Profit = Rs.50,000 (Given)
MOS Sales (in Value Rs.) = $\frac{\text{Profit}}{\text{PV Ratio}} = \frac{50,000}{20\%}$ = Rs.2,50,000

20. Illustration

(a) If margin of safety is Rs.2,40,000 (40% of sales) and P/V ratio is 30% of AB Ltd Calculate its
(1) Break even sales, and
(2) Amount of profit on sales of Rs.9,00,000.
(b) X Ltd. has earned a contribution of Rs.2,00,000 and net profit of Rs.1,50,000 on sales of Rs.8,00,000. What is its margin of safety?

Solution:

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a) 1. BEP Sales

Given, MOS Sales = Rs.2,40,000

MOS (%) = 40%

Therefore, Total Sales = $\frac{2,40,000}{40\%}$ = 6,00,000

Therefore, BEP Sales = 6,00,000 * 60% = Rs.3,60,000

2. Profit if Sales = Rs.9,00,000

BEP Sales = 3,60,000

Since, Contribution on BEP Sales = Fixed Cost

Therefore, Fixed Cost = BEP Sales * PV Ratio

= 3,60,000 * 30%

= 1,08,000

Profitability

Sales (100%)	Rs.9,00,000
Less: Variable Cost (70%)	Rs.6,30,000
Contribution (30%)	Rs.2,70,000
Less: Fixed Cost	Rs.1,08,000
Profit	**Rs.1,62,000**

b) Approach 1

Sales = Rs.8,00,000

Contribution = Rs.2,00,000

Therefore, PV Ratio = $\frac{\text{Contribution}}{\text{Sales}} = \frac{2,00,000}{8,00,000}$ = 25%

Net Profit = 1,50,000

MOS Sales = $\frac{\text{Profit}}{\text{PV Ratio}} = \frac{1,50,000}{25\%}$ = Rs.6,00,000

Approach 2

PV Ratio = 25%

Contribution = 2,00,000

Profit = 1,50,000

Since, Contribution = Fixed Cost + Profit

Therefore, 2,00,000 = Fixed Cost + 1,50,000

Fixed Cost = 2,00,000 – 1,50,000 = Rs.50,000

Therefore, BEP Sales (in Rs.) = $\frac{\text{Fixed Cost}}{\text{PV Ratio}} = \frac{50,000}{25\%}$ = Rs.2,00,000

MOS Sales = Total Sales – BEP Sales

= 8,00,000 – 2,00,000

= Rs.6,00,000

Approach 3

Total Contribution	
Contribution on BEP Sales	**Contribution on MOS**
Fixed Cost	Profit
Rs.50,000 (Bal. fig)	Rs.1,50,000
25%	75%

MOS Sales = Total Sales * 75% = 8,00,000 * 75% = Rs.6,00,000

21. Illustration

The following information is given by Star Ltd.

- Margin of Safety Rs.1,87,500
- Total Cost Rs.1,93,750
- Margin of Safety 3,750 units
- Break-even Sales 1,250 units

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Required : Calculate

1. Profit,
2. P/V Ratio,
3. BEP Sales (in Rs.) and
4. Fixed Cost

Solution:

Total Sales	
BEP Sales	**MOS Sales**
Rs.62,500 (Rs.50Per Unit * 1,250)	Rs.1,87,500
1,250 Units	3,750 Units

Therefore, Selling Price Per Unit = $\frac{\text{Rs.1,87,500}}{\text{3,750 Units}}$ = Rs.50 Per Unit

i. Profit

Total Cost = Rs.1,93,750
Total Sales = Rs.2,50,000
Profit = Sales – Cost = 2,50,000 – 1,93,750 = Rs.56,250

ii. PV Ratio

MOS Sales = Rs.1,27,500
Profit = Rs.56,250
Therefore, Contribution on MOS Sales = Profit = Rs.56,250
PV Ratio = Contribution (on MOS) = $\frac{56,250}{1,87,500}$ * 100 = 30%

iii. BEP Sales

Selling Price Per Unit = Rs.50 Per Unit
BEP (in Units) = 1,250
Therefore, BEP (in Rs.) = Rs.50 Per Unit * 1,250 Units = Rs.62,500

iv. Fixed Cost

BEP Sales = Rs.62,500
PV Ratio = 30%
Therefore, Contribution on BEP Sales = Fixed Cost
= 62,500 * 30% = Rs.18,750

22. Illustration

A company had incurred fixed expenses of Rs. 4,50,000, with sales of Rs.15,00,000 and earned a profit of Rs. 3,00,000 during the first half year. In the second half, it suffered a loss of Rs. 1,50,000.
Calculate:
(a) The profit-volume ratio, break-even point and margin of safety for the first half year
(b) Expected sales volume for the second half year assuming that selling price and fixed expenses remained unchanged during the second half year.
(c) The break-even point and margin of safety for the whole year

Solution:

Total Sales = Rs.15,00,000 **Contribution on total sales = Rs.7,50,000**	
BEP Sales	MOS Sales
Contribution on BEP Sales = Rs.4,50,000	Contribution on MOS Sales = Rs.3,00,000
Fixed Cost = Rs.4,50,000	Profit = Rs.3,00,000

a)

i. PV Ratio = $\frac{\text{Contribution}}{\text{Sales}} = \frac{7,50,000}{15,00,000}$ * 100 = 50%

ii. BEP Sales = Contribution on BEP = 4,50,000 = Rs.9,00,000

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iii. MOS Sales = $\frac{\text{Contribution on MOS}}{\text{PV Ratio}} = \frac{3,00,000}{50\%}$ = Rs.6,00,000

b) Given, Fixed Cost = Rs.4,50,000

Loss = Rs.1,50,000

Therefore, Contribution = Fixed Cost ± Profit

= 4,50,000 – 1,50,000

= 3,00,000

PV Ratio = 30%

Therefore, Sales Volume = $\frac{\text{Contribution}}{\text{PV Ratio}} = \frac{3,00,000}{50\%}$ = Rs.6,00,000

c) BEP for the year as whole

Fixed Cost = 4,50,000 * 2 = Rs.9,00,000

PV Ratio = 50%

Therefore, BEP Sales (in Rs.) = $\frac{\text{Fixed Cost}}{\text{PV ratio}} = \frac{9,00,000}{50\%}$ = Rs.18,00,000

MOS for the year as whole

Total Sales = 15,00,000 + 6,00,000 = 21,00,000

BEP Sales = 18,00,000

Therefore, MOS Sales = Total Sales - BEP Sales = 21,00,000 – 18,00,000 = Rs.3,00,000

23. Illustration

PQR Ltd. has furnished the following data for the two years:

	20X8	**20X9**
Sales	Rs.8,00,000	?
Profit/Volume Ratio (P/V ratio)	50%	37.5%
Margin of Safety sales as a % of total sales	40%	21.875%

There has been substantial savings in the fixed cost in the year 20X9 due to the restructuring process. The company could maintain its sales quantity level of 20X8 in 20X9 by reducing selling price.

You are required to calculate the following:

- Sales for 20X9 in Value,
- Fixed cost for 20X9,
- Break-even sales for 20X9 in Value.

Solution:

For the Year 20X8

Total Sales = Rs.8,00,000	
BEP Sales (60%)	**MOS Sales (40%)**
Rs.4,80,000	Rs.3,20,000
Contribution on BEP Sales (4,80,000 * 50%) Rs.2,40,000 = Fixed Cost	Contribution on MOS Sales (3,20,000 * 50%) Rs.1,60,000 = Profit

Computation for the year 20X9

Variable cost in 20X9 = Rs.4,00,000

Since Sales quantity hasn't changed in the year of 20X9, the variable cost remains Rs. 4,00,000

Given, PV Ratio = 37.5%

Variable Cost to Sales Ratio = 100% - 37.5% = 62.5%

Therefore, Sales in 20X9 = $\frac{\text{Variable Cost}}{\text{VC in \%}} = \frac{4,00,000}{62.5\%}$ = Rs.6,40,000

For the Year 20X9

Total Sales = Rs.6,40,000	
BEP Sales (100% - 21.875% = 78.125%)	**MOS Sales (21.875%)**
Rs.5,00,000 (Rs.6,40,000 * 78.125%)	Rs.1,40,000 (6,40,000 * 21.875%)
Contribution on BEP Sales	Contribution on MOS Sales

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(5,00,000 * 37.5%) Rs.2,40,000 = Fixed Cost	(1,40,000 * 21.875%) Rs.1,60,000 = Profit

24. Illustration

A Ltd. maintains margin of safety of 37.5% with an overall contribution to sales ratio of 40%. Its fixed costs amount to Rs. 5 lakhs.

Calculate the following:

i. Break-even sales
ii. Sales
iii. Total variable cost
iv. Current profit
v. New 'margin of safety' if the sales volume is increased by 7 ½ %

Solution:

MOS = 37.5%
BEP = 100% - 37.5% = 62.5%
PV Ratio = 40%
Therefore, Variable Cost = 60% of Sales (100% - 40% = 60%)
Fixed Cost = Rs.5,00,000

i. BEP Sales

Given, Fixed Cost = Rs.5,00,000
PV Ratio = 40%
Since, Contribution on BEP Sales = Fixed Cost
Therefore, Contribution on BEP Sales = Rs.5,00,000
Therefore, BEP Sales = $\frac{\text{Contribution}}{\text{PV Ratio}} = \frac{5,00,000}{40\%}$ = Rs.12,50,000

ii. Total Sales

BEP Sales = Rs.12,50,000
BEP as a % of Sales = 62.5%
Therefore, Total Sales = $\frac{12,50,000}{62.5\%}$ = Rs.20,00,000

iii.Total Variable Cost

Total Sales * VC as a % of Sales
= 20,00,000 * 60% = Rs.12,00,000

iv. Current Profit

Approach 1:

Sales	20,00,000
Less: Variable Cost	12,00,000
Contribution	**8,00,000**
Less: Fixed Cost	5,00,000
Profit	**3,00,000**

Approach 2

Total sales = Rs.20,00,000
MOS (as a %) = 37.5%
Therefore, MOS (in Rs.) = 30,00,000 * 37.5% = Rs.7,50,000
PV Ratio = 40%
Profit = Contribution on MOS = 7,50,000 * 40% = Rs.3,00,000

v. Existing Sales = Rs.20,00,000
Revised Sales = 20,00,000 * 107.5%
= Rs.2,15,00,000
BEP Sales (in Rs.) = Rs.12,50,000
Therefore, MOS (Revised) = Sales (revised) – BEP

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= 21,50,000 – 12,50,000

= Rs.9,00,000

MOS as a % of Sales = $\frac{9,00,000}{12,50,000} * 100 = 42\%$

25. Illustration

You are given the following data:

Year	Sales	Profit
20X8	Rs.1,20,000	Rs.8,000
20X9	Rs.1,40,000	R.13,000

Find out –

1. P/V Ratio
2. Breakeven point
3. Profit when sales are Rs.1,80,000
4. Sales required earn a profit of Rs.12,000
5. Margin of Safety in year 20X9

Solution:

i.PV Ratio

Particulars	20X8	20X9	Difference
Sales	1,20,000	1,40,000	Increase by Rs.20,000
Profit	8,000	13,000	Increase by Rs.5,000

PV Ratio = $\frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100 = \frac{5,000}{20,000} \times 100 = 25\%$

ii. BEP Point

Consider 20X8

Given Profit = Rs.8,000

PV Ratio = 25%

Contribution on MOS Sales = Profit

i.e, PV Ratio * MOS Sales = Profit

MOS Sales = $\frac{\text{Profit}}{\text{PV Ratio}} = \frac{8,000}{25\%}$ = Rs.32,000

Total Sales = BEP Sales + MOS Sales

1,20,000 = BEP Sales + 32,000

Therefore, BEP Sales = 1,20,000 – 32,000 = Rs.88,000

Alternatively,

Sales in 20X8 = Rs.1,20,000

PV Ratio = 25%

Therefore, Contribution = 1,20,000 * 25% = Rs.3,00,000

Contribution = Fixed Cost + Profit

Therefore, 30,000 = Fixed Cost + 8,000

Fixed Cost = 30,000 – 8,000 = Rs.22,000

BEP Sales = $\frac{\text{Fixed Cost}}{\text{PV Ratio}} = \frac{22,000}{25\%}$ = Rs.88,000

iii. Profit when Sales are Rs.1,80,000

Sales = Rs.1,80,000

PV Ratio = 25%

Therefore,

Contribution (1,80,000 * 25%)	Rs.45,000
Less: Fixed Cost	Rs.22,000
Profit	**Rs.23,000**

iv. Desired Sales when Profit required is Rs.12,000

Approach 1

Desired Profit	Rs.12,000

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Add: Fixed Cost	Rs.22,000
Desired Contribution	**Rs.34,000**

PV Ratio = 25%

Therefore, Desired sales = $\frac{\text{Desired Contribution}}{\text{PV Ratio}} = \frac{34,000}{25\%}$ = Rs.1,36,000

Approach 2

Desired Profit = Rs.12,000

PV ratio = 25%

Therefore, MOS Sales = $\frac{\text{Desired Profit}}{\text{PV Ratio}} = \frac{12,000}{25\%}$ = Rs.48,000

Desired Sales = BEP Sales + MOS Sales

= 88,000 + 48,000

= Rs.1,36,000

v.Margin of Safety in 20X9

In 20X9, Total Sales = Rs.1,40,000

Since, Sales (total) = BEP Sales + MOS Sales

1,40,000 = 88,000 + MOS Sales

Therefore, MOS Sales = 1,40,000 – 88,000 = Rs.52,000

26. Illustration

A company sells its product at Rs. 15 per unit.

1. In a period, if it produces and sells 8,000 units, it incurs a loss of Rs. 5 per unit.
2. If the volume is raised to 20,000 units, it earns a profit of Rs. 4 per unit. Calculate break-even point both in terms of Value as well as in units.

Solution:

Particulars	Period 1	Period 2	Change
No. of Units	8,000	20,000	Increase by 12,000 Units
Selling Price p.u.	Rs.15	Rs.15	-
Sales	1,20,000	3,00,000	Increase by Rs.180000
Profit/Loss	(40,000) (-Rs.5 Per Unit * 8,000)	80,000 (Rs.4 Per Unit * 20,000)	Increase by Rs.1,20,000

Therefore, PV Ratio = $\frac{\text{Change in Profit}}{\text{Change in Sales}} * 100 = \frac{1,20,000}{1,80,000} * 100 = 66.67\%$

Approach 1

Sales @ 20,000 Units	Rs.3,00,000
PV Ratio	66.67%
Contribution (3,00,000 * 66.67%)	**Rs.2,00,000**
Less: Profit	(Rs.80,000)
Fixed Cost	**Rs.1,20,000**

Therefore, BEP (in Rs.) = $\frac{\text{Fixed Cost}}{\text{PV Ratio}} = \frac{1,20,000}{66.67\%}$ = Rs.1,80,000

BEP (in Units) = $\frac{\text{Rs.1,80,000}}{\text{Rs.15P.U}}$ = 12,000 Units

Approach 2

In Period 2: - Profit = Rs.80,000

PV Ratio = 66.67%

Therefore, MOS Sales = $\frac{\text{Profit}}{\text{PV Ratio}} = \frac{80,000}{66.67\%}$ = Rs.1,20,000

Total Sales = Rs.3,00,000

Therefore, BEP Sales (in Rs.) = Total Sales – MOS Sales

= 3,00,000 – 1,20,000

= Rs.1,80,000

BEP (in Units) = $\frac{\text{Rs.1,80,000}}{\text{Rs.15P.U}}$ = 12,000 Units

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27. Illustration

A company has three factories situated in north, east and south with its Head Office in Mumbai. The management has received the following summary report on the operations of each factory for a period:

(Rs. in '000)

	Sales		Profit	
	Actual	**Over/(Under) Budget**	**Actual**	**Over/(Under) Budget**
North	1,100	(400)	135	(180)
East	1,450	150	210	90
South	1,200	(200)	330	(110)

Calculate for each factory and for the company as a whole for the period:

1. Fixed costs.
2. Break-even sales

Solution:

North ('000)

Particulars	Actuals	Budgets	Change (Over/Under)
Sales	1,100	1,500	(400)
Profits	135	315	(180)

$$\text{Therefore, PV Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} * 100 = \frac{180}{400} * 100 = 45\%$$

East ('000)

Particulars	Actuals	Budgets	Change (Over/Under)
Sales	1,450	1,300	150
Profits	210	120	90

$$\text{Therefore, PV Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} * 100 = \frac{90}{150} * 100 = 60\%$$

South ('000)

Particulars	Actuals	Budgets	Change (Over/Under)
Sales	1,200	1400	200
Profits	330	440	110

$$\text{Therefore, PV Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} * 100 = \frac{110}{200} * 100 = 55\%$$

Fixed Cost = Contribution – Profit

Fixed cost = (Sales * PV Ratio) – Profit

Actuals

North [(1,100 * 45%) – 135]	Rs.360
East [(1,450 * 60%) – 135]	Rs.660
South [(1,200 * 55%) – 330]	Rs.330
Fixed Cost for Company ('000)	Rs.1,350

$$\text{BEP Sales} = \frac{\text{Fixed Cost}}{\text{PV Ratio}}$$

North (360/45%)	Rs.800
East (660/60%)	Rs.1,100
South (330/55%)	Rs.600
BEP (in Rs. '000) for Company	Rs.2,500

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28. Illustration

Arnav Ltd. sells two products, J and K.

1. The sales mix is 4 units of J and 3 units of K.
2. The contribution margins per unit are Rs. 40 for J and Rs. 20 for K.
3. Fixed costs are Rs. 6,16,000 per month.

Compute Composite BEP.

Solution:

Particulars	Product J	Product K
Contribution Per Unit	Rs.40	Rs.20
Sales Mix	4	3
Fixed Costs	**Rs.6,16,000**	

Contribution per combination = (4 x 40) + (3 x 20) = Rs.220

Composite BEP = Fixed Cost/Contribution per Combination

= 6,16,000/220 = 2,800 Combination

BEP (Product J) = 2,800 *4 = 11,200 Units

BEP (Product K) = 2,800 * 3 = 8,400 Units

29. Illustration

The product mix of a Gama Ltd. is as under:

	Product M	Product N
Units	54,000	18,000
Selling Price	Rs.7.50	Rs.15.00
Variable Cost	Rs.6.00	Rs.4.50

Find the break-even points in units, if the company discontinues product 'M' and replace with product 'O'. The quantity of product 'O' is 9,000 units and its selling price and variable costs respectively are Rs. 18 and Rs. 9. Fixed Cost is Rs. 15,000.

Solution:

Particulars	Product N	Product O
Units	18,000	9,000
Selling Price	Rs.15	Rs.18
Variable Cost	Rs.4.5	Rs.9
Fixed Costs	**Rs.15,000**	

Sales Mix (N:O) = 2:1

Step 1:

Particulars	Product N	Product O
Selling Price	Rs.15	Rs.18
Less: Variable Cost	Rs.4.5	Rs.9
Contribution Per Unit	**Rs.10.5**	**Rs.9**

Step 2:

Combined Contribution = (10.5 * 2) + (9 * 1) = Rs.30

Step 3:

Composite BEP = $\frac{15,000}{30}$ = 500 Combinations

Step 4:

BEP (Product N) = 500 * 2 = 1000 Units

BEP (Product O) = 500 * 1 = 500 Units

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30. Illustration

A manufacturing company incurs fixed costs of Rs.3,00,000 per annum. It is a single product company with annual sales budgeted to be 70,000 units at a sales price of Rs.300 per unit. Variable costs are Rs.285 per unit.

(i) Draw a profit volume graph and use it to determine the break-even point.

The Company is deliberating upon an increase in the selling price of the product to Rs.350 per unit. This shall be required in order to improve the quality of the product. It is anticipated that despite increase in the selling price the sales volume shall remain unaffected, however, the fixed costs shall increase to Rs.4,50,000 per annum and the variable costs to Rs.330 per unit.

(ii) Draw on the same graph as for part (i) a second profit volume graph and give your comments.

Solution:

Annual Sales = 70,000 Units

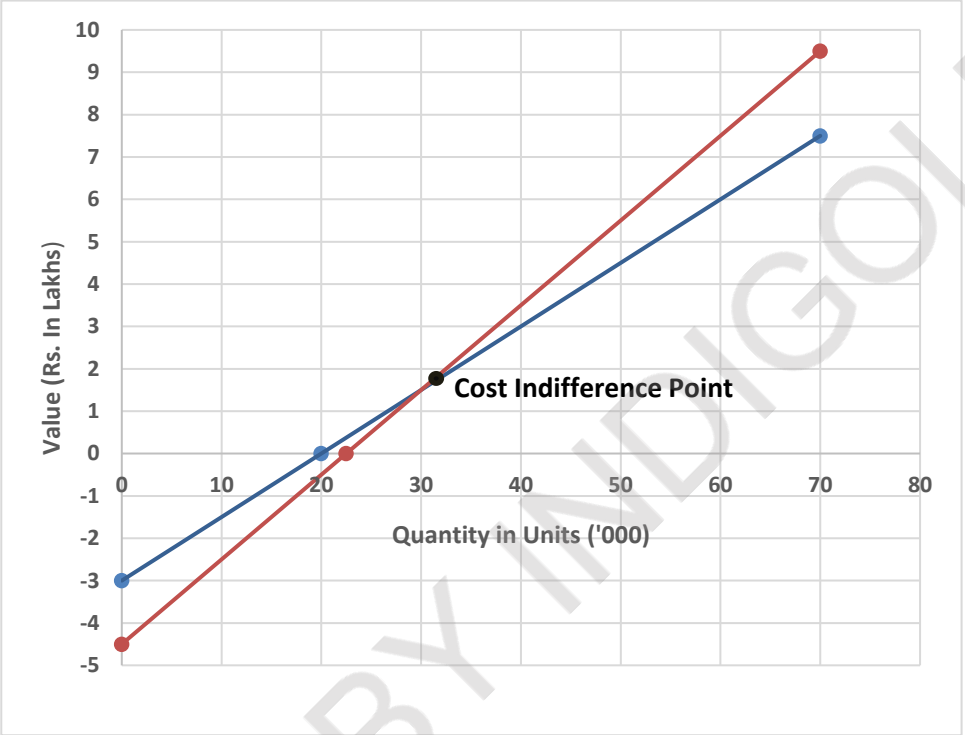
Fixed Cost = Rs.3,00,000

Selling Price Per Unit = Rs.300

Variable Cost Per Unit = Rs.285

Contribution Per Unit = Rs.15

$$\text{BEP (Units)} = \frac{\text{Fixed Cost Units}}{\text{Contribution Per Unit}} = \frac{3,00,000}{15} = 20,000 \text{ Units}$$



Situation 1

Particulars	Sales 0 Units (Rs.)	Sales 70,000 Units (Rs.)	Sales 20,000 Units (Rs.)
Sales Value @ Rs.300 p.u	0	2,10,00,000	60,00,000
Less: Variable Cost @ Rs.285 p.u	0	(1,99,50,000)	(57,00,000)
Contribution	**0**	**10,50,000**	**3,00,000**
Less: Fixed Costs	(3,00,000)	(3,00,000)	(3,00,000)
Profit/ (Loss)	**(3,00,000)**	**7,50,000**	**0**

Situation 2

Particulars	Sales 0 Units (Rs.)	Sales 70000 Units (Rs.)	Sales 20000 Units (Rs.)
Sales Value @ Rs.350 p.u	0	2,45,00,000	78,75,000

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Less: Variable Cost @ Rs.330 p.u	0	(2,31,00,000)	(74,25,000)
Contribution	**0**	**14,00,000**	**4,50,000**
Less: Fixed Costs	(4,50,000)	(4,50,000)	(4,50,000)
Profit/ (Loss)	**(4,50,000)**	**9,50,000**	**0**

Particulars	Situation 1	Situation 2
No. of Units	30,000	30,000
Sales Value	90,00,000	10,50,00,000
Less: Variable Cost	85,50,000	99,00,000
Contribution	**4,50,000**	**6,00,000**
Less: Fixed Cost	3,00,000	4,50,000
Profit/ (Loss)	**1,50,000**	**1,50,000**

OBSERVATIONS:

i. Situation 1 allows to breakeven earlier i.e at 20,000 Units than the 22,500 units breakeven point of situation 2, w.r.t BEP situation 1 is better
ii. Situation 2 allows higher profits (Incremental profit of Rs.2,00,000) at maximum sales of 70,000 units, i.e when the selling price, variable costs and fixed costs have increased, thus w.r.t overall profit position situation 2 is better
iii. Profit at 30,000 units is same for both situation 1 and situation 2, i.e Rs.1,50,000. Thus 30,000 units is the cost indifference point
iv. Addition contribution from situation 2 is Rs.5 per unit and additional fixed costs if Rs.1,50,000, company has to sell 30,000 units to recover the additional fixed costs by shifting to situation 2.
v. Below 30,000 units, situation 1 is preferable and above 30000 units of sales situation 2 is preferable.

31. Illustration

(a) You are given the following data for the coming year for a factory:

Budgeted output	8,00,000 units
Fixed expenses	Rs.40,00,000
Variable expenses per unit	Rs.100
Selling price per unit	Rs.200

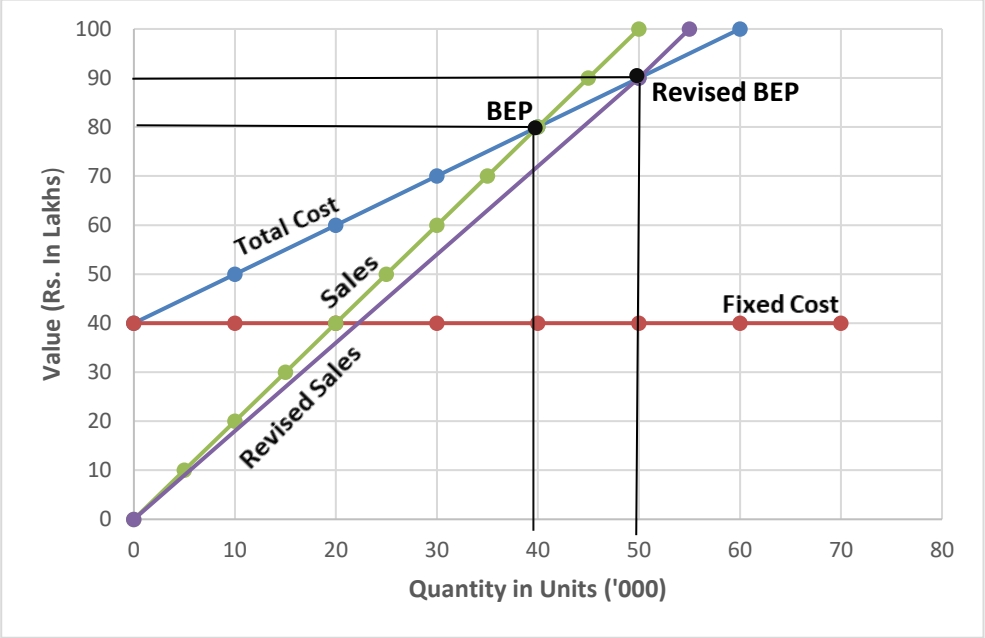
Draw a break-even chart showing the break-even point.

(b) If the price is reduced Rs.180, what will be the new break-even point? Indicate this on the graph.

Solution:

Budgeted output	8,00,000 units
Fixed expenses	Rs.40,00,000
Variable expenses per unit	Rs.100
Selling price per unit	Rs.200
Contribution per unit	Rs.100
BEP = Fixed Cost/ Contribution p.u.	40,000 Units

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32. Illustration

M.K. Ltd. manufactures and sells a single product X whose selling price is Rs.40 per unit and the variable cost is Rs.16 per unit.

1. If the Fixed Costs for this year are Rs. 4,80,000 and the annual sales are at 60% margin of safety, calculate the rate of net return on sales, assuming an income tax level of 40%
2. For the next year, it is proposed to add another product line Y whose selling price would be Rs.50 per unit and the variable cost Rs.10 per unit. The total fixed costs are estimated at Rs.6,66,600. The sales mix of X : Y would be 7 :
3. At what level of sales next year, would M.K. Ltd. break even? Give separately for both X and Y the break-even sales in rupee and quantities.

Solution:

i.

Selling Price Per Unit	Rs.40
Less: Variable Price Per Unit	Rs.16
Contribution Per Unit	**Rs.4**

Fixed Cost = Rs.4,80,000 p.a

Therefore, BEP (in Units) = $\frac{\text{Fixed Cost}}{\text{Contribution Per Unit}} = \frac{\text{Rs.4,80,000}}{\text{Rs.24 p.u}}$ = 20,000 Units

Given, MOS = 60%, Therefore BEP Sales = 100% - 60% = 40%

Annual Sales = $\frac{20,000 \text{ Units}}{0.40.}$ = 50,000 Units

Calculation of Rate of Net Return

Sales Revenue (50,000 Units * Rs.40p.u.)	2,00,00,000
Less: Variable cost (50,000 Units * Rs.16p.u.)	8,00,000
Contribution	**12,00,000**
Less: Fixed Cost	4,80,000
Profit	**7,20,000**
Less: Tax @ 40%	2,88,000
PAT	**4,22,000**

Therefore, Rate of Net Return on Sales = $\frac{4,80,000}{30,00,000} * 100 = 21.62\%$

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ii. Combined BEP

Particulars	X	Y
Selling Price Per Unit	40	50
Less: Variable Cost Per Unit	16	10
Contribution Per Unit	**24**	**40**
MIX	**7:3**	

Therefore, Combined contribution per combination = (24 x 7) + (40 x 3)
= 168 + 120
= 288

Fixed Cost = Rs.6,66,600

Therefore BEP (in no of Combination) = $\frac{6,66,600}{288}$ = 2,314.58 Combination

Product wise BEP

Particulars	X	Y
No. of Units per combination	7	3
Total no. of Units	16,202.08 or 16,202	6,943.74 or 6,944
Selling Price Per Unit	40	50
Sales @ BEP (in Rs.)	6,48,080	3,47,200
Total	**9,95,280**	

33. Illustration

X Ltd. supplies spare parts to an aircraft company Y Ltd. The production capacity of X Ltd. facilitates production of any one spare part for a particular period of time. The following are the cost and other information for the production of the two different spare parts A and B:

Per unit	Part A	Part B
Alloy usage	1.6 kgs.	1.6 kgs.
Machine Time: Machine A	0.6 hrs.	0.25 hrs.
Machine Time: Machine B	0.5 hrs.	0.55 hrs.
Target Price (Rs.)	145	115

1. Total hours available:
   - Machine A 4,000 hours
   - Machine B 4,500 hours
2. Alloy available is 13,000 kgs. @ Rs.12.50 per kg.
3. Variable overheads per machine hours:
   - Machine A: Rs. 80
   - Machine B: Rs. 100

Required:
(1) Identify the spare part which will optimize contribution at the offered price.
(2) If Y Ltd. reduces target price by 10% and offers Rs. 60 per hour of unutilized machine hour, what will be the total contribution from the spare part identified above?

Solution:

Unutilized machine time (6666 parts of A)

Machine	Time Available	Time use for 6,666 Units	Balance
A	4,000	4,000	-
B	4,500	3,333	1,167

Revised Contribution

From Sales (6,666 * 12.5)	83,325
From Machine Hours (60 * 1,167)	70,020
Total Revised	**1,53,345**

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Calculation of Revised Contribution Per Unit

Existing Contribution Per Unit from Part A	Rs.27 Per Unit
Less: Discount (145 * 10%)	Rs.14.5 Per Unit
Revised Contribution Per Unit	**Rs.12.5 Per Unit**

Working Note:

1. **Maximum Possible Production and Sale**

Resource	Max available	Max Possible Part A (Standalone)	Production Part B (Standalone)
Alloy	13,000 Kgs	8,125 (13,000/1.6)	8,125 (13,000/1.6)
Machine Time A	4,000 Hrs	6,666 (4,000/0.6)	16,000 (4,000/0.25)
Machine Time B	4,500 Hrs	9,000 (4,500/0.5)	8,181(4,500/0.55)
Practical possible production & Sales	-	6,666	8,125

2. **Calculation of Contribution Per Unit**

Particulars	Existing	
	A	B
Selling Price Per Unit (Target Price)	145	115
Less: Variable Cost		
Alloy cost @ 12.5/Kg	20	20
Machine Overhead A @ Rs.80	48	20
B @ Rs.100	50	55
Contribution Per Unit	**27**	**20**

3. **Maximum Contribution**

Part A = Rs.27 p.u. * 6,666 = 1,79,982
Part B = Rs.20 p.u. * 8,125 = 1,62,500
Therefore, Part A will be selected

34. Illustration

The profit for the year of R.J. Ltd. works out to 12.5% of the capital employed and the relevant figures are as under:

- Sales... Rs. 5,00,000
- Direct Materials... Rs. 2,50,000
- Direct Labour... Rs. 1,00,000
- Variable Overheads... Rs.40,000
- Capital Employed... Rs. 4,00,000

The new Sales Manager who has joined the company recently estimates for next year a profit of about 23% on capital employed, provided

- the volume of sales is increased by 10% and
- simultaneously there is an increase in Selling Price of 4% and
- an overall cost reduction in all the elements of cost by 2%. Required

Find out by computing in detail the cost and profit for next year, whether the proposal of Sales Manager can be adopted.

Solution:

Particulars	Existing	Revised
Sales	5,00,000	5,72,000 (5,00,000 * 1.10 * 1.04)
Less: Variable Cost		
Direct Material	2,50,000	2,69,500 (2,50,000 * 1.10 * 0.98)
Direct Labour	1,00,000	1,07,800 (1,00,000 * 1.10 * 0.98)
Variable Overhead	1,00,000	(4,00,000 * 1.10 * 0.98)

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Contribution	**1,10,000**	**1,51,500**
Less: Fixed Cost	60,000	58,800 (60,000 * 0.98)
Profit	**50,000**	**92,780**
Capital Employed	**4,00,000**	**4,00,000**
ROCE	**12.5%** **50,000 * 100** **4,00,000**	**23.20%** **92,780 * 100** **4,00,000**

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UNIT 2 : STANDARD COSTING

OVERVIEW

- Meaning of Standard cost and standard costing
- Types of standard
- The process of standard costing
- Setting up of standard cost
- Types of variance

1. Meaning of standard cost and standard costing

- Cost control is one of the objectives of cost management. Management of an organisation sets predetermined cost for the comparison of the actual cost with the predetermined cost. Predetermined costs are standard costs used for cost control and the performance evaluation.
- Standard costing is a method of cost and management accounting which starts with setting up of standards and ends with the reporting of variances to the management to take corrective actions.
- The Official Terminology of CIMA, London defines standard costing as "Control technique that reports variances by comparing actual costs to pre-set standards so facilitating action through management by exception."
- We will learn how standards are set for each cost component i.e., material, labour, and overheads of a cost object below.

Standard Cost

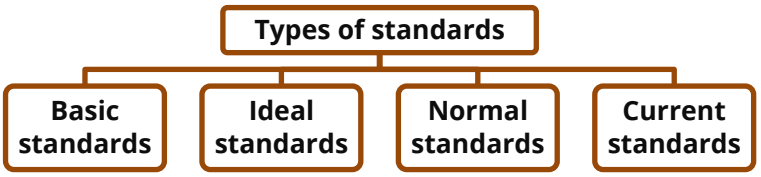
- Standard cost is defined in the CIMA Official Terminology as "'the planned unit cost of the product, component or service produced in a period. The standard cost may be determined on several bases. The main use of standard costs is in performance measurement, control, stock valuation and in the establishment of selling prices." From the above definition Standard costs can be said as
  - Planned cost.
  - Determined on a base or number of bases.

Why is Standard Costing Needed?

- Standards or Standard costs are established to evaluate performance of a responsibility centre. Apart from performance evaluation and cost control, standard costs are also used to value inventory where actual figures are not reliably available and to determine selling prices particularly while preparing quotations.
- Standard costing system is widely accepted as it serves different needs of an organisation. The standard costing is preferred for the following reasons:
- Prediction of future cost for decision making: Standard costs are set after taking all present conditions and future possibilities into consideration. Hence, standard cost is future cost for the purpose of cost estimation and profitability from a proposed project/ order/ activity.
- Provide target to be achieved: Standard costs are the target cost which should not be crossed by the responsibility centres. Performance of a responsibility centre is continuously monitored and measured against the set standards. Any variance from the standard is noted and reported for appropriate action.
- Used in budgeting and performance evaluation: Standard costs are used to set budgets and based on these budgets managerial performance is evaluated. This is of two benefits, one managers of a responsibility centre will not compromise with the quality to fulfil the budgeted quantity and second, variances can be traced with the responsible department or person.
- Interim profit measurement and inventory valuation: Actual profit can only be known after the closure of the accounts. But an organisation may need to prepare profitability statement for interim periods for managerial reporting and decision making. To arrive at profit figure, standard costs are deducted from the revenue.

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2. Types of standards



A. Basic standard

- This is a standard which is established for use unaltered over a long period of time.
- standards are fixed scientifically and hence it is more of a technical job.
- These basic standards are supposed to remain unchanged so long as quality requirements for constant rooftop, moreover if forward contracts are entered into regarding materials and labour pact signed for a certain period the costs can be planned accordingly.
- Such cost i.e., basic standards may have where had to be adjusted for changes in circumstances in a period.

B. Current standards

- Current standard is a standard is a standard established for use over a short period of time, related to current conditions.
- The problem with this type of standard is that is does not try to improve on current levels of efficiency.

C. Normal standard

- Yet another target is one which is intended to cover a longer period a period long enough to cover one trade cycle i.e., roughly 7 to 10 years.
- This is defined as the average standard which it is anticipated can be attained over a further period preferably long enough to cover one trade cycle.

D. Ideal standard

- The standard referred to the target which can be attained under most ideal conditions. Hence it is more idealistic and less realistic.
- It is defined by the terminology as the standard which can be our time under the most favourable conditions with no allowances for normal losses based and machine downtime.
- Current Standards: These standards reflect the management's anticipation of what actual costs will be for the current period. These are the costs which the business will incur if the anticipated prices are paid for the goods and services and the usage corresponds to that believed to be necessary to produce the planned output.
- The variances arising from expected standards represent the degree of efficiency in usage of the factors of production, variation in prices paid for materials and services and difference in the volume of production.

3. Process of standard costing

The process of standard cost is as below:

- **Setting of Standards:** The first step is to set standards which are to be achieved, the process of standard setting is explained below.
- **Ascertainment of actual costs:** Actual cost for each component of cost is ascertained. Actual costs are ascertained from books of account, material invoices, wage sheet, charge slip etc.
- **Comparison of actual cost with standard cost**: Actual costs are compared with the standards costs and variances are determined.
- **Investigate the reasons for variances**: Variances arises are investigated for further action. Based on this, performance is evaluated, and appropriate actions are taken
- **Disposition of variances:** Variances arise are disposed-off by transferring it the relevant accounts (costing profit and loss account) as per the accounting method (plan) adopted.

4. Setting up of standard cost

- Study of the technical and operational aspects of the concern Such as methods of manufacture and the processes involved management of organisation and line of assignment of responsibilities division of the

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organisation into cost centres units of measurement of input and output anticipation of wastes, rejections and losses expected efficiency, and capacity likely to be utilized.

- Review of existing costing system and the cost records and forms in use
- The type of standard to be used I.e., weather current basic or normal standard costs are to be set. The choice of standard will depend upon two factors Viz which type would be most effective for cost control in the organisation and whether the standards will be merged in accounting system or kept outside the accounts as statistical data.
- Proper classification of the counts so that variances maybe determined in in the manner desired.
- Fixation of responsibility for setting standards. As definite responsibility for variances from standards is ultimately to be laid on individuals or departments it is but natural that all those individuals our departments should be associated with the setting of standards.

5. Physical standards

- Physical standards refer to expression of standards in units or hours. At this stage standard quantity and standard hours are determined for a particular product or service. The purpose of setting standards is to secure economies in scale of production and to set selling price for quotation purpose.
- In manufacturing organisations, the task of setting physical standards is assigned to the industrial engineering department. While setting standards consideration is given to the
    - Company's operating plan i.e., budgets
    - Final output to be produced.
    - Material specification, in both quantity and quality provided by the engineering department.
    - Proportion of material to be used in case of multiple inputs.
    - Method of production i.e., fully automated, semi-automated or manual
    - Skill set of workers and availability of workers.
    - Working conditions and internal factors
    - External factors (such as Labour Law, Factories Act, Govt. policy etc.)

Procedure of setting material price standards

- Material prices are not altogether within the control of the manufacturer; but the purchasing department, on being apprised of production quantities required, should be able, from its knowledge of current market conditions and trends to state with reasonable accuracy price for the constituent items.
- The standards for prices of materials should be based on the following factors, if price fluctuations are small and are not serious.
    - Stock of materials on hand and the prices at which they are held.
    - The prices at which orders for future deliveries of materials (agreement entered) have already been placed,
    - Minimum support price fixed by the appropriate authority and
    - Anticipated fluctuation in price levels
- In case there are unsystematic fluctuations in the market price, it may be difficult to determine standard costs of materials; fluctuations in the market price may be of different sorts; prices may be different from month to month, from one season to another or from one year to another.
- There may be a secular trend which, overall, is pushing price upwards or downwards.
- The nature of difficulties encountered in fixing standard costs of materials will naturally be different in each case.
- In addition, the purchasing policy of the company and the objective to be achieved (from cost accounting) will make a difference.

The difficulty in determining the standard cost of material in such a situation can be resolved as follows:

- In case prices fluctuate from month to month, the average of prices of a year corrected for the known secular changes and any other expected change can very well serve as the standard price for the next year.

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- If the fluctuations are seasonal, but the whole year's requirements are purchased at one time, the weighted average of the likely prices to be paid should be treated as the standard price. But, if buying is also spread over the whole year, the weighted average of the prices for the whole year should be the standard price.
- If prices fluctuate from one year to another, a careful estimate of the price likely to prevail next year, based on a statistical study, should be adopted as the standard price.

Procedure of setting wage rate standard

The type of labour required for performing a specific job would be the most important factor for deciding the rate of wage to be paid to workers. Standard wage rate for skilled and unskilled workers are set based on the following basis:

- Time taken by the workers to complete a unit of production.
- Time or piece rate prevailing in the industry. It can be known from the peers.
- Wage agreement entered between the management and workers' union.
- Law prevailing in operation, law like Payment of minimum wages Act, Payment of bonus Act etc.

Procedures of setting of overhead expense standards

- In computing the overhead expense standards, consideration should be given to the level of output and the budgeted expenses.
- A budgeted output is fixed considering practical manufacturing capacity and anticipated sales demand.
- Expenditures can be budgeted under different heads for the level of output chosen. These expenditures are classified as fixed and variable.
- Thus, the overhead expense standards are set by computing the optimum level of output for a production department followed by budgets for fixed and variable overheads.
- If production is seasonal or it fluctuates during the year, a flexible budget may be prepared to facilitate comparison between the set target and actual expenditure for the period.

6. Types of variances

A. Favourable and unfavourable variance

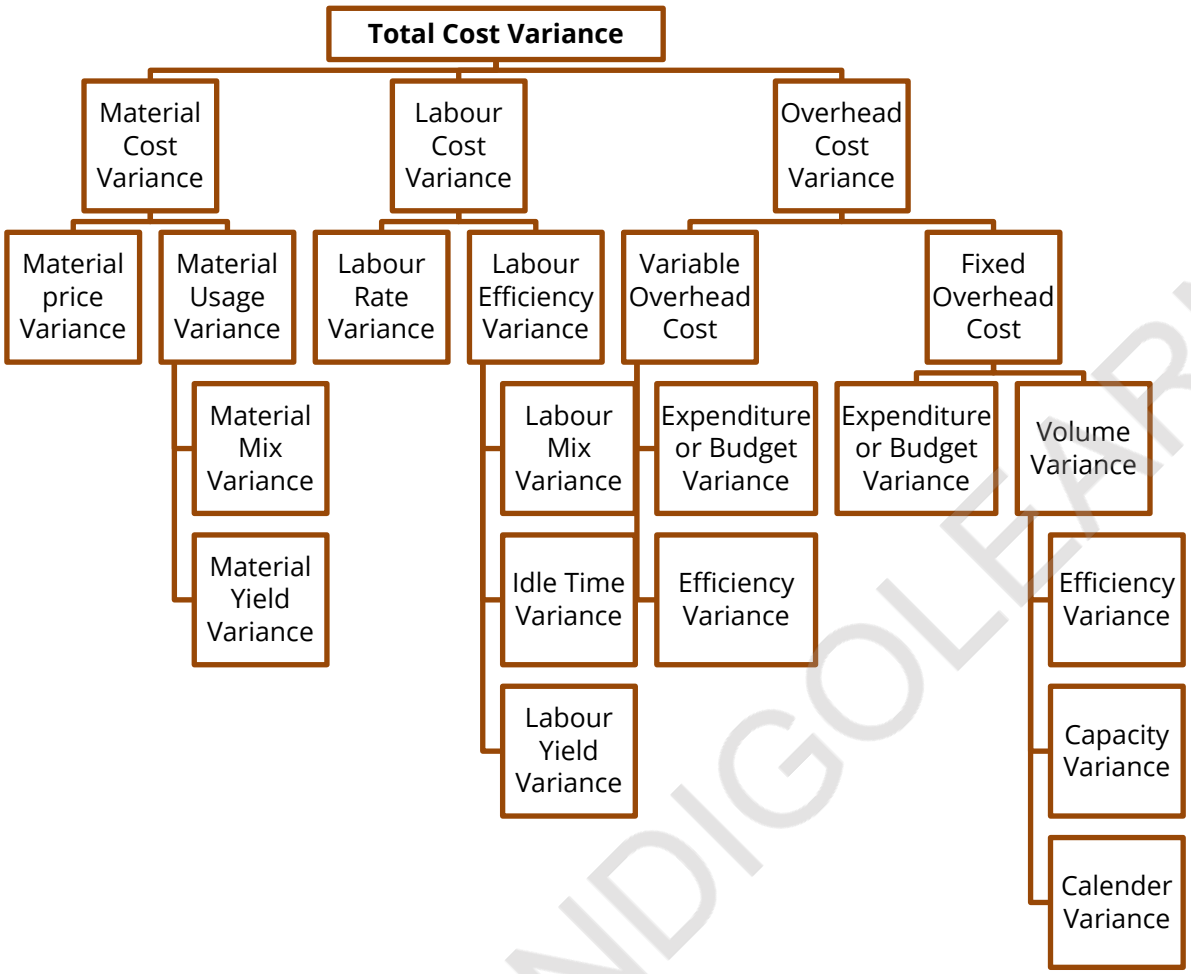
- If the actual cost is less than standard cost the difference is known as favourable variants credit variants are positive variance denoted by F or CR-it increases the profit.
- On the other hand, if actual cost exit standard cost that divergence is known as unfavourable variance debit variance, negative variance or adverse variance denoted by A or Dr - it reduces the profit.

B. Controllable and uncontrollable variance

- When the variance with respect to any cost item reflects the degree of efficiency of an individual or department i.e., a particular individual or departmental head is responsible for the variance, the variance is known as a controllable variance.
- Obviously, such a variance is amenable to control by suitable action.
- And uncontrollable variance is one which is not amenable to control by individual or departmental action.
- Such a variance is caused by external factors like change in market conditions fluctuations in demand and supply etc.
- No individual within the organisation can be held responsible for it.
- Mean variances are reported attention of the management is particularly drawn towards controllable variances.
- If a variance has been caused by multiple factors the path of cost variance relevant to each factor should be determined.

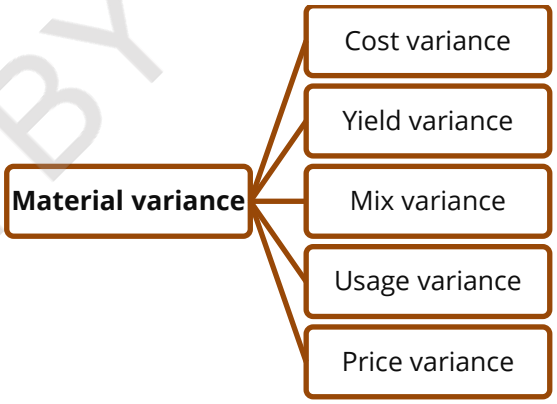
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Classification of variances



7. Types of variances

Material variances



A. Direct materials cost variance

- Direct material cost variance is the difference between the actual direct material cost incurred and the standard direct material cost specified for the production achieved.

$$\text{Material Cost Variance} = \text{Standard Cost} - \text{Actual Cost}$$
$$\text{Or}$$
$$(\text{Std. Quantity} \times \text{Std. Price}) - (\text{Actual Quantity} \times \text{Actual Price})$$

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Causes for cost variance:

- Material cost variance arises mainly because of either difference in material price from the standard price or difference in material consumption from standard consumption or both the reasons.
- Analysis of material cost variance is done dividing it into two parts namely Material Price variance and Material Usage variance

B. Direct material price variance

- This is that portion of material cost variance which is due to the difference between the standard prices specified and actual price paid.
- Material price variance is that portion of direct materials cost variance which is the difference between the standard price specified and actual price paid for the direct materials used.
- This is an incurring variance. This reflects that extra price paid on the units purchased. While making this calculation standard consumption of units should not be given any consideration.
- It is computed by multiplying the actual quantity by the difference between the standard price and actual price.

$$\text{Material Price Variance} = \text{Standard Cost of Actual Quantity} - \text{Actual Cost}$$

Or

$$\text{Actual Quantity (AQ)} \times (\text{Std. Price (SP)} - \text{Actual Price (AP)})$$

Or

$$(\text{SP} \times \text{AQ}) - (\text{AP} \times \text{AQ})$$

Causes of material price variance:

- Change in basic purchase price of material.
- Change in quantity of 50 for an economical size of purchase order.
- Rush order to meet shortage of supply for purchase in less or more favourable market.
- Failure to take advantage of offseason price failure to purchase when price is cheaper.
- Weak purchase organisation
- Payment of excess or less freight
- Use of substitute material having a higher or lower unit price.
- Transit losses and description cease if purchase price is inflated to include the loss.
- Change in materials purchase upkeep and store keeping cost. (this is applicable only when such changes are allocated to direct material cost on a pre-determined for standard cost basis).

C. Direct materials usage variance

- The difference between the actual quantity used and the amount which should have been used valued at standard price.

Direct material usage variance= (standard quantity for actual output X standard price) minus (standard price X actual quantity)

$$\text{Material Usage Variance} = \text{Standard Cost of Standard Quantity for Actual Production} - \text{Standard Cost of Actual Quantity}$$

Or

$$\text{Std. Price (SP)} \times \{\text{Std. Quantity (SQ)} - \text{Actual Quantity (AQ)}\}$$

Or

$$[(\text{SQ} \times \text{SP}) - (\text{AQ} \times \text{SP})]$$

Causes of material usage variance:

- Variation in usage of materials due to inefficient or careless use, or economic use of materials
- Change in specification for design of product.
- Inefficient and inadequate inspection of raw materials
- Purchase of inferior materials or change in quality of materials.
- Rigid technical specifications and strict inspection leading to more rejections which require more materials for rectification.
- Inefficiency in production resulting in wastages.
- Use of substitute materials.

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- Theft, pilferage of materials
- change in composition of mixture of materials for specified output.
- Faulty materials processing. Timber for example if not properly seasoned may be wasted while being used in subsequent processes.
- Defective machines tools and equipment and bad or improper maintenance leading to breakdown and more usage of materials.

D. Direct material yield variance

- Direct material yield variance is the difference between the standard cost of production achieved and the actual total quantity of materials used. Multiplied by the standard weighted average price per unit.

$$\text{Material Yield Variance} = \begin{bmatrix}\text{Standard Cost of Standard Quantity for Actual Proportion} \\ - \text{ Standard Cost of Actual Quantity}\end{bmatrix}$$

Or

$$\text{Std. Price (SP)} \times \{\text{Std. Quantity (SQ)} - \text{ Revised Standard Quantity (RSQ)}\}$$

Or

$$[(\text{SQ} \times \text{SP}) - (\text{RSQ} \times \text{SP})]$$

E. Material mix variance

- If a process uses several different materials which could be combined in a standard proportion and mix variance can be calculated which shows the effect on cost variance is from the standard proportion.
- There are two recognised ways of calculating this mix variance.
- Some authorities regard the variances as a subset of the usage variance, but others treat it as part of the price variance.
- If the mix variance is treated as a subset of the usage variance, then the material mix variance is the difference between the total quantity in standard proportion price at the standard price and the actual quantity of material used price that the standard price.

$$\text{Material Mix Variance} = \begin{bmatrix}\text{Standard Cost of Actual Quantity in Standard Proportion} - \\ \text{Standard Cost of Actual Quantity}\end{bmatrix}$$

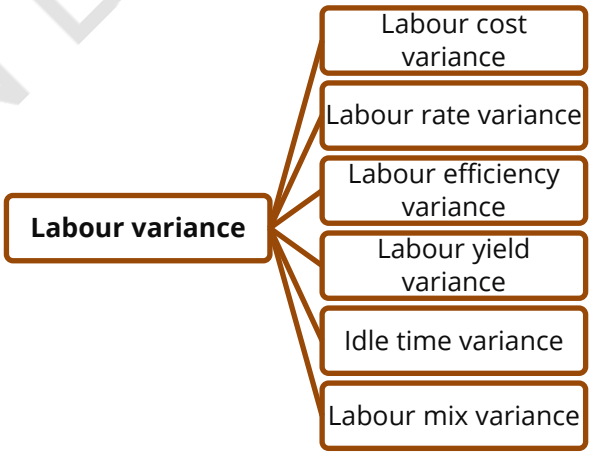
Or

$$\text{Std. Price (SP)} \times \{\text{Revised Std. Quantity (RSQ)} - \text{ Actual Quantity (AQ)}\}$$

Or

$$[(\text{RSQ} \times \text{SP}) - (\text{AQ} \times \text{SP})]$$

8. Labour variances



A. Labour cost variance

Labour cost variance (also termed as direct wage variance) is the difference between the standard and direct wages specified for the activity achieved and the actual direct wages paid.

$$\text{Labour Cost Variance} = [\text{Standard Cost} - \text{ Actual Cost}]$$

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Or

$$[(SH \times SR) - (AH \times AR)]$$

Cost of labour is determined by labour time and wages of labour cost variance is composed of either or both of variances relating to labour time and labour rate. SH labour cost variance is analysed into two separate variances viz wages (labour) rate variance and labour efficiency variance.

B. Labour rate variance

This is that portion of wages variance which is due to the difference between the actual rate and standard rate of any specified full stop it is calculated like the materials price variance.

$$\text{Labour Rate Variance} = [\text{Standard Cost of Actual Time} - \text{Actual Cost}]$$

Or

$$\text{Actual Hours (AH)} \times \{\text{Std. Rate (SR)} - \text{Actual Rate (AR)}\}$$

Or

$$[(SR \times AH) - (AR \times AH)]$$

Causes of wages (labour) rate variance:

- Changes in basic wage structure or change in piece work rate.
- Employment of one or more workers of different grade than the standard grade
- payment of guaranteed wages to the workers who are unable to earn their normal wages if such guaranteed wages form part of direct labour cost.
- New walkers not being allowed full normal wage rate.
- Use of different method of payment i.e., payment of day rates while standards are based on piece work method of remuneration.
- Higher wages paid on account of overtime for urgent work.
- composition of gang as regards the skill and rate of wages being different from that laid down in the standard.

C. Labour time or efficiency variance

- Also termed as labour efficiency variance. It is that portion of direct wages variance which is due to the difference between standard labour hours specified and actual labour hours expended.
- Obviously, the variants provide a key to the control of workers efficiency and labour cost. In effect it is a usage variance. The computation of variance is as follows :

$$\text{Labour Efficiency Variance} =$$
$$[\text{Standard Cost of Standard Time for Actual Production} - \text{Standard Cost of Actual Time}]$$

Or

$$\text{Std. Rate (SR)} \times \{\text{Std. Hours (SH)} - \text{Actual Hours (AH)}\}$$

Or

$$[(SH \times SR) - (AH \times SR)]$$

Causes of labour efficiency variance:

- The causes giving rise to labour efficiency variance or are as follows.
- lack of proper supervision or strict supervision than specified.
- Poor working conditions
- Defective machinery and equipment
- Discontentment in workers due to unsatisfactory personal relations
- Increase in labour turnover.
- use of nonstandard material requiring operation time.
- Basic in efficiency of workers due to insufficient raining fault instructions in correct scheduling for jobs etc.
- Wrong selection of workers.

D. Labour yield variance

Labour yield variance arises due to difference in standard output specified & actual output obtained.

$$\text{Labour Yield Variance Or Sub} - \text{Efficiency Variance}$$
$$= [\text{Standard Cost of Standard Time for Actual Production} - \text{Standard Cost of Actual Time Worked in Standard Proportion}]$$

Or

$$\text{Std. Rate (SR)} \times \{\text{Std. Hours (SH)} - \text{Revised Std. Hours (RSH)}\}$$

Or

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$$[(SH \times SR) - (RSH \times SR)]$$

E. Idle time variance

- Idle time variance represents the difference between hours paid and hours worked i.e., idle how was X the standard wage rate per hour.
- The variants may arise due to illness machine breakdown hold up on the production line because of lack of material.

$$\text{Labour Idle Time Variance} = [\text{Standard Rate per Hour} \times \text{Actual Idle Hours}]$$
Or
$$\text{Std. Rate (SR)}\{\text{Actual HoursPaid} - \text{Actual HoursWorked}\}$$
Or
$$[(AH \times SR) - (AH \times SR)]$$

F. Labour Mix Variance:

Labour efficiency variance which arises due to change in the mix or combination of different skill set i.e., number of skilled workers, semi-skilled workers, and un-skilled workers.

$$\text{Labour Mix Variance Or Gang Variance} = [\text{StandardCostofActualTimeWorkedinStandardProportion} - \text{StandardCostofActualTimeWorked}]$$
Or
$$\text{Std. Rate (SR)} \times \{\text{Revised Std. Hours (RSH)} - \text{Actual HoursWorked(AH)}\}$$
Or
$$[(RSH \times SR) - (AH \times SR)]$$

9. Variable overhead variance

- It is the difference between the standard variable overhead cost allowed for the actual output achieved and the actual variable overhead.
- Normally this variance is represented by expenditure (cost) variants only because variable overhead cost will vary in proportion to production so that were only a change in expenditure can cause such variance.

$$\text{Variable Overhead Cost Variance} = (\text{Standard Variable Overheads for Production} - \text{Actual Variable Overheads}$$

- Variable overhead cost variance is usually calculated in total only since various overheads vary according to output and not according to time hence there is only one variance.
- However, some accountants argue that certain variable overhead may vary according to time also in variable overhead efficiency variance arise just like labour efficiency variance and it cannot be calculated if information relating to actual time taken and allowed is given.
- In that case the variable overhead variance can be segregated into two parts.

A. Variable overhead expenditure variance

- It is the difference between the actual variable overhead rate per hour and the standard variable overhead rate per hour X the actual hours perfect.
- The actual hours worked must be used not the actual hours paid because the latter may include idle time and it is usually assumed that variable overhead will not be recovered in idle time.

$$(\text{Standard Variable Overheads for Actual Hours}) - (\text{Actual Variable Overheads})$$
Or
$$[(SR - AR) \times AH]$$
Or
$$[(SR \times AH) - (AR \times AH)]$$

B. Variable overhead efficiency variance

- The variable overhead efficiency variance is calculated by taking the difference in standard output and actual output multiplied by the standard variable overhead rate.

$$(\text{Standard Variable Overheads for Production}) - (\text{Standard Variable Overheads for Actual Hours})$$
Or

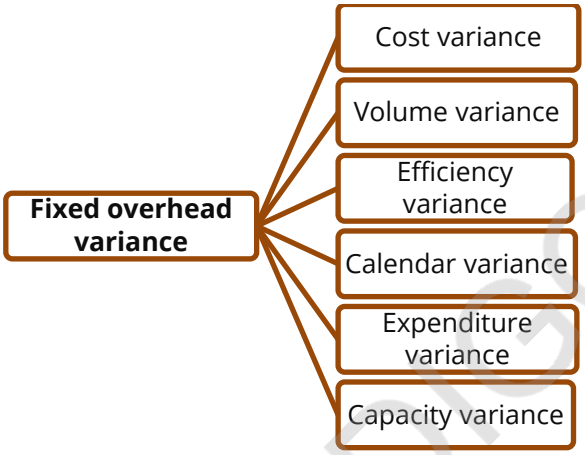
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$$[(SH - AH) \times SR]$$
Or
$$[(SH \times SR) - (AH \times SR)]$$

Meaning of the terms used in the formulae

Term	Meaning
Standard Hours (SH)	Hours required producing actual output
Actual Hours (AH)	Actual Hours taken to produce actual output
Revised Standard Hours (RSH)	If actual labour hours worked were worked by standard mix (combination) of labour.
Actual Yield (AY)	Actual Hours worked
Standard Yield (SY)	Actual hours if labour worked in standard ratio
Standard Labour Cost (SLC)	Standard labour cost for actual output

10. Fixed overhead variance



A. Fixed Overhead Cost Variance

- The recovery of the fixed components of the estimated overheads depends upon capacity utilization.
- In case a company produces less than the projected utilization it shall not be able to recover all the budgeted fixed overheads. This unrecovered portion is known as production volume variance.
- The other variance is because of variations in actual spending when compared with both estimated fixed and estimated variable overheads. Such a variance is known as Overhead expenses variance.

B. Fixed overhead Volume variance

- Fixed overhead volume variance is the difference between standard cost or fixed overhead allowed for actual output and the budgeted fixit overheads for the period.
- The variance shows the over or under absorption of fixed overheads during a particular period.
- If the actual output is more than the budgeted output, then there will be over recovery of fixed overheads and volume variance will be favourable and vice versa.
- This is so because fixed overheads are not expected to change with the change in output. Volume variance arises due to the following reasons.
    - Poor efficiency of workers
    - Poor efficiency of machinery
    - Lack of orders
    - Shortage of power
    - Inefficient supervision
    - Morales working days.

$$(\text{Absorbed Fixed Overheads}) - (\text{Budgeted Fixed Overheads})$$

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Or

Actual Units – Budgeted Units = FOH Volume variance

Or

$(\text{SH} \times \text{SR}) - (\text{B}H \times SR)$

C. Expenditure variance

This is also known as budget variance. This is obtained by comparing the total overhead cost in cut against the budgeted overhead cost I.e.

$$(\text{Budgeted Fixed Overheads}) - (\text{Actual Fixed Overheads})$$

Or

$$(\text{BH} \times \text{SR}) - (\text{AH} \times \text{AR})$$

If actual overheads are more, it shall result in an adverse variance and vice versa. Thus, variance gives a measure of efficiency of spending.

Fixed Overhead Cost Variance: Fixed overhead cost variance is the difference between actual fixed overhead and absorbed fixed overhead. Fixed overhead variance is divided into two parts:

(A) Fixed Overhead Expenditure Variance and

(B) Fixed Overhead Volume Variance.

D. Fixed overhead efficiency variance

Efficiency variance arises due to the difference between budgeted efficiency to production and actual efficiency is achieved.

$$\text{SR}(\text{SH} - \text{AH})$$

Or

$$(\text{SH} \times \text{SR}) - (AH \times SR)$$

E. Fixed overhead capacity variance

The capacity variance represents the path of volume variance which arise due to working at higher or lower capacity than standard capacity.

$$\text{SR}(\text{AH} - \text{BH})$$

Or

$$(\text{AH} \times \text{SR}) - (\text{BH} \times \text{SR})$$

F. Fixer overhead calendar variance

The calendar variance varies due to the volume variance which is due to the difference between the number of working days anticipated in the budgeted period and the actual working days in the period to which the budget is applied.

$\text{Std. Fixed Overhead rate per day} (\text{Actual no. of Working days} - \text{Budgeted Working days})$

Basic terms used in the computation of overhead variance.

$$\text{Standard overhead rate (per hour)} = \frac{\text{Budgeted Overhead}}{\text{Budgeted hours}}$$

Or

$$\text{Standard overhead rate (per unit)} = \frac{\text{Budgeted Overhead}}{\text{Budgeted Output in Units}}$$

Note: Separate overhead rates will be computed for fixed and variable overheads.

Basic calculations before the computation of overhead variances:

The following basic calculation should be made before computing variances.

When overhead rate per hour is used

Standard hours for actual output (SHAO)

- $\text{SHAO} = \frac{\text{Budgeted Hours}}{\text{Budgeted Output}} \times \text{Actual Output}$

- $\text{Absorbed (or Recovered) overhead} = \text{Std. hours for actual output} \times \text{Std. overhead rate per hour}$
- $\text{Standard overhead} = \text{Actual hours} \times \text{Std. overhead rate per hour}$
- $\text{Budgeted overhead} = \text{Budgeted hours} \times \text{Std. overhead rate per hour}$
- $\text{Actual overhead} = \text{Actual hours} \times \text{Actual overhead rate per hour}$

When overhead rate per unit is used

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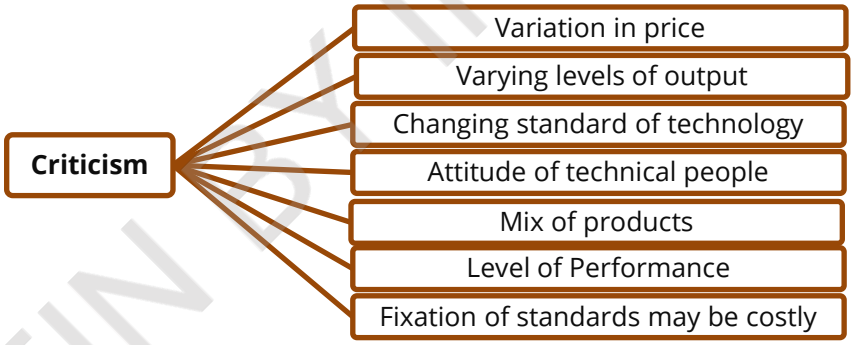
Standard output for actual hours (SOAH)

- $\text{SOAH} = \frac{\text{Budgeted Output}}{\text{Budgeted hours}} \times \text{Actual Hours}$
- Absorbed overhead = Actual output × Std. overhead rate per unit
- Standard overhead = Std. output for actual time × Std. overhead rate per unit
- Budgeted overhead = Budgeted output × Std. overhead rate per unit
- Actual overhead = Actual output × Actual overhead rate per unit
- Overhead cost variance = Absorbed overhead – Actual overhead
- OCV = (Std. hours for actual output × Std. overhead rate)– Actual overhead

11. Advantages of standard costing

- Standard costing system establishes yardsticks against which the efficiency of actual performance is measured.
- Standards provide incentive and motivation to work with greater effort and vigilance for achieving the standard. this increase efficiency and productivity all round.
- Benefits all the divisions of the concern.
- List number of forms and records required.
- Costs available with promptitude of work in progress and finished stock and determining idle capacity.
- Standard costing is an exercise in planning -it can be very easily fitted into and used for budgetary planning.
- Individual full stop this also tones up the general organisation of the concern.
- Variance analysis and reporting is based on the principle of management by exception. Variance is from the standards. So that corrective measures may be taken in time.
- When constantly reviewed standards provide means for achieving cost reduction.
- Standard cost assistant in performance analysis by providing ready means for preparation of information.
- Production and pricing policies maybe formulated in advance before production starts. This helps in prompt decision making.
- Standard costing facilitates the integration of accounts so that reconciliation between cost accounts and financial accounts maybe eliminated.
- Standard costing optimizes the use of plant capacity, current assets and working capital.

12. Criticism of standard costing



A. Variation in price:

- One of the chief problems faced in the operation of the standard costing system is the precise estimation of likely prices or rate to be paid.
- The variability of prices is so great that even actual prices are not necessarily adequately representative of cost.
- But the use of sophisticated forecasting techniques should be able to cover the price fluctuation to some extent.
- Besides this, the system provides for isolating uncontrollable variances arising from variations to be dealt with separately.

B. Varying levels of output:

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- If the standard level of output set for pre- determination of standard costs is not achieved, the standard costs are said to be not realised.
- However, the statement that the capacity utilisation cannot be precisely estimated for absorption of overheads may be true only in some industries of jobbing type.
- In vast majority of industries, use of forecasting techniques, market research, etc., help to estimate the output with reasonable accuracy and thus the variation is unlikely to be very large.
- Prime cost will not be affected by such variation and, moreover, variance analysis helps to measure the effects of idle time.

C. Changing standard of technology:

- In case of industries that have frequent technological changes affecting the conditions of production, standard costing may not be suitable.
- This criticism does not affect the system of standard costing.
- Cost reduction and cost control is a cardinal feature of standard costing because standards once set do not always remain stable. They must be revised.

D. Attitude of technical people:

- Technical people are accustomed to think of standards as physical standards and, therefore, they will be misled by standard costs.
- Since technical people can be educated to adopt themselves to the system through orientation courses, it is not an insurmountable difficulty.

E. Mix of products:

- Standard costing presupposes a pre-determined combination of products both in variety and quantity.
- The mixture of materials used to manufacture the products may vary in the long run but since standard costs are Set normally for a short period, such changes can be taken care of by revision of standards.

F. Level of Performance:

- Standards may be either too strict or too liberal because they may be based on
  (a) Theoretical maximum efficiency,
  (b) Attainable good performance or
  (c) Average past performance.
- To overcome this difficulty, the management should give thought to the selection of a suitable type of standard.
- The type of standard most effective in the control of costs is one which represents an attainable level of good performance.
- Standard costs cannot possibly reflect the true value in exchange.
- If previous historical costs are amended roughly to arrive at estimates for ad hoc purposes, they are not standard costs in the strict sense of the term and hence they cannot also reflect true value in exchange.
- In arriving at standard costs, however, the economic and technical factors, internal and external, are brought together and analysed to arrive at quantities and prices which reflect optimum operations.
- The resulting costs, therefore, become realistic measures of the sacrifices involved.

G. Fixation of standards may be costly:

- It may require high order of skill and competency.
- Small concerns, therefore, feel difficulty in the operation of such system.

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Illustrations

1. Illustration

The standard and actual figures of product 'Z' are as under:

Particulars	Standard	Actual
Material quantity	50 units	45 units
Material price per unit	Rs.1.00	Rs.0.80

Calculate material cost variance.

Solution:

Particulars	**Standards**			**Actual**			**Variance**
	SQ	**SP**	**SC**	**AQ**	**AP**	**AC**	**SC-AC**
Material	50 units	1/unit	50	45 units	0.8/unit	36	14 F

Type of Variance	**Formulae**	**Computation**	**Variance in Value (Rs.)**
Material Price Variance	**(SP-AP) X AQ Purchased**	(1-0.80) X 45 units	**9 F**
Material Usage Variance	**(SQ-AQ) X SP**	(50-45) X 1	**5 F**
Material Cost Variance	**M Price Variance + M Usage Variance**	9 F + 5 F	**14 F**

2. Illustration

NXE Manufacturing Concern furnishes the following information:

Standard	Material for 70 kg finished products	100 kg
	Price of Material	Rs.1 per kg
Actual	Output	2,10,000 kg
	Material Used	2,80,000 kg
	Cost of Materials	Rs.2,52,000

Calculate:
(a) Material usage variance,
(b)Material price variance,
(c) Material cost variance.

Solution:

70Kgs Output ⟶ Input 100Kgs ; 2,10,000Kgs ⟶ ??? Actual Price per kg = ₹2,52,000 / 2,80,000Kgs = ₹0.90

Particulars	**Standards**			**Actual**			**Variance**
	SQ	**SP**	**SC**	**AQ**	**AP**	**AC**	**SC-AC**
Material	3,00,000 Kgs	₹1/kg	3,00,000 Kgs	2,80,000 Kgs	₹0.9/Kg	₹2,52,000	48,000

Actual Output
$= 2,10,000 \text{ kgs} \times \frac{100\text{kgs}}{70\text{kgs}}$
= **3,00,000 kgs**

Material Cost Variance = SC-AC = 3,00,000-2,52,000 = **48,000F**

Material Price Variance = (SP-AP) X AQ Purchased
= (₹1-₹0.9) X 2,80,000Kgs
= 0.10 X 2,80,000
= **28000 F**

Material Usage Variance = (SQ-AQ) X SP

= (3,00,000-2,80,000) X ₹1/Kg
= 0.10 X 2,80,000
= **20,000 F**

Cross Verification

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M Cost Variance = M Price Variance + M Usage Variance
= 28000 F + 20000F
= **48000F**

3. Illustration

The standard cost of a chemical mixture is as follows:
- 40% material A at Rs.20 per kg.
- 60% material B at Rs.30 per kg.
- A standard loss of 10% of input is expected in production.

The cost records for a period showed the following usage:
- 90 kg material A at a cost of Rs.18 per kg.
- 110 kg material B at a cost of Rs.34 per kg.
- The quantity produced was 182 kg. of good product.

Calculate all material variances.

Solution:

Chemical Mixture
- 40% A
- 60% B

Input 100 Kgs (-) 10 Kgs 90 Kgs	100 → 90 ??? ← 182	182 X 100 = **202.22 Kgs** 90

Particulars	Standards			Actual			Variance
	SQ	**SP**	**SC**	**AQ**	**AP**	**AC**	**SC-AC**
Material A	80.89 (202.22KgX40%)	20	10617.80	90	18	1620	**2.20 A**
Material B	121.33 (202.22Kgsx60%)	30	3639.90	110	34	3740	**100.10 A**
Total	**202.22**		**5257.70**	**200**		**5360**	**102.30A**
Less: Loss	20.22 (10%)			18 Kgs			
Actual Output	**182 Kgs**			**182 Kgs**			

Material Price Variance = (SP-AP) X AQ Purchased
A = (₹20-₹18) X 19 = 180 F
B = (₹30-₹34) X 110 = 440A
260A

Material Usage Variance = (SQ-AQ) X SP
A = (80.90-90) X 20/Kg = 182.20 A
B = (121.33-110) X 30/Kg= 339.90F
157.70F

Material Mix Variance

Particulars	Actual Input in Std Mix (RSQ)	AQ	Variance (Kg)	SP	Variance (₹)
A	80 (200 x 40%)	90	10 Kgs A	20	**200 A**
B	120 (200 x 60%)	110	10 Kgs F	30	**300 F**
Total	**200**	**200**	**-**		**100 F**

Material Yield Variance

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Particulars	SQ	RSQ	Variance (Kg) (SQ-RSQ)	SP	Variance (₹)
A	80.89	80	0.89 F	20	**17.8F**
B	121.33	120	1.33 F	30	**39.9F**
Total	**202.22**	**200**	**-**		**57.7 F**

Cross Verification

Type of Variance	Formulae	Computation		Variance in Value (Rs.)		TOTAL
M Cost Variance	M Price Variance + M Usage Variance	**A**	**B**	**A**	**B**	**A + B**
		180 F+182.20 A	440 A + 339.90 F	2.20 A	100.10 A	**102.30 A**
M Usage Variance	M Mix Variance + M Yield Variance	200A+17.8F	300F + 39.9F	182.2 A	339.9 F	**157.70 F**

4. Illustration

For making 10 kg of CEMCO, the standard material required is:

Material	Quantity	Rate per kg. (Rs.)
A	8	6.00
B	4	4.00

During April 1,000 kg of CEMCO were produced. The actual consumption of materials is under:

Material	Quantity	Rate per kg. (Rs.)
A	750	7.00
B	500	5.00

Calculate
1. Material Cost Variance;
2. Material Price Variance;
3. Material Usage Variance

Solution:

Particulars	Standards for 1000 units			Actuals for 1000 units			Variance
	SQ	**SP**	**SC**	**AQ**	**AP**	**AC**	**SC-AC**
Material A	800	6	4,800	750	7	5,250	**450A**
Material B	400	4	1,600	500	5	2,500	**900A**
Total	**1200**		**6,400**	**1,250**		**7,750**	**1,350A**

Material Price Variance = (SP-AP) X AQ Purchased

A = (₹6-₹7) X 750 = 750 A

B = (₹4-₹5) X 500 = 500A

1250A

Material Usage Variance = (SQ-AQ) X SP

A = (800-750) X ₹6 = 300F

B = (400-500) X ₹4 = 400A

100A

Cross verification

M Cost Variance = M Price Variance + M Usage Variance

A = 750 A + 300 F = 450 A

B = 500 A + 400 A = 900 A

1350A

Material Mix Variance

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Particulars	Actual Qty of Input in Std Mix (RSQ)	AQ	Variance (units)	SP	Variance (₹)
A	833.33 (1250 x 2/3)	750	83.33 F	6	**499.98 F**
B	416.67 (1250 x 1/3)	500	83.33A	4	**433.32A**
Total	**1250**	**1250**	**-**		**166.66 F**

Material Yield Variance

Particulars	SQ	RSQ	Variance (Kg) (SQ-RSQ)	SP	Variance (₹)
A	800	833.33	33.33 A	6	**199.98 A**
B	400	416.67	16.67 A	4	**66.68 A**
Total	**1200**	**1250**	**50 A**		**266.66 A**

M Usage Variance = M Mix Variance + M Yield Variance
= 166.66 F + 266.66 A
= 100A

5. Illustration

The standard mix to produce one unit of product is

Material X	60 units @ Rs.15 per unit	Rs. 900
Material Y	80 units @ Rs.20 per unit	Rs. 1,600
Material Z	100 units @ Rs.25 per unit	Rs. 2,500
	240 units	**Rs. 5,000**

During the month of April, 10 units were actually produced, and consumption was as follows:

Material X	640 units @ Rs.17.50 per unit	Rs. 11,200
Material Y	950 units @ Rs.18.00 per unit	Rs. 17,100
Material Z	870 units @ Rs.27.50 per unit	Rs. 23,925
	2460 units	**Rs. 52,225**

Calculate all material variances.

Solution:

Particulars	Standards for 10 units			Actuals for 10 units			Variance
	SQ	**SP**	**SC**	**AQ**	**AP**	**AC**	**SC-AC**
Material X	600	15	9,000	640	17.50	11,200	**2200A**
Material Y	800	20	16,000	950	18.00	17,100	**1100A**
Material Z	1000	25	25,000	870	27.50	23,925	**1075 F**
Total	**2400**		**50,000**	**2460**		**52,225**	**2,225 A**

Material Price Variance = (SP-AP) X AQ
X = (₹15-₹17.5) X 640 = 1600 A
Y = (₹20-₹18) X 950 = 1900F
Z = (₹25-₹27.5) X 870 = 2175 A
1875A

Material Usage Variance = (SQ-AQ) X SP
X = (600-640) X ₹15 = 600 A
Y = (800-950) X ₹20 = 3000 A
Z = (1000-870) X ₹25 = 3250 F
350A

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M Cost Variance = M Price Variance + M Usage Variance
= 1875 A + 350 A = 2225 A

Material Mix Variance

Particulars	Actual Qty of Input in Std Mix (RSQ)	AQ	Variance (units)	SP	Variance (₹)
X	615 (2460 x 600/2400)	640	25 A	15	**375 A**
Y	820 (2460 x 800/2400)	950	130 A	20	**2600 A**
Z	1025 (2460 x 1000/2400)	870	155 F	25	**3875 F**
Total	**2460**	**2460**	**-**		**900 F**

Material Yield Variance

Particulars	SQ	RSQ	Variance (Kg) (SQ-RSQ)	SP	Variance (₹)
X	600	615	15 A	15	**225 A**
Y	800	820	20 A	20	**400 A**
Z	1000	1025	25 A	25	**625 A**
Total	**2400**	**2460**	**60 A**		**1250 A**

M Usage Variance = M Mix Variance + M Yield Variance
= 900 F + 1250 A
= 350 A

6. Illustration

J.K. Ltd. manufacturers NXE by mixing three raw materials. For every batch of 100 kg of NXE, 125 kg of raw materials are used. In April, 20X2 60 batches were prepared to produce an output of 5,600 kgs of NXE.
The standard and actual particulars of April, 20X2, are as follows:

Raw materials	Standard		Actual		Qty of raw Material purchased
	Mix	Price per kg	Mix	Price per kg	
	(%)	Rs.	(%)	Rs.	(Kg.)
A	50	20	60	21	5,000
B	30	10	20	8	2,000
C	20	5	20	6	1,200

Calculate all variances.

Solution:

Working Note 1

Batch 100Kgs → 125 Kgs of input	For 60 Batches → 125 Kgs x 60 → 7500 Kgs

Actual Quantity Consumed:

Material	Total Actual Qty	Actual Qty Mix	Total Qty x Actual Mix
A	7500	60%	4500
B	7500	20%	1500
C	7500	20%	1500

Working Note 2: Std Qty of input required

1 Batch → 125 Kgs input → 100Kgs output		= 7000 Kgs

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??? ← **5600Kgs Actual output**	$\frac{5600}{100} * 125$	

A = 7000 X 50% = 3500 Kgs
B = 7000 X 30% = 2100 Kgs
C = 7000 X 20% = 1400 Kgs
7000 Kgs

Working Note 3 : Standards , Actuals and Variance

Particulars	**Standards for Actual Output of 5600 units**			**Actuals for 5600 Kgs of output**			**Variance**
	SQ	**SP**	**SC**	**AQ**	**AP**	**AC**	**SC-AC**
Material A	3500	20	70,000	4500	21	94,500	**24,500 A**
Material B	2100	10	21,000	1500	8	12,000	**9,000 F**
Material C	1400	5	7,000	1500	6	9,000	**2,000 A**
Total	**7000**		**98,000**	**7500**		**1,15,500**	**17,500 A**

Working Note 4 : Comparison

Particulars	**Quantity Purchased**	**Quantity Consumed**
Material A	5000	4500
Material B	2000	1500
Material C	1200	1500
	8200	**7500**

Working Note 5 Computation of Variances

Material Price Variance = (SP-AP) X AQ Purchased
A = (₹20-₹21) X 5000 = 5000 A
B = (₹10-₹8) X 2000 = 4000 F
C = (₹5-₹6) X 1200 = 1200 A
2200A

Material Price Variance = (SP-AP) X AQ Consumed
A = (₹20-₹21) X 4500 = 4500 A
B = (₹10-₹8) X 1500 = 3000 F
C = (₹5-₹6) X 1500 = 1500 A
3000A

Working Note 6

Material Usage Variance = (SQ-AQ) X SP
A = (3500-4500) X ₹20 = 20,000 A
B = (2100-1500) X ₹10 = 6,000 F
C = (1400-1500) X ₹5 = 500 A
14500A

Working Note 7: Material Mix Variance

Particulars	**Actual Qty of Input in Std Mix (RSQ)**	**AQ**	**Variance (units)**	**SP**	**Variance (₹)**
A	3750 (7500 x 50%)	4500	750 A	20	**15000 A**
B	2250 (7500 x 30%)	1500	750 F	10	**7500 F**
C	1500 (7500 x 20%)	1500	-	5	**-**

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Total	7500	7500	-		7500 A

Working Note 8: Material Yield Variance

Particulars	SQ	RSQ	Variance (Kg) (SQ-RSQ)	SP	Variance (₹)
A	3500	3750	250 A	20	**5000 A**
B	2100	2250	150 A	10	**1500 A**
C	1400	1500	100 A	5	**500 A**
Total	**7000**	**7500**	**500 A**		**7000 A**

Cross Verification

M Usage Variance = M Mix Variance + M Yield Variance
= 7500 A + 7000 A = 14500A.

M Cost Variance = M Price Variance + M Usage Variance
On the basis of Consumption
3000 A + 14500 A = **17500 A**
On the basis of Purchase
2200 A + 14500 A = **16700 A**

7. Illustration

Standard for 1 Chair is given below:

- 5 hours of skilled labour @ Rs.10 per hour
- 10 hours of unskilled labour @ Rs.5 per hour

Actuals for 1,000 chairs is as follows:

- 6,000 hours of skilled labour @ Rs.9 per hour
- 9,000 hours of unskilled labour @ Rs.6 per hour

Compute Labour Variances.

Solution:

Labour Cost variance

Particulars	Standards for actual production of 1000 chairs			Actuals			Variance
	Std Hrs	Std Rate	Std cost	Actual Hrs	Actual Rate	Actual Cost	Std - Actual
Skilled	5,000	10	50,000	6,000	9	54,000	**4,000 A**
Unskilled	1,000	5	50,000	9,000	6	54,000	**4,000A**
Total	**15,000**		**1,00,000**	**15,000**		**1,08,000**	**8,000 A**

Labour Rate Variance

Particulars	Std Rate	Actual Rate	Variance (SR-AR)	Actual Hours	Variance(₹)
Skilled	10	9	1 F	6000	6000 F
Unskilled	5	6	1 A	9000	9000 A
Total					**3000 A**

Labour Efficiency Variance

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Particulars	Std Hrs	Actual Hrs	Variance (SH-AH)	Std Rate	Variance(₹)
Skilled	5,000	6,000	1,000 A	10	10,000 A
Unskilled	10,000	9,000	1,000 F	5	5,000 F
Total					**5000 A**

Cross Verification

Labour Cost Variance = Labour Rate Variance + Labour Efficiency Variance
= 3000A + 5000A
= **8000A**

Labour Mix Variance

Particulars	Actual Hrs in Std Mix (RSH)	Actual hours	Variance (hours)	SR	Variance(₹)
Skilled	5,000 (15000 x 1/3)	6000	1,000A	10	**10,000 A**
Unskilled	10,000 (15000 x 2/3)	9000	1,000F	5	**5,000 F**
	15000	15000	-		**5,000 A**

Labour Yield Variance

Particulars	SH	RSH	Variance (Hrs)	SR	Variance(₹)
Skilled	5,000	5,000	-	10	**-**
Unskilled	10,000	10,000	-	5	**-**
Total	**15,000**	**15,000**	**-**		**-**

Labour Efficiency Variance = Labour Mix Variance + Labour Yield Variance
= 5000 A + NIL = **5000 A**

8. Illustration

The standard and actual figures of a firm are as under:

Standard time for the job	1,000 hours
Standard rate per hour	Rs.0.50
Actual time taken	900 hours
Actual wages paid	Rs.360

Compute the variances.

Solution:

Labour Cost Variance

Particulars	Standards			Actuals			Variance
	Std Hrs	Std Rate	Std cost	Actual Hrs	Actual Rate	Actual Cost	Std - Actual
Skilled	1,000	0.5	500	900	0.4 (360/900)	360	**140 F**

Labour Rate Variance = (SR – AR) X AH
= (0.50 – 0.40) X 900
= **90 F**

Labour Efficiency Variance = (SH-AH) X SR
= (1000-900) X 0.50
=50F

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Labour Cost Variance = Labour Rate Variance + Labour Efficiency Variance
= 90A + 50A
= **140A**

9. Illustration

The standard labour employment and the actual labour engaged in a week for a job are as under:

	Skilled workers	Semi-skilled workers	Unskilled workers
Standard no. of workersin the gang	32	12	6
Actual no. of workersemployed	28	18	4
Standard wage per hour	Rs. 3	Rs. 2	Rs. 1
Actual wage rate perhour	Rs. 4	Rs. 3	Rs. 2

During the 40-hour working week, the gang produced 1,800 standard hours of work. Calculate:

1. Labour Cost Variance	4. Labour Mix Variance
2. Labour Rate Variance	5. Labour Yield Variance
3. Labour Efficiency Variance	

Solution:

Working Note 1: Budgeted Hours

Skilled = 32 workers x 40 Hrs = 1280 Hrs
Semi-Skilled = 12 workers x 40 Hrs = 480 Hrs
Unskilled = 6 workers x 40 Hrs = 240 Hrs
2000 Hrs

Working Note 2: Actual Hours Worked

Skilled = 28 workers x 40 Hrs = 1120 Hrs
Semi-Skilled = 18 workers x 40 Hrs = 720 Hrs
Unskilled = 4 workers x 40 Hrs = 160 Hrs
2000 Hrs

Working Note 3: Computation of Standard Hours for Actual Output

Actual Production = 1800 Hrs of Output
Skilled = 1800 x 1280/2000 = 1152 Hrs
Semi-Skilled = 1800 x 480/2000 = 432 Hrs
Unskilled = 1800 x 240/2000 = 216 Hrs
1800 Hrs

Working Note 4:

Particulars	**Standards for actual production of 1800 Hrs**			**Actuals**			**Variance**
	Std Hrs	**Std Rate**	**Std cost (SC)**	**Actual Hrs**	**Actual Rate**	**Actual Cost (AC)**	**SC-AC**
Skilled	1,152	3	3,456	1120	4	4,480	**1,024 A**
Semi-Skilled	432	2	864	720	3	2,160	**1,296 A**
Unskilled	216	1	216	160	2	320	**104 A**
Total	**1800Hrs**		**4,536**	**2,000**		**6,960**	**2,424 A**

Labour Rate Variance : (SR – AR) X AH
Skilled = (3-4) x 1120 = 1120A
Semi-Skilled = (2-3) x 720 = 720 A

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Unskilled = (1-2) x 160 = 160A

2000A

Labour Efficiency Variance : (SH-AH) X SR

Skilled = (1152-1120) x 3 = 96 F

Semi-Skilled = (432-720) x 2 = 576 A

Unskilled = (216-160) x 1 = 56 A

424A

Labour Cost Variance: Labour Rate Variance + Labour Efficiency Variance

: 2000 A + 424 A = **2424 A**

Labour Mix (Gang) Variance:

Particulars	Actual Hrs in Std Mix (RSH)	Actual hrs	Variance(hrs)	SR	Variance(₹)
Skilled	1280 (2000 x 1280/2000)	1120	160 F	3	**480 F**
Semi-Skilled	480 (2000 x 480/2000)	720	240 A	2	**480 A**
Unskilled	240 (2000 x 240/2000)	160	80 F	1	**80 F**
	2000	**2000**			**80 F**

Labour Yield (Sub-Efficiency) Variance:

Particulars	SH	RSH	Variance (Hrs)	SR	Variance(₹)
Skilled	1152	1280	128 A	3	**384 A**
Semi-Skilled	432	480	48 A	2	**96 A**
Unskilled	216	240	24 A	1	**24 A**
Total	**1800**	**2000**	**-**		**504 A**

Labour Efficiency Variance = Labour Mix Variance + Labour Yield Variance **=** 80 F + 504 A = **424 A**

10. Illustration

The following standards have been set to manufacture a product

Particulars	Amount (Rs.)
Direct Material:	
2 units of A @ Rs. 4 per unit	8.00
3 units of B @ Rs. 3 per unit	9.00
15 units of C @ Rs. 1 per unit	15.00
	32.00
Direct Labour:	
3 hours @ Rs. 8 per hour	24.00
Total standard prime cost	56.00

The company manufactured and sold 6,000 units of the product during the year. Direct material costs were as follows:

Particulars	Rate per unit
12,500 units of A	Rs. 4.4
18,000 units of B	Rs. 2.8
88,500 units of C	Rs. 1.2

The company worked 17,500 direct labour hours during the year. For 2,500 of these hours, the company paid at Rs. 12 per hour while for the remaining, the wages were paid at standard rate. Calculate materials price variance and usage variance and labour rate and efficiency variances.

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Solution:

Particulars	Standards for actual output of 6000 units			Actuals			Variance
	SQ/SH	SP/SR	SC	AQ/AH	AP/AR	AC	SC-AC
A	12,000	4	48,000	12,500	4.40	55,000	**7000 A**
B	18,000	3	54,000	18,000	2.80	50,400	**3,600 F**
C	90,000	1	90,000	88,500	1.20	1,06,000	**16,200 A**
Total			**1,92,000**			**2,11,000**	**19,600 A**

Material Price Variance = (SP-AP) X AQ

A = (₹4-₹4.40) X 12500 = 5000 A
B = (₹3-₹2.80) X 18000 = 3600 F
C = (₹1-₹1.20) X 88500 = 17700 A
19,100 A

Material Usage Variance = (SQ-AQ) X SP

A = (12000-12500) X ₹4 = 2000 A
B = (18000-18000) X ₹3 = 0
C = (90000 - 88500) X ₹5 = 1500 F
500A

M Cost Variance = M Price Variance + M Usage Variance
= 19,100 A + 500A **= 19600A**

Labour Cost Variance

Particulars	Standards for 6000 units			Actuals			Variance
	Std Hrs	Std Rate	Std cost	Actual Hrs	Actual Rate	Actual Cost	Std Cost – Actual Cost
Labour	18000	8	1,44,000	15,000	8	1,20,000	**6000 A**
				2500	12	30,000	
Total	**18,000**		**1,44,000**	**17,500**		**1,50,000**	**6,000 A**

Labour Rate Variance: (SR – AR) X AH
For 15,000 Hrs = (8 - 8) x 15,000 = 0
For 2,500 Hrs = (8-12) x 2500 = 10,000 A

Labour Efficiency Variance: (SH-AH) X SR
(18000 – 17500) x 8 **= 4000 F**

Labour Cost Variance: Labour Rate Variance + Labour Efficiency Variance
=10000 A + 4000 F = **6000 A**

11. Illustration

Following information is available from the records of a factory:

Particulars	Budget	Actual
Fixed overhead for June, 20X2	Rs.10,000	Rs. 12,000
Production in June, 20X2 (units)	2,000	2,100
Standard time per unit (hours)	10	–
Actual hours worked in June	–	21,000

Compute:
1. Fixed overhead cost variance

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2. Expenditure variance
3. Volume variance

Solution:

Budgeted FOH Exp. : 10,000
Budgeted no. of units = 2000
Fixed OH Recovery Rate p.u = 10000/2000 = ₹5 p.u

Actual produced and sold = 2,100
Actual expenditure = ₹12,000

FOH Expenditure Variance = Budgeted exp – Actual Exp
= 10,000 – 12,000 = **2,000 A**

FOH Volume Variance = (2100 – 2000) x ₹5
= (AQ-BQ) X FOHRR p.u.
= **500 F**

FOH Cost Variance = FOH Exp Variance + FOH Volume Variance
= 2000 A + 500 F = **1500 A**

AQ = 2100 X 5 = **10,500**

FOH Cost Variance = Std Cost – Actual Cost
= 10,500 – 12,000 = **1500 A**

12. Illustration

XYZ Ltd. has furnished you the following information for the month of August, 20X2:

	Budget	Actual
Output (units)	30,000	32,500
Hours	30,000	33,000
Fixed overhead	Rs. 45,000	Rs. 50,000
Variable overhead	Rs. 60,000	Rs. 68,000
Working days	25	26

Calculate all Fixed Overhead Variances:

- FOH cost variance
- FOH expenditure variance
- FOH volume variance
- FOH Capacity, Calendar and Efficiency variances

Solution:

Budgets:

- Budgeted FOH = ₹45000
- Budgeted Capacity (in units) = 30,000 units
- Budgeted Capacity (in hours) = 30,000 hrs
- Budgeted Capacity (in days) = 25 working days
- Budgeted FOHRR per unit = ₹45,000/30,000 units = ₹1.5 p.u
- Budgeted FOHRR per hour = ₹45,000/30,000 hrs = ₹1.5 p.hr
- Budgeted FOHRR per day = ₹45,000/25 days = ₹1800 per day

Actuals:

- Actual FOH = ₹50,000
- Actual units = 32,500 units
- Actual hours used: 33,000 Hrs
- Actual working days: 26 working days
- Actual Capacity available (hrs) = $26 \text{ days} * 30{,}000/25\text{days}$
= 31,200 units

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Standards:
Std Time p.u = 30,000/30,000 = 1 hr/unit
Std time for actual output = 1hr x 32500 (SH X AQ) = 32,500 hrs
Std FOH Cost p.u = 32,500 x ₹1.5 p.u = AQ X FOHRR p.u = 48,750

FOH Cost Variance = Std FOH Cost – Actual FOH
= 48,750 – 50,000 = **1,250 A**

FOH Expenditure Variance = Budgeted FOH – Actual FOH
= 45,000 – 50,000 = **5,000 A**

FOH Volume Variance = (AQ-BQ) X FOHRR p.u
= (32,500 – 30,000) x ₹1.5 p.u = **3750 F**

Cross Verification

Type of Variance	Formulae	Computation	Variance
FOH Cost Variance	FOH Expenditure Variance + FOH Volume Variance	5000 A + 3750 F	**1250 A**

FOH Calendar Variance = (Actual working days – Budgeted working days) x FOHRR per day
= (26-25) x 1800 = **1800 F**

FOH Capacity Variance = (Actual Capacity in hours – Available Capacity in hours) x FOHRR per hr
= (33,000 – 30,000) x ₹1.5 per hr = **2700 F**

FOH Efficiency Variance = (SH – AH) X FOHRR per hr
= (32500 –33000) x ₹1.5 per hr = **750 A**

Cross Verification
FOH Calendar Variance + FOH Capacity Variance + FOH Efficiency Variance = FOH Volume Variance
1800F + 2700F +750A **= 3750F**

13. Illustration

XYZ Company has established the following standards for factory

Particulars	Value
Variable Overhead per unit	Rs.10
Fixed Overheads per month	Rs.1,00,000
Capacity of the plant	20,000 units per month

The actual data for the month is as follows:
- Actual overheads incurred Rs.3,00,000
- Actual output (units) 15,000 units

Required:
Calculate overhead variances: Production volume and Overhead Expense variance.

Solution:

FOHRR p.u = Budgeted FOH / Budgeted no. of units
= ₹ 1,00,000 / 20,000 = **₹5 per unit**

Std Variable OH p.u = ₹10 p.u

Overhead Cost Variance

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Std OH Cost (combined)
Std VOH for actual output = 15000 units x ₹10 p.u. = 1,50,000
Std FOH for actual output = 15,000 units x ₹5 p.u. = 75,000
Std OH Cost = ₹2,25,000
Actual OH (given) = ₹3,00,000

OH Cost Variance = Std OH Cost – Actual OH Cost
= 2,25,000 – 3,00,000 = **75,000A**

OH Expenditure Variance = FOH Exp Variance + VOH Exp Variance
FOH Exp V = Budgeted FOH – Actual FOH
= 1,00,000 – Actual FOH

VOH Exp V = (SR-AR) X AQ
= (10 – AR) x 15000 = (10 x 15,000) – (AR X 15,000)
= 1,50,000 – Actual VOH

OH Exp V = FOH Exp V + VOH Exp V
= (1,00,000 – Actual FOH) + (1,50,000 – Actual VOH)
= 2,50,000 – (Actual FOH + Actual VOH) = 2,50,000 – Actual OH
= 2,50,000 – 3,00,000 = **50,000 A**

OH Production Variance
FOH Volume Variance = AQ-BQ) x FOHRR p.u
= (15,000 – 20,000) x 5 p.u = **25,000 A**

14. Illustration

Overhead expense budget for a factory producing to a capacity of 200 units per month is as follows:

Description of Overhead	Fixed Cost per unit in (Rs.)	Variable cost per unit in (Rs.)	Total Cost per unit in (Rs.)
Power and fuel	1,000	500	1,500
Repair & maintenance	500	250	750
Printing andstationary	500	250	750
Other overheads	1,000	500	1,500
Total	**3,000**	**1,500**	**4,500**

The factory has actually produced only 100 units in a particular month. Details of over heads actually incurred have been provided by the accounts department and are as follows:

Description of Overhead	Actual Cost (Rs.)
Power and Fuel	4,00,000
Repair and Maintenance	2,00,000
Printing and Stationary	1,75,000
Other Overheads	3,75,000

You are required to compute:
1) Production Volume Variance
2) Overhead expenses Variance

Solution:
Overhead Cost Variance
Std OH Cost
Std VOH Cost = SR x AQ = 1500 X 100 = 1,50,000
Std FOH Cost = FOHRR p.u x AQ = ₹3000 x 100 = 3,00,000

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Total Std OH Cost = 1,50,000 + 3,00,000 = **4,50,000**

Actual OH Cost

Power & Fuel	4,00,000
Repair & Maintenance	2,00,000
Printing & Stationery	1,75,000
Other OH	3,75,000
	11,50,000

OH Cost Variance = Std OH Cost – Actual OH Cost = 4,50,000 – 11,50,000 = **7,00,000 A**

OH Production Variance:

FOH Volume Variance = (AQ-BQ) x FOHRR p.u = (100-200) x 3,000 **= 3,00,000 A**

FOH Expenditure Variance = VOH Exp Variance + FOH Exp Variance

VOH Exp Variance = (SR - AR) X AQ = (1500 - AR) X AQ = (1500 X 100) – (AQ X AQ)
= 1,50,000 – Actual VOH

FOH Exp V = Budgeted FOH – Actual FOH.
= (3,000 x 200 units) – Actual FOH
= **6,00,000 – Actual FOH**

OH Exp V = FOH Exp V + VOH Exp V
= (1,50,000 – Actual VOH) **+ (**6,00,000 – Actual FOH**)**
= 7,50,000 – (Actual VOH + Actual FOH) = 7,50,000 – 11,50,000
= **4,00,000 A**

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UNIT 3 : BUDGET AND BUDGETARY CONTROL

OVERVIEW

- Meaning of budget, budgetary control etc
- Objectives of budgeting
- Types of budget
- Process of preparing budget.
- Difference between fixed and flexible budgeting
- Meaning of Performance budgeting and Zero-base budgeting
- Advantages and disadvantages of budget costing

1. Budget and Budgeting meaning

Budget:

- A budget is an instrument of management used as an aid in the planning, programming, and control of business activity.
- The Chartered Institute of Management Accountants (CIMA) UK defines budget as "A financial and/or quantitative statement, prepared and approved prior to a defined period of the policy to be pursued during that period for the purpose of attaining a given objective.
- It includes income, expenditure and employment of capital" The budget is a blue- print of the projected plan of action which is expressed in quantitative terms for a specified period.

Budget and forecast

- A forecast is an assessment of probable future events.
- Budget is an operating and financial plan of a business concern.
- At the stage of planning, it is necessary to prepare forecasts of probable future action for the business.
- Budget is a kind of commitment or a target which the management seeks to attain based on the forecast already made.
- Forecasts are made regarding sales, production cost and financial requirements of the business.
- A forecast indicates some degree of flexibility while a budget denotes a definite target.

Budgeting

- Budgeting is the complete process of designing, implementing and operating budgets.
- The main emphasis is that it is short term budgeting process involving the provision of resources to support plans which is being implemented.

The main characteristics of budget are as follows:

- A budget is concerned for a definite future period.
- A budget is a written document.
- A budget is a detailed plan of all the economic activities of a business.
- All the departments of a business unit should co-operate for the preparation of a business budget.
- Budget is a mean to achieve business objectives and it is not an end in itself.
- Budget needs to be updated, corrected, and controlled every time circumstances change. Therefore, it is a continuous process.
- Budget helps in planning, coordination, and control.
- Different types of budgets are prepared by industries according to business requirements.
- A budget acts as a business barometer.
- Budget is usually prepared in the light of past experiences.
- Budget is a constant endeavour of the Management.

2. Essential steps for preparation of budget

Essential steps for preparing a budget are as follows:

- Organisational structure must be clearly mentioned, and responsibility should be distributed to the identifiable units within the organisation.

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- Clear objectives and reasonable targets should be set. Objectives should be in consonance with the long-term plan of the organisation.
- Objectives and responsibility should be clearly stated and communicated to the management or responsible persons.
- Budgets are prepared for the upcoming future periods based upon expected course of actions.
- Budgets are updated for the event which was not kept into the mind while establishing budgets. Hence, budgets should be flexible for mid- term revision.
- The whole organisation must be committed to the preparation and implementing budgeting.
- Budgets must be quantifiable and master budget should be sub-divided into various functional budgets.
- Budgets should be checked periodically. Variances of the actual outcomes should be compared with the actual and variances analysed, and those responsibilities should be fixed.
- Budgetary performance should be linked effectively to the reward system.

Objectives of budgeting

Planning:

- Planning is the beginning of any activity. Planning establishes the objectives of the firm and decides the course of action to achieve it.
- It is concerned with formulating short-term and long-term plans to achieve a particular end.
- Planning is a statement of what should be done, how it should be done and when it should be done.
- The process of preparing budget begins with the establishment of specific targets of performance and is followed by devising plans to achieve such desired goals.
- These targets include both the overall business targets as well as the specific targets for the individual units within the business.
- Establishing specific targets for future operations is part of the planning function of management, while executing actions to meet the goals is the directing function of management.
- Budget is prepared in synchronisation with the overall objectives of the organisation, keeping mission and corporate strategy into account. Individual plans at unit level should be in consonance with organisational plan.
- Budget reflects plans. Therefore, planning should precede the preparation of budget.
- Budgeted plans are quantified, and responsibility is assigned to the persons who are responsible for execution of plan.
- Communication of business objectives through budget has helped many a company to reduce expenses during business recession.
- Planning not only motivates employees to attain goals but also improves overall decision making.
- During the planning phase of the budget process, all viewpoints are considered, options identified, and cost reduction opportunities assessed.
- This process may reveal opportunities or threats that were not known prior to the budget planning process.

Directing and Coordinating:

- Once the budget plans are in place, these can be used to direct and coordinate operations to achieve the stated targets.
- A business, however, is much more complex and requires more formal direction and coordination.
- The budget offers an important tool to direct and coordinate business activities and units to achieve stated targets of performance.
- The budgetary units in an organisation are called responsibility centres. Each responsibility centre is led by a manager who has the authority over and responsibility for the unit's performance.
- Objectives of each responsibility centre and degree of performance expected from them are separately communicated.

Controlling:

- Control is the process of monitoring, measuring, evaluating, and correcting actual results to ensure that a firm's goals and plans are achieved. Control is achieved through the process of feedback.
- As time passes, the actual performance of an operation can be compared against the planned targets. This provides prompt feedback to employees about their performance. If necessary, employees can use such feedback to fine-tune their activities in the future.

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- Feedback received in the form of budget report from the responsibility centre is helpful to know the performance of the concerned unit.
- Any unforeseen changes into the conditions which were prevailing at the time of preparing budget are considered and budgets are revised to show true performance.
- Comparing actual results to the plan helps prevent unplanned expenditures. The budget helps employees to regulate their spending priorities.

3. Budgetary control

- Budgetary control is solely connected with the budgets.
- The chartered institute of management accountants London defines budgetary control as the establishment of budgets relating the responsibilities of executive to the requirements of a policy and the continuous comparison of actual with budgeted results is there to secure by individual action the objectives of the policy or to provide a firm bases its revision.
- Budgetary control system secures control over performance and cause in the different parts of a business.
  - By establishing budgets
  - By comparing actual attainments against the budgets
    By talking corrective action and remedial measures for revision of the budget if necessary
- The budget is a blueprint of a projected plan of action expressed in quantitative terms and for a specified period.
- The budgets put the plan in the concrete form and follow-up action to see that plan is adhered to complete the system of control.
- In other words, while budgeting is that of planning budgetary control is that of adhering to the plan.
- In fact, budgetary control involves continuous comparison of actual results with the budgets and talking appropriate remedial action promptly.

Objectives of budgetary control system



- **Definition of goals**: Portraying with the precision the relations of the business and determining targets of performance for each section or department of the business.
- **Defining responsibilities:** Laying down the responsibilities of everyone so that everyone knows what is expected of him and how he will be judged.
- **The Basis for performance:** Evaluation providing basis for the comparison of actual performance with the pre-determined targets and investigation of deviation if any of actual performance and expenses from the budgeted figures. It helps to take timely corrective measures.
- **Optimum use of resources:** Ensuring the best use of all available resources to maximize profit a production subject to the limiting factors.
- **Coordination:** Coordinating the various activities of the business and centralising control but also making a facility for the management to decentralised responsibility and delegate authority

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- **Planned action:** Engendering spirit of careful thought assessment of what is possible and an attempt at it. It leads to dynamism without recklessness. It also helps to drop long-range plans with a fair measure of accuracy.
- **Basis for policy:** Providing a basis for revision of current and future policies.

Steps for establishing budgetary control.

For the successful implementation of a system of budgetary control certain prerequisites are to be fulfilled they are summarised below

- There should be an organisation chart layout in absolute terms, the responsibilities, and duties of each level of executives and the delegation of authority to various levels.
- The objectives, plans and policies of the business must be defined in clear and unambiguous terms.
- The budget factor or the key factors which will be the start point of the preparation of the various budget must be indicated.
- For formulation and efficient execution of the plan, a budget committee should be set up.
- There must be an efficient system of accounting for the recording and providing data in line with the budgetary control system.
- There should be a proper system of communication and reporting between the different levels of management.
- There should be a budget manual containing all details regarding the plan and its procedure of operation are given as also the length of the budget period.
- The budget should primarily be prepared by the persons who are responsible for performance.
- The budgets should be comprehensive, complete, continuous, and realistic to attain.
- There should be an assurance from the top management executives for the cooperation and acceptance of the budgetary control system.
- For the success of a budgetary control system, it is essential that there should be a sound organisation for budget preparation, budget maintenance and budget administration.
- The budgetary control organisation is usually managed by a top executive who is known variously as budget controller, budget director, budget officer who can have under him a budget committee which is constituted with the representatives of various departments like purchases, sales production, development, administration, and accounts.

4. Budget committee and budget officer

Budget committee

- The budget committee is a group of representatives of various functions in an organisation.
- As all functions are closely related and as any change in one's target will have its impact on that of other, it is necessary to discuss the targets so that mutually agreed program will be determined.
- This is called as co-ordination in budget making.
- It is a powerful force in knitting together the various activities of the business and to enforce real control over operations.
- The budget manual must specify those responsibilities and duties of the budget committee which should include the following points.
  - Receive under review budget estimates from the respective divisions or departments and make recommendations.
  - Recommend decisions or budget matters in which there will be conflicts between departments or divisions.
  - Recommend changes and approval of revised budget.
  - Receive, study, and analyse periodic reports by comparing the budget with actual performance.
  - Consider and make recommendations for revision of budgets when conditions warrant.
  - Take Considerations of the recommendations for changes in budget policies and procedures.
  - Make recommendations for the budget manual.

Budget officer

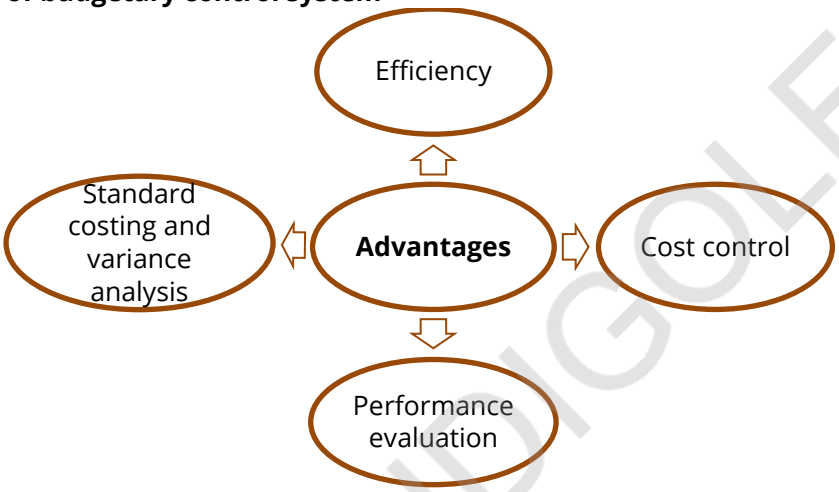
- Successful implementation of budgetary control system will be based upon the working of the budget committee which would be composed of all functional heads and a member from the board to preside over and guide the deliberations.

The budget committee's responsibilities include.

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- Preparation of Functional budget to assist in preparation of various budgets by coordinating the work of accounts department (which normally complies budget) with the element functional department like sales, production, plant maintenance etc.
- Due Communication to responsibility centres to forward the budget to the individuals who are responsible to adhere to them and to guide them in overcoming any practical difficulties in its working.
- Proper Co-ordination is required to prepare the periodical budget report for circulation to the concerned individuals coordinating with them in formulation of budgets for subsequent periods.
- Following up to know the follow-up action to be taken on the budget reports.
- Budget committee reviews for the preparation of an overall budget working report for discussion at the budget committee meetings and to ensure a follow up on the lines of action which is being suggested by the committee.
- Board review to prepare periodical reports for the board meeting, comparing the budgeted profit and loss account and balance sheet with that of actual results.

5. Advantages of budgetary control system



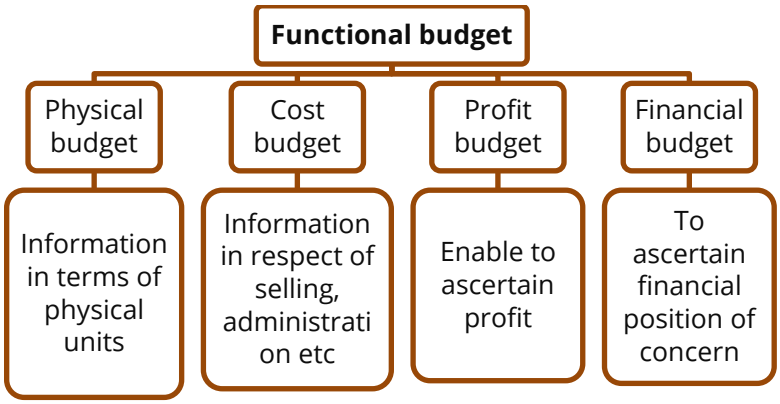
Efficiency: It enables the management in conducting its business activities in an efficient manner. Effective utilisation of scares resources i.e., man, material, machinery methods and money are made possible.
Cost control: it is a strong and powerful instrument used by firms to control their expenditure. It improves the feeling of cost consciousness among workers.
Performance evaluation: it provides a yardstick for the measurement and evaluation of the performance of individuals and their departments.
Standard costing and variance analysis: It creates apt condition for the implementation of standard costing system in the firm. It exposes the deviation from the budgeted figures after making necessary comparison with the actual figures.
Policy formulation: It helps in the review of current trends and framing of future policies.

6. Disadvantages of budgetary control system

- Estimate budgets may or may not be true. Assumptions about future events may or may not actually happen.
- Rigidity budgets are considered as rigid document, too much emphasis on budgets may affect day-to-day operations and neglects the dynamic state of organisational functioning.
- False sense of security mere: budgeting cannot lead to profitability. Budgets unable to be executed automatically. It may create a false sense of security which everything has been taken care of in the budgets.
- Lack of coordination and staff cooperation is generally not available during budgetary control exercise.
- Time and cost introduction and implementation of system is considered expensive.

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7. Functional budgets



A. Physical budgets

- A budget has the information in terms of physical units about sales production etc.
- For example, quantity of sales, quantity of production, inventories, manpower budgets.

B. Cost budgets

- Budgets which give cost information in respect of manufacturing selling administration etc.
- For example, manufacturing costs, selling cost, administration cost, R&D cost budgets etc.

C. Profit budgets

- Budgets which enable the ascertainment of profit for example sales budget profit and loss budget etc.

D. Financial budgets

- Financial budget is those budgets which facilitates to ascertain the financial position of a concern.
- For example, cash budget, capital expenditure, budgeted balance sheet etc.

8. Preparation of budgets

- Budget should be made in written form within the areas of control clearly demarcated and stating the items of revenue and expenditure to be covered by the budget.
- This will give a proper understanding of the plan and its scope to all those who must co-operate to make its implementation a success.
- Identification of key (or budget) factor key factor represents our resource availability is less than its requirement and puts a limit on the form's objective of maximum profitability.
- For proper budgeting, the key factors must be located and estimated properly.
- Budget committee and controller formulation of a budget usually requires whole-time services of a senior executive in must be assisted in this work by a budget committee consisting of hits of all departments along with the managing director as the chairman.
- The controller is responsible for coordinating and development of the budget programs and preparing the budget manual.
- Standard of activity or output based on past statistics known market changes and current conditions and forecast of future situations the standard of activity levels for future period should be light down.
- In a progressive business that achievement of must exceed those of earlier years.

9. Budget manual

Budget manual is a document which sets out standing instructions governing the responsibilities of persons and the procedures, forms and records relating to the preparation and use of budgets and it is a booklet containing standing instructions regarding the procedures to be followed and the time schedules to be observed.
The following was important matters dealt with in the budget manual.

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- The dates by which primary forecasts and plan are needed to be submitted.
- The form in which these are to be submitted and the persons to whom these are to be forwarded.
- The important factors that must be considered for each forecast or plan.
- Dividing expenses into variable and fixed side and the way each of the expenses is to be estimated and dealt with.
- The way scrutiny to be made and the personnel to carry it out.
- The matters which should be settled only with the consent of the managing director department and manager etc.
- The finalization of functional budgets and their compilation into master budget
- The form in which the various reports should be made out, their periodicity and dates the persons to whom these and their copies should be sent.
- The reporting of remedial actions
- The way budgets after their acceptance and issuance are to be revised or else to be amended.
- The content is included in budgets on which the action may be taken only with the approval of top management.

10. Budget period

- CIMA defines budget period as the period for which a budget is being prepared and used which may then be sub-classified into control periods.
- It refers to the period the budget covers.
- The board classification in this regard has already been mentioned as long-term budget and short-term budget.
- The short-term budget itself might be bifurcated into to yearly and quarterly budgets.
- Long term budgets provide the perspective since a person would be able to have a view of what is likely to be achieved and what the main problems are likely to be resolved such as competition from new products.
- Short term budgets say for a year is quite accurate and those for a quarter even more so. These are especially suitable for control purpose.
- A short-term budget need not necessarily be for single year. It is generally long enough to cover one season or business year.

11. Different types of budgets

A. Fixed budget

- Budget may be classified either as a fixed budget or a flexible budget.
- A fixed budget is the budget designed to remain unchanged irrespective of the level of activity.
- A fixed budget is one which is designed for a particular planned output level and same is not adjusted to the level of activity at the time of comparison between the budgeted and actual costs.
- Obviously, fixed budget can be established only for a small period when the actual output is not anticipated to differ much from budgeted output.
- However, if it is a project, it is liable to be revised, if it is due to business conditions undergoing a basic change or due to other reasons, actual operation largely differ from those plant in the fixed budget.
- This budget is mostly suited for fixed expenses, but they have only a limited application and are ineffective as a tool for cost control.

B. Flexible budget

- The chartered institute of management accountants London defines flexible budget as a budget which by recognising different cost behaviour patterns, is designed to change when the volume of output changes.
- It is budget prepared in a manner to give the budgeted cost at any level of activity.
- Flexible budget is a budget which by recognising the difference between fixed, semi fixed, and variable cost is designed to change in relation to the activity attained.
- It is designed to provide budgeted cost at any level of activity attained.

Flexible budgeting is desirable in the following cases:

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1. When the level of activity during the present year varies from period to period either due to the seasonal nature of the industry or due to variation in demand.
2. When the business is a new one and is difficult to see the future demand.
3. When the business is suffering from shortage of a factor of production such as materials, labour, plant capacity, etc.

- The main features of flexible budget are that it shows the appropriate expenditure to various levels of output.
- If the volume of output changes the expenditure appropriate to it will be established from the flexible budget for comparison with actual expenditure as a means of control.
- It provides a proper and logical comparison of budget allowances with actual cost.
- When flexible budget is prepared, actual cost at the level of actual activity is compared with budgeted cost at actual activity that is two things to a like base.
- For preparation of flexible budget, items of cost must be analysed individually to determine how different items of cost behave to change in volume.
- Therefore, deep cost analysis and cost identification is required to prepare a flexible budget.

Advantages and disadvantages of flexible budget

Advantages

- Using the help of flexible budget, the sales, costs, and profit may be calculated easily by the business at various levels of production capacity.
- In flexible budget, adjustment is very simple according to change in business conditions.
- It also helps in determination of production level as it shows budgeted costs with classification at various levels of activity along with sales. Hence the management can easily select the level of production which shows the profit predetermined by the owners of the business.
- It also shows the quantity of product to be produced to earn determined profit.

Disadvantage:

- The formulation of flexible budget is possible only when there is proper accounting system maintained, perfect knowledge about the factors of production and various business circumstances is available.
- Flexible Budget also requires the system of standard costing in business.
- It is very expensive, and it is labour oriented.

Difference between fixed and flexible budget

#	Fixed Budget	Flexible Budget
1.	It does not change with actual volume of activity achieved. Thus, it is known as rigid or inflexible budget	It can be re-casted based on activity level to be achieved. Thus, it is not rigid
2.	It operates on one level of activity and under one set of conditions. It assumes that there will be no change in the prevailing conditions, which is unrealistic	It consists of various budgets for different levels of activity
3.	Here as all costs like - fixed, variable, and semi-variable are related to only one level of activity so variance analysis does not give useful information.	Here analysis of variance provides useful information as each cost is analysed according to its behaviour
4.	If the budgeted and actual activity levels differ significantly, then the aspects like cost ascertainment and price fixation do not give a correct picture.	Flexible budgeting at different levels of activity facilitates the ascertainment of cost, fixation of selling price and tendering of Quotations.
5.	Comparison of actual performance with budgeted targets will be meaningless specially when there is a difference between the two activity levels	It provides a meaningful basis of comparison of the actual performance with the budgeted targets

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C. Sales Budgets

- Sales forecast is the commencement of budgeting and hence sales budget assumes primary importance.
- The quantity which can be sold may be the principal budget factor in many business undertakings.
- In any case to chalk out a realistic budget programme, there must be an accurate sales forecast.
  It indicates.
    - The quantity of estimated sales and
    - The expected unit selling price. These data are often reported by regions or by sales representatives.
- Once an estimate of the sales volume is obtained, the expected sales revenue can be determined by multiplying the volume by the expected unit sales price.
- The sales budget represents the total sales in physical quantities and values for a future budget period.
- The purposes of sales budget are not to attempt to estimate or guess what the actual sales will be, but rather to develop a plan with clearly defined objectives towards which the operational effort is directed to attain or exceed the objective. Hence, sales budget is not merely a sales forecast. The sales budget may be prepared under the following classification or combination of classifications:
    - Products or groups of products
    - Areas, towns, salesmen and agents
    - Types of customers as for example: (i) Government, (ii) Export, (iii) Home sales, (iv) Retail depots
    - Period—months, weeks, etc.

D. Production budget

Production Budget is a forecast of the production for the budget period of an undertaking. Production budget is prepared in two parts, viz. production volume budget for the physical units of the products to be produced and the cost of production or manufacturing budget detailing the budgeted cost under material, labour, and factory overhead in respect of the products. Production budget reflects the production for the budget period based upon:

- Sales budget,
- Production capacity of the factory,
- Planned increase or decrease in finished stocks, and
- Policy governing outside purchase.

Sales and production capacity comparison

- The available production facility and the sales budget will be compared and coordinated to determine the production budget.
- If production facilities are not sufficient, factors like working overtime, working in shifts, subcontracting for purchasing of additional plant and machinery may be considered to balance the production.
- If the production facilities are available in surplus due to consideration should be given to promote advertising, reduction of prices increase the sales, subcontracting of surplus capacity etc.

Stock level determination

- The level of stocks will depend upon the following factors seasonal industries in which stock have to be built up during off season to carter to the peak season.
- Steady and uniform level of production utilise the plant fully and to avoid retrenchment of workers.
- Production in such a way that minimum stocks are maintained at any time to avoid locking up of funds in inventory.

Effect of stock level policy

- Production budget can be used to show stabilized production every month i.e., maximum possible production or stabilized minimum quantity of stocks which will reduce inventory cost.
- In case of stabilizer production, the production facility will be fully utilised but the inventory carrying cost will vary according to stocks held.
- In case of stabilized stocks however the inventory carrying cost will be the lowest but there may be under utilisation of capacity.

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E. Plant utilisation budget

- Plant utilisation budget is used to be prepared for the estimation of plant capacity to meet the budgeted production during the budgeted period.
- It is a forecast of plant capacity is available for the fulfilment of production requirements as specified in production budget.
- This budget can be expressed in working hours or other convenient units.

Following are the features of plant utilisation budget.

- It will be the base for the machine requirements for sale and production department.
- It will provide the base of reasonable depreciation with the help of that machine can be replaced in future.
- It can be considered best for the new inventions in the context of plant and machinery.
- It will indicate the budget admission load on department for machines.
- It reveals the overloading on some departments so that sales volume can be increased by providing after sales service advertisement campaign reducing selling price.

F. Direct-material usage budget

The following steps are involved in the compilation of direct materials usage budget.

- The quality standard for each item of material must be specified. In this connection, standardization of size, quality, colour, etc., may be considered.
- Standard requirement of each item of materials required must also be set. While setting the standard quality, consideration should be given to the normal loss in process. The standard allowance for normal loss may be given after the consideration of past performance, test runs, technical estimates etc.
- Standard prices for every item of materials should be set after considering stock and contracts that is entered into.

After the standards setting for quality, quantity and prices, the direct materials budget will be prepared by multiplying each item of material required for the production by standard price.

G. Purchase budget

- Purchase budget represents the purchase that must be made during the budget period to meet the needs of the business.
- Purposes of purchase budget is to plan the purchase and plan long-term contracts when necessary, taking into consideration the market position and trend in prices and plan the finances required for the purchase.
- Components of purchase budget include cost of direct materials, indirect materials purchase of services, finished goods required for resale as set out in sales production, cost capital expenditure, R&D budgets etc.

Considerations purchase budget is prepared after considering the following factors.

- Material consumption quantities for the budgeted production
- Planned increase or decrease of inventory.
- Purchase orders already placed.
- material components are parts to be manufactured within the factory.
- Economic order quantity
- Reorder point with safety stock to cover fluctuations in demand.
- Selling and distribution budget
- The selling expenses include all items of expenditure on the promotion maintenance and distribution of finished products.
- This budget which is closely related to the sales budget is the forecast of the cost of selling and distribution for the budget period.
- Selling and distribution expenses may be fixed or variable about the volume of sales; separate budgets are usually established for fixed or variable selling and distribution expenses.

H. Production cost budget

- Production cost budget may be further classified as materials budget and labour Budget.
- Material requirement budget, which is commonly known as materials budget, assist the purchase department in suitably planning the purchases fixing the maximum and minimum levels of materials components etc.

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- The timing and amount of funds will be needed to make purchases on own with the help of the materials budget.
- Labour content of each item of production as per the production budget is determined based on grades and trades of the workers required and the labour time for each job operation and process.
- Rates of pay allowances, bonus etc of each category are then be considered and labour cost to be set for each budget centre will be calculated by multiplying the wage rate with the labour hours for the number of units of products budgeted.

I. Ending-inventory budget

This budget shows the cost of closing stock of raw materials and finished goods, etc. This information is required to prepare cost-of-goods-sold budget and budgeted financial statements i.e., budgeted income statement and budgeted balance sheet.

J. Cost of Goods Sold Budget

This budget covers direct material cost, direct labour cost, manufacturing expenses and cost of ending inventory of finished products.

K. Selling and distribution budget

Selling and distribution are the essential aspects of the profit earning function. At the same time, the pre-determination of these costs is very difficult. Selling & Distribution Cost Budget is a forecast of the cost of selling & distribution of goods during the budget period.

Following factors are to be considered when considering selling cost.

- **Nature of cost:** Fixed, variable and semi variable, cost should also be separated into variable and fixed elements.
- **Relationship between cost and sales volume:** heavy expenditure on failing and sales promotion may have to be incurred when the sales is in declining trend. This will increase the percentage of cost to total sales.
- **Time period of benefit:** sometimes intensive sales and promotion efforts are included in 1 year, but the benefits of such efforts accrue in subsequent years.
- **Trend factors**: using the experience of a guide, consideration should be given to the future trend of sales, possible changes in competition, etc in predetermination of selling costs.

The problems faced in the preparation of selling cost budgets are.

- Heavy expenditure on selling and sales promotion may have to be incurred when the volume of sales is falling off. This will increase the percentage of such cost of total sales and
- Sometimes intensive sales and promotion efforts are called for one year and the benefits of such efforts accurate in the subsequent years. This makes it difficult to establish the proportion of selling cost to sales.
- Despite these problems some relationship between selling cost and volume of sales must be established and it is the duty of the budget controller to determine the amount of selling costs to be incurred to achieve the desired level of sales volume.

Distribution cost

- Distribution costs have been defined as the cost of the sequence of operations which begins with making the packet of products available for dispatch and ends with making the reconditioned return of empty package if any available for reuse.
- It includes transport for the purpose of storage and warehousing cost etc.

Preparation of advertising cost budget is the responsibility of the sales manager or the advertisement manager. While preparing the advertisement cost, purchase consideration should be given to the following factors.

  - Best method of advertisement must be selected; cost will vary according to the method selected.
  - The maximum amount to be spent in a period, say one year, must be decided.
  - Advertising and sales must be coordinated. It means that money should be spent an advertisement only during enough of the product advertised are ready for sale.
  - An effective control over the advertisement expenditure must be exercised and the effectiveness of the advertisement should also be measured.
  - The choice of the method of advertising a product is based on the effectiveness of the money spent on advertisement in increasing or maintaining sales. The output sold increases the production cost will come down because of the economics of large-scale production.

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L. Capital expenditure budget.

- Capital expenditure budget is the plan of the proposed outlay on fixed assets, and it is very closely related to the cash budget.
- Capital expenditure forecasting is a continuous process and by nature it is a long-term function.
- Capital forecast should be made for number of years along with the long-term forecast that should be short term forecast to cover the general budget period under consideration.
- it is also essential that capital expenditure budget be properly coordinated with all the operational budgets of the concessions was to form an integral part of the plan.

Advantages

- It outlines the capital development programme and estimates capital expenditure during the budget period.
- It enables the company to establish a system of priorities. When there is a shortage of funds, capital rationing becomes necessary.
- It serves as a tool for controlling expenditure.
- It provides the amount of expenditure to be incorporated in the future budget summaries for calculation of estimated return on capital employed.
- This enables the cash budget to be completed. With other cash commitments capital expenditure commitment should also be considered for the completion of the budget
- It facilitates cost reduction programme, particularly when modernization and renovation is covered by this budget.

M. Administration expense budget

- Items of cost administration expenses are mostly policy costs under him speak side in nature.
- Some examples are audit fees depreciation of office equipment insurance subscriptions postage stationery telephone telegrams office supplies etc.
- Manner of estimation administrative expenses are estimated based on experience with due regard to anticipated changes either in general policy or the volume of business.
- To control ah, it is necessary to review them frequently and to determine at regular intervals whether these expenses continue to be adjusted.

N. Direct labour budget

This is based on the following factors.

- Budgeted production and plant utilisation
- Details of various machine operations involved, and services required.
- Estimate of different grades of labour required direct indirect labour complement Etc.
- Standard hours required to be worked.
- Labour cost budget standards rates of wages for each grade of labour can be introduced and then the direct and indirect labour cost budget can be prepared.
- Manpower recruitment budget this is based on the following factor.
- Direct labour hours required during the period.
- Effective hours per worker for different grades
- Existing manpower their skills need for training etc.
- Labour turnover rates
- Labour market conditions and availability of skilled labour

Advantages

- Define the direct and indirect labour force required.
- It enables the personnel department to plan in recruitment and training of workers so that labour turnover can be reduced to the minimum.
- It reveals the labour cost to be incurred in the manufacture and facilitates preparation of manufacturing cost budget and cost budgets for financing the wage bill.

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O. Research and development expense budget

- Research may be either your research or applied research your research increases knowledge whereas applied research aims at producing define results like improved methods of production etc.
- Research and development expenses should be controlled carefully and hence element on the spending is placed.

The following are the methods of allocation of R&D expense

- The percentage based on total sales value. This method is good if sales value is steady from year to year.
- Percentage based on net profit.
- Total sum is estimated based on past experience and future R&D plans and policies.
- A sum is fixed based on cash resources available with the company.
- A sum based on all factors which affect R&D e.g., in demand for existing products competition economic condition etc.

P. Cash budget

- Cash forecast precedes cash budget.
- Cash forecast is an estimate showing the amount of cash which would be available in a further period.
- This budget usually of two parts giving detailed estimates of cash receipts and cash disbursements.
- Estimates of cash receipts are prepared on monthly basis and depend upon estimated cash sales collections from debtors and anticipated receipts from other sources such as sale of assets borrowing etc.
- Estimates of cash disbursements are based on estimated cash purchases payment to creditors employee's remuneration bonus advances to suppliers' budget and capital expenditure for expansion etc.

Q. Production overhead budgets

- Items of cost production overhead consist of all items of indirect material indirect labour and indirect expenses.
- Does the estimated factory overhead cost necessary for production should include the factory overhead cost budget?
- The production overhead budget is usually for working out the pre-determined factory overhead recovery rates.

Manner of preparation

- This budget usually includes the total estimated cost for each item of factory overheads.
- So, I care full study and determination of the behaviour of different types of cost will be essential in preparation of factory overhead budget.
- Supporting schedules for factory overhead may be prepared for each department classifying the overhead into those cost for which departmental managers are responsible and those costs which are not within their spear of influence to evaluate performance.

Considerations the following factors irrelevant in preparation of factory overhead budget

- Fixed expenses are policy costs and hence they are based on policy matters.
- For estimating indirect labour work study may be adopted and the flexible estimated of number of indirect workers require for each level of direct workers employed is made e.g., one supervisor for every twenty direct workers.
- For estimating the consumption of indirect materials, the age and condition of plant and machinery should be taken into consideration.
- Production cost budget covers direct material cost direct labour cost and manufacturing expenses. After preparing direct material direct labour and production overhead cost budgets the summary budget i.e., production cost budget can be prepared.

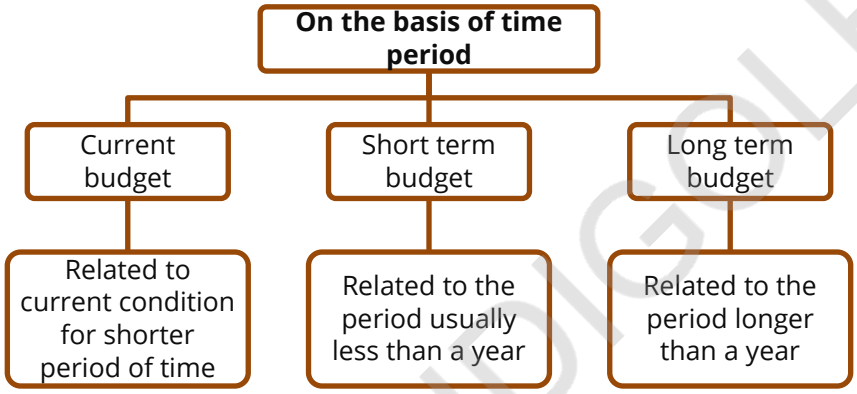
R. Master budget

- Master budget is a consolidated summary of the various functional budgets.
- Master budget is the summary budget incorporating its component functional budget and which is finally approved adopted and employed.

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- It is the culmination of the preparation of all other budgets like the sales budget production budget purchase budget etc.
- It consists of the budgeted profit and loss account, the balance sheet, and the budgeted funds flow statement.
- The master budget is prepared by the budget committee based on coordinated functional budgets and becomes the target of the company during the budget period when it is finally approved.
- This budget acts as the company's individualized key to successful financial planning and control.
- It provides the basis of computing the effect of any changes in any face of operations such as sales volume product mix prices labour cost material cost for change in facilities.
- it segregates income costs and profit by areas of responsibilities master budget presents all this information to the depth appropriate for the top management action.
- In the master budget costs are classified and summarised by types of expenses as well as by departments.
- This information extends the range of usefulness of master budget. It is considered as the best mode of understanding the companies' micro economic position relating to their fore coming budget period.
- Master budget is not merely compendium of theoretical calculations. The figures that it contains are the reflection of the actual intentions of the company relating to different areas for the forthcoming budget period.

12. Classification based on time.



These types of Budgets are classified based on time periods. These types of budgets reflect the planning period of the organization.

A. Current budgets

- Current budget can be defined as a budget which is related to the current conditions and is prepared for use over short period of time.
- This budget is more useful than basic budget at the target it lays down will be corrected to current condition.

B. Long term budgets

- Long term budget can be defined as a budget which is prepared for periods longer than a year.
- These budgets help in business forecasting and forward planning.
- capital expenditure budget and research development budgets are just examples of long-term budgets.

C. Short term budgets

- This budget is defined as a budget which is prepared for a period less than a year and is very useful to lower levels of management for control purpose.
- In an ideal situation a short-term budget should be perfectly fit into a long-term budget.

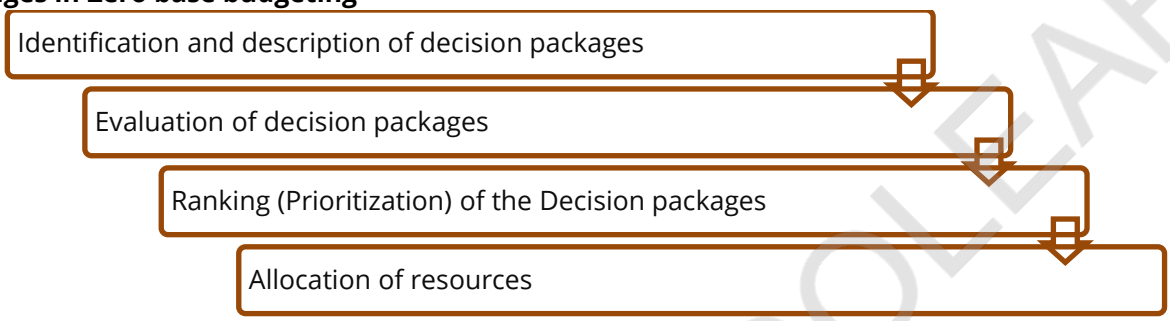
13. Zero base budgeting

- CIMA defines Zero base budgeting as "a method of budgeting whereby all activities are re-evaluated each time and budget is set. Discrete levels of each activity are valued, and a combination chosen to match funds available".

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- Zero base budgeting is a revolutionary concept of planning the future activities and there is a shark contradiction from conventional budgeting.
- Zero base budgeting may be better termed as "de nova budgeting" are budgeting from the beginning without any reference to any base past budget and actual happening.
- Zero base budgeting may be defined as "a planning and budgeting process which requires each manager to justify his entire budget request in detail from scratch (hand zero base) and shift the burden of proof to each manager to justify why he should spend any money at all. The approach requires that all activities be analysed in decision packages which are evaluated by systematic analysis and ranked in order of importance".
- It is a technique which complements and links the existing planning budgeting and review processes.
- It identifies alternative and effective methods of utilising limited resources in effective attainment of selected benefits.
- It is a flexible management approach which provides a credible rationale for re allocating resources by focusing on systematic review and justification of the funding and performance levels of current programs of activities.

Stages in Zero base budgeting



- **Identification and description of Decision packages:** Decision packages are the programmes or activities for which decision is required to be taken. The programmes or activities are described for technical specifications, financial impact in the form of cost benefit analysis and other issues like environmental, regulatory, social etc.
- **Evaluation of Decision packages:** Once Decision packages are identified and described, it is evaluated against factors like synchronization with organisational objectives, availability of funds, regulatory requirement etc.
- **Ranking (Prioritization) of the Decision packages:** After evaluation of the decision packages, it is ranked on the basis priority of the activities. Because of this prioritization feature ZBB is also known as Priority-based Budgeting.
- **Allocation of resources:** After ranking of the decision packages, resources are allocated for decision packages. Budgets are prepared like it is done first time without taking reference to previous budgets.

Advantages of zero-base budgeting

- Zero base budgeting is not based on incremental approach, so it promotes operational efficiency because it requires managers to review and justify the activities for the fund requested.
- since this system requires participation of all managers preparation of budget responsibility of all levels at management in successful execution of budgetary system can be ensured
- This technique is relatively elastic because budgets are prepared every year on zero bases. this system makes it obligatory to develop financial planning and management information system.
- This system weeds out inefficiency and reduces the cost of production because every budget proposal is evaluated based on cost benefit analysis.
- It provides the organisation with a systematic way to evaluate different operations and program undertaken by the management. It enables management to allocate resources according to priority of the programs.
- It is helpful to management in making optimum allocation of scarce resources because a unique aspect of Zero-base budgeting is the evaluation of both current and proposed expenditure and placing it some order of priority.

Criticism against Zero base budgeting

- Defining the decision units and decision packages is rather difficult.
- Zero-based budgeting requires a lot of training for managers.
- Cost of preparing the various packages may be very high in large forms involving large number of decisions packages.

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- It may lay more emphasis on short-term benefits to the detriment of long-term objectives of organisation.
- It will lead to enormous increase in paper were created by the decision packages. Machines about cost and benefits in each package must be continuously updated and new packages developed as soon as new activities emerge.
- Man, objective is very difficult to quantify as in search and development Zero base budgeting does not offer any significant control advantage.

Difference between traditional budget and Zero-base budgeting

- Traditional budgeting is accounting oriented. Main stress happens to be on previous level of expenditure. Zero base budgeting makes a decision-oriented approach.
- In traditional budgeting first reference is made to pass the level of spending and then demand is need for inflation and new programs. In Zero base budgeting and decision unit is broken into understandable decision packages which are anchored according to importance to enable top management to focus attention only on decision packages which enjoy priority to others
- In traditional budgeting some managers deliberately in flat their budget request so that after the cuts they still get what they want. In Zero base budgeting a rational analysis off budget proposal is attempted.
- Traditional budgeting is not as clear and responsive has Zero base budgeting.
- In traditional budgeting it is for top management to decide why a particular amount should be spent on a particular decision unit. In zero base budgeting this responsibility is shifted from top management to manager of decision unit.
- Traditional budgeting makes a routine approach while Zero base budgeting makes a very straightforward approach and immediately spotlights the decision packages enjoying priority over others.

14. Performance budgeting

- The concept of performance budgeting relates to greater management efficiency especially in government work.
- With the view of introducing a system approach the concept of performance budgeting was developed and as such there was a shift from financial classification to cost or objective classification.
- Performance budgeting is there for looked upon has a budget based on functions activities and projects and is linked to the budgetary system based on objective classification of expenditure.
- According to National institute of Bank management Bombay performance budgeting technique is the process of analysing and identifying simplifying and crystallizing specific performance objectives of a job to be achieved over a period in the framework of the organisational objectives the purpose and objectives of the job the technique is characterized by its specific direction towards the business objectives of the organisation.
- Thus, performance budgeting lays immediate stress on the achievement of specific goals over a period. It requires preparation of periodic performance reports.
- Such reports compare budget and actual data and show any existing variances.

The main purpose of performance budgeting is.

- To review at every stage and at every level of organisation to measure progress towards the short term and long-term objectives.
- Winter related physical and financial aspects of every program project or activity.
- To facilitate more efficient performance audit
- To assess the effects of the decision-making of supervisor to the middle and top managers
- To bring annual plans and budgets in line with short- and long-term plan objectives
- To present a comprehensive operational document showing complete planning fabric for programs and prospectus their objectives interwoven with the financial and physical aspects

Steps in Performance budgeting

According to Administrative Reforms Commission (ARC) the following steps are the basic ones in PB:

- Establishing a meaningful functional programme and activity classification of government operations.
- Bring the system of accounting and financial management in accordance with this classification.
- Evolving suitable norms, yardsticks, work units of performance and unit's costs, wherever possible under each programme and activity for their reporting and evaluation.

The Report of the ARC use the following terms in an integrated sequence.

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Performance Reporting at various levels of management:

Report	:	A major part of the management accountant's job consists of preparing reports to provide information for purposes of control and planning. The important consideration in drawing up of reports and determining their scope are the following:
Significance	:	Are the facts in the reports reliable? Does it either? called for action or demonstrate the effect of action? It is material enough.
Timeliness	:	How late can the information be and still be of use? What is the earliest moment at which it could be used if it were available? How frequently is it required?
Accuracy	:	How small should be an inaccuracy which does not alter the significance of the information?
Appropriateness	:	Is the recipient the right person to take any action that is needed? Is there any other information which is required to support the information to anyone else jointly interested?
Discrimination	:	Will anything be lost by omitting the item? Will any of the items gain from the omission. Is the responsibility for suppressing the item acceptable?
Presentation	:	Is the report clear and unbiased? Is the form of it is? suitable to the subject? Is the form of it suitable to the recipient?

The following are certain types of reports which are to be prepared and submitted to management regularly at predetermined time interval:

Top Management:

(Including Board of Directors and financial managers)

- Balance Sheet
- Profit & Loss Statement
- Position of stocks
- Disposition of funds or working capital.
- Capital expenditure and forward commitments together with progress of projects in hands.
- Cash-flow statements.
- Sales, production, and other appropriate statistics.

Sales Management:

- Actual sales compared with budgeted sales to measure performance by:
    - Products,
    - Territories
    - Individual salesmen, and
    - Customers.
- Standard profit and loss by product:
    - For fixing selling prices, and
    - To concentrate on sales of most profitable products.
- Selling expenses in relation to budget and sales value analysed by:
    - Products,
    - Territories
    - Individual salesmen, and
    - Customers.
- Bad debts and accounts which are slow and difficult in collection.
- Status reports on new or doubtful customers.

Production Management:

- To Buyer: Price variations on purchases analysed by commodities.

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- To Foreman:
  - Operational efficiency for individual operators duly summarized as departmental average.
  - Labour utilization report and causes of lost time and controllable time.
  - Indirect shop expenses against the standard allowed; and
  - Scrap report.
- To Works Managers:
  - Departmental operating statement.
  - General works operating statements (Expenses relating to all works expenses not directly allocable or controllable by departments).
  - Plant utilization report.
  - Department Scrap report; and
  - Material usage report.

15. Budget Ratios

A. Efficiency ratio:

This ratio may be defined as standard hours equivalent of work produced expressed as a percentage of the actual hours spent in producing the work.

1. $\text{"}\mathbf{Efficiency\ Ratio}\ =\ \text{"}\ \text{"}\mathbf{Standard\ Hours}\text{"}\ /\text{"}\mathbf{Actual\ Hours}\text{"}\ \text{"}\ \times \mathbf{100}\text{"}$

B. Activity ratio:

This may be defined as the number of standard hours equivalent to work produced expressed as a percentage of the budget of standard hours.

2. $\text{"}\mathbf{Activity\ Ratio}\ =\ \text{"}\ \text{"}\mathbf{Standard\ Hours}\text{"}\ /\text{"}\mathbf{Budgeted\ Hours}\text{"}\ \text{"}\ \times\ \mathbf{100}\text{"}$

C. Calendar ratio:

This ratio may be defined as the relationship between the number of working days in a period and the number of working as in the relative budget period.

3. $\mathbf{Calender\ Ratio}\ =\ (\mathbf{Available\ working\ Hours})/(\mathbf{Budgeted\ Working\ Hours})\ \times \mathbf{100}$

D. Standard capacity usage ratio:

This ratio indicates the extent to which facilities were utilized during the budget period.

4. $\mathbf{Standard\ Capacity\ Usage\ Ratio}\ =\ (\mathbf{Budgeted\ hours})/(\mathbf{Max.\ possible\ Hours\ in\ the\ Budgeted\ period})\ \times \mathbf{100}$

E. Capacity usage ratio:

This is a relationship between the budgeted number of working hours and the maximum possible number of working hours in a budget period.

5. $\mathbf{Actual\ Capacity\ Usage\ Ratio}\ =\ (\mathbf{Actual\ Hours\ worked})/(\mathbf{Max.\ possible\ working\ in\ a\ period})\ \times \mathbf{100}$

$\mathbf{Actual\ Usage\ of\ Budgeted\ Capacity}\ =\ (\mathbf{Actual\ hours\ Worked})/(\mathbf{Budgeted\ Hours}) \times \mathbf{100}$

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Illustrations

1. Illustration

A factory which expects to operate 7,000 hours, i.e., at 70% level of activity, furnishes details of expenses as under:

- Variable expenses Rs.1,260
- Semi-variable expenses Rs. 1,200
- Fixed expenses Rs. 1,800

The semi-variable expenses go up by 10% between 85% and 95% activity and by 20% above 95% activity. Construct a flexible budget for 80, 90 and 100 per cent activities.

Solution:

Particulars	Level of Activity			
	70%	80%	90%	100%
Budgeted no. of hours	**7,000**	**8,000**	**9,000**	**10,000**
(A) Variable Expenses (Rs.)	1,260	1,440	1,620	1,800
		$[\frac{1260}{70\%} * 80\%]$	$[\frac{1260}{70\%} * 90\%]$	$[\frac{1260}{70\%} * 100\%]$
(B) Semi-Variable Expenses	1,200	1,200	1,320	1,440
(C) Fixed Expenses	1,800	1,800	1,800	1,800
Total (A + B+ C)	**4,260**	**4,440**	**4,740**	**5,040**

2. Illustration

A department of Company X attains sale of ₹6,00,000 at 80 % of its normal capacity and its expenses are given below:

Particulars	Amount (Rs.)
Administration costs:	
• Office salaries	90,000
• General expenses	2 % of sales
• Depreciation	7,500
• Rates and taxes	8,750
Selling costs:	
• Salaries	8 % of sales
• Travelling expenses	2 % of sales
• Sales office expenses	1 % of sales
• General expenses	1 % of sales
Distribution costs:	
• Wages	15,000
• Rent	1 % of sales
• Other expenses	4 % of sales

Draw up flexible administration, selling and distribution costs budget, operating at 90 % 100 % and 110 % of normal capacity.

Solution:

Particulars	80%	90%	100%	110%
Sales (I)	6,00,000	6,75,000 $[\frac{6L * 90\%}{80\%}]$	7,50,000 $[\frac{6L * 100\%}{80\%}]$	8,25,000 $[\frac{6L * 110\%}{80\%}]$
Less: Cost				

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Administration Cost:				
Office Salaries (F)	90,000	90,000	90,000	90,000
General Expenses (V) (2% of Sales)	12,000	13,500	15,000	16,500
Depreciation (F)	7,500	7,500	7,500	7,500
Rent & Rates (F)	8,750	8,750	8,750	8,750
Sub Total (A)	**1,18,250**	**1,19,750**	**1,21,250**	**1,22,750**
Selling Cost:				
Salaries (V) (8% of Sales)	48,000	54,000	60,000	66,000
Travelling Expenses (V) (2% of Sales)	12,000	13,500	15,000	16,500
Sales Office Expenses (V) (1% of Sales)	6,000	6,750	7,500	8,250
General Expenses (V) (1% of Sales)	6,000	6,750	7,500	8,250
Sub Total (B)	**72,000**	**81,000**	**90,000**	**99,000**
Distribution Cost:				
Wages (F)	15,000	15,000	15,000	15,000
Rent (V) (1% of Sales)	6,000	6,750	7,500	8,250
Other Expenses (V) (4% of Sales)	24,000	27,000	30,000	33,000
Sub Total (C)	**45,000**	**48,750**	**52,500**	**56,250**
Overall Total (A+B+C) (ii)	**2,35,250**	**2,49,500**	**2,63,750**	**2,78,000**
Budgeted Profit (i) – (ii)	**3,64,750**	**4,25,500**	**4,86,250**	**5,47,000**

Note: F – Fixed Cost, V – Variable Cost

3. Illustration

Action Plan Manufacturers normally produce 8,000 units of their product in a month, in their Machine Shop. For the month of January, they had planned for a production of 10,000 units. Owing to a sudden cancellation of a contract in the middle of January, they could only produce 6,000 units in January.

Indirect manufacturing costs are carefully planned and monitored in the Machine Shop and the Foreman of the shop is paid a 10% of the savings as bonus when in any month the indirect manufacturing cost incurred is less than the budgeted provision. The Foreman has put in a claim that he should be paid a bonus of Rs.88.50 for the month of January. The Works Manager wonders how anyone can claim a bonus when the Company has lost a sizeable contract. The relevant figures are as under:

Indirect manufacturing	Expenses for a normal month(Rs.) 8000 units	Planned for January (Rs.) 10,000 units	Actual costs in January (Rs.) 6000 units
Salary of foreman	1,000	1,000	1,000
Indirect labour	720	900	600
Indirect material	800	1,000	700
Repairs and maintenance	600	650	600
Power	800	875	740
Tools consumed	320	400	300
Rates and taxes	150	150	150
Depreciation	800	800	800
Insurance	100	100	100
	5,290	**5,875**	**4,990**

Do you agree with the Works Manager?

Is the Foreman entitled to any bonus for the performance in January? Substantiate your answer with facts and figures.

Solution:

Flexible budget for January (6000 units)

Particulars	Nature of Cost	Cost for normal month 8,000 units	Cost planned for Jan 10,000 units	Flexible budget of Actual output 6,000 units	Actual cost of 6,000 units

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Salary for Foremen	F	1,000	1,000	1,000	1,000
Indirect Labour	V	720	900 (0.09*10,000)	540 (0.09*6,000)	600
Indirect Material	V	800	1000 (0.1*10,000)	600 (0.1*6,000)	700
Repair & Maintenance (WN1)	SV	600	650	550 {(0.025 * 6,000) + 400}	600
Power (WN2)	SV	800	875	725 {(0.0375 * 6,000) + 500}	740
Tools consumed	V	320	400 (0.04*10,000)	240 (0.04*6,000)	300
Rates & Taxes	F	150	150	150	150
Depreciation	F	800	800	800	800
Insurance	F	100	100	100	100
TOTAL		**5,290**	**5,875**	**4,705**	**4,990**

Note: F – Fixed; V – Variable; SV – Semi-variable

Here difference between Flexible budget cost and actual cost of 6000 units = 4990-4705 = Rs.285

Therefore, the Foreman is not entitled to any bonus for the performance in January since the actual cost is more than flexible budget cost

Working Note:

Separation of semi – variable cost

1. Repair and Maintenance

Volume	8,000 units	10,000 units	2,000 units Increase
Expenditure	Rs.600	Rs.650	Rs.50 Increase

Therefore, Variable component per unit = $\frac{\text{Rs.50}}{\text{2,000 Units}}$ = Rs.0.025 Per unit

Hence,

8,000 Units	Variable Cost	8,000 * 0.025 = Rs.200
	Fixed Cost	600 – 200 = Rs.400 (Bal. Fig)
10,000 Units	Variable Cost	10,000 * 0.025 = Rs.250
	Fixed Cost	650 – 250 = Rs.400

2. Power

Volume	8,000 units	10,000 units	2,000 units Increase
Expenditure	Rs.800	Rs.875	Rs.75 Increase

Therefore, Variable component per unit = $\frac{\text{Rs.75}}{\text{2,000 Units}}$ = Rs.0.0375 Per unit

Hence,

8,000 Units	Variable Cost	8,000 * 0.0375 = Rs.300
	Fixed Cost	800 – 300 = Rs.500 (Bal. Fig)
10,000 Units	Variable Cost	10,000 * 0.0375 = Rs.375
	Fixed Cost	875 – 375= Rs.500

4. Illustration

A single product company estimated its sales for the next year quarter-wise as under:

Quarter	Sales (Units)
1	30000
2	37500

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3	41250
4	45000

The opening stock of finished goods is 10,000 units and the company expect to maintain the closing stock of finished goods at 16,250 units at the end of the year. The production pattern in each quarter is based on 80% of the sales of the current quarter and 20% of the sales of the next quarter.
The opening stock of raw materials in the beginning of the year is 10,000 kg. and the closing stock at the end of the year is required to be maintained at 5,000 kg. Each unit of finished output requires 2 kg. of raw materials.

The company proposes to purchase the entire annual requirement of raw materials in the first three quarters in the proportion and at the prices given below:

Quarter	Purchase of raw materials % to total annual requirement in quantity	Price per kg(Rs)
1	30%	2
2	50%	3
3	20%	4

The value of the opening stock of raw materials in the beginning of the year is Rs 20,000. You are required to present the following for the next year, quarter wise:
(i) Production budget (in units).
(ii) Raw material consumption budget (in quantity).
(iii) Raw material purchase budget (in quantity and value).
(iv) Priced stores ledger card of the raw material using First in First out method

Solution:

Priced Stores Ledger Card (FIFO Method)

		Q1	Q2		Q3		Q4	
Opening	**Qty**	10000	41500		122500		38500	63000
	Rate	2	2		3		3	4
	Value	20000	83000		367500		115500	252000
Purchase	**Qty**	94500	157500		63000		-	
	Rate	2	2		4		-	
	Value	189000	472500		252000		-	
Issue	**Qty**	63000	41500	35000	84000		38500	58000
	Rate	2	2	3	3		3	4
	Value	126000	83000	105000	252000		115000	232000
Closing	**Qty**	41500	122500		38500	63000	5000	
	Rate	3	3		3	4	4	
	Value	83000	367500		115500	252000	200000	

Working Note:

1. **Annual Production Requirement**

Total Sales Required	
Q1	30,000
Q2	37,500
Q3	41,250
Q4	45,000
	1,53,750
Add: Closing Stock Required	16,250
Total Quantity Required	1,70,000
Less: Opening Stock	(10,000)

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Production Required	**1,60,000**

2. Production Budget (in units) – Quarter wise

Particulars	Q1	Q2	Q3	Q4	Total
Sales	30,000	37,500	41,250	45,000	1,53,750
Production required 80% of current quarter	24,000	30,000	33,000	36,000	1,23,000
20% of next month quarter sales	7,500	8,250	9,000	12,250 (Bal.Fig)	37,000
Total	**31,500**	**38,250**	**42,000**	**48,250**	**1,60,000**

3. Raw Material Consumption Budget (in Qty)

Particulars	Q1	Q2	Q3	Q4	Total
Units to be produced	31,500	38,250	42,000	48,250	1,60,000
Raw Material consumption required Production Qty * 2Kg	63,000	76,500	84,000	96,500	3,20,000

4. Raw Material Purchase Budget (in Qty)

Raw Material consumption required	3,20,000
Add: Closing Stock of Raw Material Required	5,000
	3,25,000
Less: Opening Stock of Raw material	(10,000)
Qty of Raw Material to be purchased	**3,15,000 Kgs**

5. Raw Material Purchase Budget (in Qty & Value)

Particulars	Q1	Q2	Q3	Q4	Total
% of Raw Material to be purchased	30%	50%	20%	-	100%
Raw Material to be purchased in Qty	94,500	1,57,500	63,000	-	3,15,000 Kgs

5. Illustration

A company is engaged in the manufacture of specialized sub-assemblies required for certain electronic equipment. The company envisages that in the forthcoming month, December 2018, the sales will take a pattern in the ratio of 3: 4: 2 respectively of sub-assemblies, ACB, MCB and DP

The following is the schedule of components required for manufacture:

Sub – Assembly	Selling Price	Base Board	Component Requirements		
			IC08	IC12	IC26
ACB	520	1	8	4	2
MCB	500	1	2	10	6
DP	350	1	2	4	8
Purchase Price (Rs)		60	20	12	8

The direct labour time and variable overheads required for each of the sub- assemblies are:

	Labour hours per Assembly		
	Grade A	Grade B	Variable Overheads per Sub-Assembly (Rs)
ACB	8	16	36
MCB	6	12	24
DP	4	8	24

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Direct wage rate per hour (Rs)	5	4	_

The labourers work 8 hours a day for 25 days a month. The opening stocks of sub-assemblies and components for December 2018 are as under:

	Sub – Assemblies	**Components**	
ACB	800	**Base Board**	1600
MCB	1200	IC08	1200
DP	2800	IC12	6000
		IC26	4000

Fixed overheads amount to Rs 7,57,200 for the month and a monthly profit target of Rs 12 lacs has been set. The company is eager for a reduction of *closing inventories for December 2012 of sub-assemblies and components by 10% of quantity as compared to the opening stock.

Prepare the following budgets for December 2018:

(a) Sales budget in quantity and value.

(b) Production budget in quantity

(c) Component usage budget in quantity.

(d) Component purchase budget in quantity and value.

(e) Manpower budget showing the number of workers and the amount of wages payable

Solution:

1. **Calculation of Contribution Per Unit**

Particulars	**ACB**	**MCB**	**DP**
Selling Price per unit	520	500	350
Less: Variable Cost			
Components:			
Base Board @ Rs.60	60	60	60
IC08 @ Rs.20 per unit	160 (8*20)	40 (2*20)	40 (2*20)
IC12 @ Rs.12 per unit	48 (4*12)	120 (10*12)	48 (4*12)
IC26 @ Rs.8 per unit	16 (2*8)	48 (6*80)	64 (8*8)
Labour:			
Grade A @ Rs.5 per hr	40 (8*5)	30 (6*5)	20 (4*5)
Grade B @ Rs.4 per hr	64 (16*4)	48 (12*4)	32 (8*4)
Variable production OH	36	24	24
Contribution per unit	**96**	**130**	**62**

2. **Computation of Desired Profit and Desired Contribution**

Desired Profit	Rs.12,00,000
Add: Fixed Cost	Rs.7,57,000
Desired Contribution	**Rs.19,57,500**

3. **Desired Sales quantity**

Particulars	**ACB**	**MCB**	**DP**
Contribution per unit	96	130	62
Mix (Ratio)	3	4	2
Total Contribution for each combination	288	520	124
Total of all contribution	**932**		

Desired Sales in no of combination = $\frac{\text{Rs.19,57,000}}{\text{Rs.932}}$ = 2,100 combination

No. of ACB = 2,100*3 = 6,300

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No. of MCB = 2.100*4 = 8,400
No. of DP = 2,100*2 = 4,200

4. Calculation of Sales Budget in Qty and Value

Particulars	ACB	MCB	DP	Total
No. of Units	6,300	8,400	4,200	
Selling Price per unit	520	500	350	
Sales Volume (in Rs.)	**32,76,000**	**42,00,000**	**14,70,000**	**89,46,000**

5. Production Budget in Qty

Particulars	ACB	MCB	DP
Sales in Units	6,300	8,400	4,200
Add: Closing Stock required (Opening Stock * 90%)	720 (800*90%)	1,080 (1,200*90%)	2,520 (2,800*90%)
Total Qty required	**7,020**	**9,480**	**6,720**
Less: Opening stock	(800)	(1,200)	(2,800)
Qty to be produced	**6,220**	**8,280**	**3,920**

6. Component usage budget in Qty

Particulars	Base board	IC08	IC12	IC26
ACB 6,220 Units	6,220 (6,220*1)	49,760 (6,220*8)	24,880 (6,220*4)	12,440 (6,220*2)
MCB 8,280 Units	8,280 (8,280*1)	16,560 (8,280*2)	82,800 (8,280*10)	49,680 (8,280*6)
DP 3,920 Units	3,920 (3,920*1)	7,840 (3,920*2)	15,680 (3,920*4)	31,360 (3,920*8)
Total required	**18,420**	**74,160**	**1,23,360**	**93,480**

7. Component Purchase budget in Qty and Value

Particulars	Base board	IC08	IC12	IC26
Usage required	18,420	74,160	1,23,360	93,480
Add: Closing Stock (Opening Stock*90%)	1,440 (1,600*90%)	1,080 (1,200*90%)	6,000 (6,000*90%)	3,600 (4,000*90%)
Total requirement	**19,860**	**75,240**	**1,28,760**	**97,080**
Less: Opening Stock	(1,600)	(1,200)	(6,000)	(4,000)
Qty to be purchased	**18,260**	**74,040**	**1,22,760**	**93,080**
Purchase price per unit	**Rs.60**	**Rs.20**	**Rs.12**	**Rs.8**
Purchase price (in Rs.)	**10,95,600**	**14,80,800**	**14,73,120**	**7,44,640**

8. Manpower budget showing the no. of workers and the amount of wages payable

Particulars	Grade A	Grade B
ACB (6,220 Units)	49,760 (6,220*8)	99,520 (6,220*16)
MCB (8,280 Units)	49,680 (8,280*6)	99,360 (8,280*12)
DP (3,920 Units)	15,680 (3,920*4)	31,360 (3,920*8)
Total Hours required	1,15,120	2,30,240
Hours per man per month (8*25)	200 Hrs	200 Hrs
No. of workers required	576 (1,15,120/200)	1,152 (2,30,240/200)
Rate per hour	Rs.5	Rs.4
Wage rate per worker per month	1,000 (200*5)	800 (200*4)
Wages payable	5,76,000 (576*1000)	9,21,600 (1,152*800)
Total wages payable	**14,97,600**	

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6. Illustration

Floatglass Manufacturing Company requires you to present the Master budget for the next year from the following information:

Particulars	Amount (Rs)
Sales Toughened Glass Bent Glass	 600000 200000
Direct material cost	60% of Sales
Direct wages	20 workers @ Rs 150/ month
Factory overheads: Indirect labour • Works manager • Foreman	 500 per month 400 per month
Stores and spares	2.5% on Sales
Depreciation on machinery	12600
Light and power	3000
Repairs and maintenance	8000
Other sundries	10% on Direct wages
Administration, selling and distribution expenses	36000 per year

Solution:

Statement showing Master Budget
Budgeted Income Statement

Particulars	Amount
Sales: Toughened Glass Bent Glass	 6,00,000 2,00,000
Total	**8,00,000**
Less: Cost of Production (WN1)	(5,74,000)
Gross Profit	2,26,000
Less: Administration, Selling & distribution Exp	(36,000)
Net Profit	**1,90,000**

Working Note:

1.Cost of Production

Particulars	Amount
Direct Material (6,00,000+2,00,000) * 60%	4,80,000
Direct Labour (20 Workers * Rs.150per month * 12 months)	36,000
Prime Cost	**5,16,000**
Fixed Factory Cost: Work manager's salary Foreman's salary Depreciation Light & Power	 6,000 4,800 12,600 3,000
Variable Factory Overhead Stores & Spare Repairs & Maintenance Sundry Exp (10% of Direct Wages = 36,000 * 10%)	 20,000 8,000 3,600
Production Cost	**5,74,000**

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7. Illustration

ABC Ltd. is currently operating at 75% of its capacity. In the past two years, the levels of operations were 55% and 65% respectively. Presently, the production is 75,000 units. The company is planning for 85% capacity level during 20X3-20X4. The cost details are as follows:

	55% capacity (Rs)	65% capacity (Rs)	75% capacity (Rs)
Direct Materials	11,00,000	13,00,000	15,00,000
Direct Labour	5,50,000	6,50,000	7,50,000
Factory Overheads	3,10,000	3,30,000	3,50,000
Selling Overheads	3,20,000	3,60,000	4,00,000
Administrative Overheads	1,60,000	1,60,000	1,60,000
	24,40,000	**28,00,000**	**31,60,000**

Profit is estimated @ 20% on sale. The following increases in costs are expected during the year:

	(%)
Direct Material	8
Direct Labour	5
Variable Factory Overheads	5
Variable Selling Overheads	8
Fixed Factory Overheads	10
Fixed Selling Overheads	15
Administrative Overheads	10

Prepare flexible budget for the period 20X3-20X4 at 85% level of capacity. Also ascertain profit and contribution.

Solution:

Statement showing Flexible Budget @ 85% capacity i.e 85,000 Units

Particulars	Amount
Variable Cost:	
Direct Material (WN1)	18,36,000
Direct Labour (WN2)	8,92,500
Variable Factory Overhead (WN3)	1,78,500
Variable Selling Overhead (WN4)	3,67,200
Total Variable Cost	**32,74,200**
Fixed Cost:	
Fixed Factory Overhead (WN3)	2,20,000
Fixed Selling Overhead (WN4)	1,15,000
Fixed Administration Overhead (WN5)	1,76,000
Total Fixed Cost	**5,11,000**
Total Cost	**37,85,200**
Add: Profit Mark-up 20% on Sales 37,85,200 * 20% 80%	9,46,300
Budgeted Sales	**47,31,500**

Contribution

Budgeted Sales	47,31,500
Less: Variable Cost	(32,74,200)
Contribution	**14,57,300**
Less: Fixed Cost	(5,11,000)
Profit	**9,46,300**

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Alternatively,

Contribution = Fixed Cost + Profit

= 5,11,000 + 9,46,300 = Rs.14,57,300

Working Note:

1. Direct Material

Particulars	55%	65%	75%
Cost Incurred	11,00,000	13,00,000	15,00,000
No. of Units	55,000 75,000 * 55% 75%	65,000 75,000 * 65% 75%	75,000 75,000 * 75% 75%
Cost Per Unit	**Rs.20 Per Unit**	**Rs.20 Per Unit**	**Rs.20 Per Unit**

Therefore, Nature of cost is variable

Cost in the next period = 20 per unit * 75,000 * 85% * 1.08 = Rs.18,36,000
75%

2. Direct Labour

Particulars	55%	65%	75%
Cost Incurred	5,50,000	6,50,000	7,50,000
No. of Units	55,000 75,000 * 55% 75%	65,000 75,000 * 65% 75%	75,000 75,000 * 75% 75%
Cost Per Unit	**Rs.10 Per Unit**	**Rs.10 Per Unit**	**Rs.10 Per Unit**

Therefore, Nature of cost is variable

Cost @ 85% = 10 per unit * 75,000 * 85% * 1.05 = Rs.8,92,500
75%

3. Factory Overhead

Particulars	55%	65%	75%
Cost Incurred	3,10,000	3,30,000	3,50,000
No. of Units	55,000 75,000 * 55% 75%	65,000 75,000 * 65% 75%	75,000 75,000 * 75% 75%
Cost Per Unit	**Rs.5.6363 Per Unit**	**Rs.5.0769 Per Unit**	**Rs.4.666 Per Unit**

Since the cost per unit is not constant and cost in totality is also not constant, it is a semi-variable cost

Break-up of Factory Overhead into Variable Cost & Fixed Cost

At 55%	55,000 Units	3,10,000
At 65%	65,000 Units	3,30,000
	Increase by 10,000 Units	Increase by Rs.20,000
Variable Cost Per Unit = 20000/10000 = Rs.2 Per Unit		

At 55%	Total Cost	3,10,000
	Less: Variable Cost (55,000 * 2)	1,10,000
	Fixed Cost (Bal. Fig)	**2,00,000**

Cost @ 85% Level	
Variable Cost (2 * 85,000 * 1.05)	1,78,500
Fixed Cost (2,00,000 * 1.10)	2,20,000

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4. Selling Overheads

Particulars	55%	65%	75%
Cost Incurred	3,20,000	3,60,000	4,00,000
No. of Units	55,000 75,000 * 55% 75%	65,000 75,000 * 65% 75%	75,000 75,000 * 75% 75%
Cost Per Unit	**Rs.5.8181**	**Rs.5.5384**	**Rs.5.33**

Therefore, the nature of the overhead is Semi-Variable.

At 55%	55,000 Units	3,20,000
At 65%	65,000 Units	3,60,000
	Increase by 10,000 Units	Increase by Rs.40,000
Variable Cost Per Unit = 40,000/10,000 = Rs.4 Per Unit		

At 55%	Total Cost	3,20,000
	Less: Variable Cost (55000 * 4)	2,20,000
	Fixed Cost (Bal. Fig)	**1,00,000**

Cost @ 85% Level	
Variable Cost (4 * 85,000 * 1.08)	3,67,200
Fixed Cost (2,00,000 * 1.15)	1,15,000

5. Admin Overheads

Since the total cost is constant at all the levels of activity, the nature of Admin. **Overheads is Fixed**

Therefore, Cost at 85% = 1,60,000 * 1.10 = Rs.1,76,000

8. Illustration

The accountant of manufacturing company provides you the following details for year 20X2:

	(Rs.)		(Rs.)
Direct materials	1,75,000	Other variable costs	80,000
Direct Wages	1,00,000	Other fixed costs	80,000
Fixed factory overheads	1,00,000	Profit	1,15,000
Variable factory overheads	1,00,000	Sales	7,50,000

During the year, the company manufactured two products A and B and the output and costs were:

	A	B
Output (units)	2,00,000	1,00,000
Selling price per unit	Rs.2.00	Rs.3.50
Direct materials per unit	Rs. 0.50	Rs. 0.75
Direct wages per unit	Rs. 0.25	Rs. 0.50

Variable factory overhead is absorbed as a percentage of direct wages. Other variable costs have been computed as: Product A Rs.0.25 per unit; and B Rs.0.30 per unit.

During 20X3, it is expected that the demand for product A will fall by 25 % and for B by 30%. It is decided to manufacture a further product C, the cost for which are estimated as follows:

	Product C
Output (units)	2,00,000
Selling price per unit	Rs.1.75
Direct materials per unit	Rs.0.40
Direct wages per unit	Rs.0.25

It is anticipated that the other variable costs per unit will be the same as for product A. Prepare a budget to present to the management, showing the current position and the position for 20X3. Comment on the comparative results

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Solution:

Statement showing Profitability

Current Year			
Particulars	**A**	**B**	**Total**
No. of Units	2,00,000	1,00,000	-
Sales Revenue	4,00,000 (2,00,000*2)	3,50,000 (1,00,000*3.5)	7,50,000
Less: Variable Cost			
Direct Material	1,00,000 (2,00,000*0.5)	75,000 (1,00,000*0.75)	1,75,000
Direct Labour	50,000 (2,00,000*0.25)	50,000 (1,00,000*0.5)	1,00,000
Variable Factory Cost	50,000	50,000	50,000
Other Variable Overhead	50,000 (2,00,000*0.25)	30,000 (1,00,000*0.3)	80,000
Contribution	**1,50,000**	**1,45,000**	**2,95,000**
Less: Fixed Cost			
Factory	-	-	1,00,000
Other Fixed Cost	-	-	80,000
Profit	**-**	**-**	**1,15,000**

Next Year				
Particulars	**A**	**B**	**C**	**Total**
No. of Units	1,50,000	70,000	2,00,000	-
Sales Revenue	3,00,000 (1,50,000*2)	2,45,000 (70,000*3.5)	3,50,000 (2,00,000*1.75)	8,95,000
Less: Variable Cost				
Direct Material	75,000 (15,000*0.5)	52,500 (70,000*0.75)	80,000 (2,00,000*0.40)	2,07,500
Direct Labour	37,500 (1,50,000*0.25)	35,000 (70,000*0.5)	50,000 (2,00,000*0.25)	1,22,500
Variable Factory Cost	37,500	35,000	50,000	1,22,500
Other Variable Overhead	37,500 (50,000*0.25)	21,000 (70,000*0.3)	50,000 (2,00,000*0.25)	1,08,500
Contribution	**1,12,500**	**1,01,500**	**1,20,000**	**3,34,000**
Less: Fixed Cost				
Factory	-	-	-	1,00,000
Other Fixed Cost	-	-	-	80,000
Profit	**-**	**-**	**-**	**1,54,000**

Since the profit is increasing by Rs.39,000, Product C should be added.

Working Note:

1. **Variable factory Overheads as a percentage of Direct Wages**
   Given, Variable Factory Overheads = Rs.1,00,000
   Direct Wages = Rs.1,00,000
   Therefore Percentage = 100%
2. **Revised No. of Units**
   A = 2,00,000 * (100% - 25%) = 1,50,000 units
   B = 1,00,000 * (100% - 30%) = 70,000 units

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9. Illustration

Jigyasa Ltd. is drawing a production plan for its two products Minimax (MM) and Heavyhigh (HH) for the year 20X3-X4. The company's policy is to hold closing stock of finished goods at 25% of the anticipated volume of sales of the succeeding month.

The following are the estimated data for two products:

	Minimax (MM)	Heavyhigh (HH)
Budgeted Production Units	1,80,000	1,20,000
	(Rs.)	**(Rs.)**
Direct material cost per unit	220	280
Direct labour cost per unit	130	120
Manufacturing overhead	4,00,000	5,00,000

The estimated units to be sold in the first four months of the year 20X3-X4 are as under

	April	**May**	**June**	**July**
Minimax	8,000	10,000	12,000	16,000
Heavyhigh	6,000	8,000	9,000	14,000

Prepare production budget for the first quarter in month wise.

Solution:

Production Cost Budget

Particulars	**Mini-Max**	**Heavy-High**	**Total**
Qty to be produced	32,000	25,000	-
Direct Material	70,40,000 (32,000 * 220)	7,00,000 (25,000 * 280)	1,40,40,000
Direct Labour	4,01,60,000 (32,000 * 130)	30,00,000 (25,000 * 120)	71,60,000
Manufacturing Overhead	71,111 4,00,000 * 32,000 1,80,000	104167 5,00,000 * 25,000 1,20,000	1,75,278
Total	**1,12,71,111**	**1,01,04,167**	**2,13,75,278**

Working Note:

1. Qty to be produced (Mini-Max)

Particulars	**April**	**May**	**June**	**Total**
Sales	8,000	10,000	12,000	20,000
Add: Closing Stock required (25% of next month sales)	2,500 (25% * 10,000)	3,000 (25% * 12,000)	4,000 (25% * 6,000)	
Subtotal	**10,500**	**13,000**	**16,000**	
Less: Opening Stock	(2,000) (25% * 8,000)	(2,500) (25% * 10,000)	(3,000) (25% * 12,000)	
Qty to be produced	**8,500**	**10,500**	**13,000**	**32,000**

2. Qty to be produced (Heavy-High)

Particulars	**April**	**May**	**June**	**Total**
Sales	6,000	8,000	9,000	23,000
Add: Closing Stock required (25% of next month sales)	2,000 (25% * 8,000)	2,250 (25% * 9,000)	3,500 (25% * 14,000)	
Subtotal	**8,000**	**10,250**	**12,500**	
Less: Opening Stock	(1,500) (25% * 6,000)	(2,000) (25% * 8,000)	(2,250) (25% * 9,000)	
Qty to be produced	**6,500**	**8,250**	**10,250**	**25,000**

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10. Illustration

Following data is available for DKG and Co:

Standard working hours	8 hours per day of 5 days per week
Maximum capacity	50 employees
Actual working	40 employees
Actual hours expected to be workedper four weeks	6,400 hours
Std. hours expected to be earned perfour weeks	8,000 hours
Actual hours worked in the four- weekperiod	6,000 hours
Standard hours earned in the four-week period	7,000 hours

The related period is of 4 weeks. In this period there was a one special day holiday due to national event. Calculate the following ratios:

(1) Efficiency Ratio, (2) Activity Ratio, (3) Calendar Ratio, (4) Standard Capacity Usage Ratio, (5) Actual Capacity Usage Ratio. (6) Actual Usage of Budgeted Capacity Ratio.

Solution:

1. Standard Capacity usage ratio:

$$= \frac{\text{Budgeted Hours}}{\text{Maximum hours available in the budgeted period}} \times 100$$

$$= \frac{6{,}400 \text{ hrs}}{8{,}000 \text{ hrs}} * 100$$

$$= \mathbf{80\%}$$

2. Actual Capacity usage ratio:

$$= \frac{\text{Actual Hours worked}}{\text{Maximum hours available in the budgeted period}} \times 100$$

$$= \frac{6{,}000 \text{ hrs}}{8{,}000 \text{ hrs}} \times 100$$

$$= \mathbf{75\%}$$

3. Actual usage of budgeted capacity ratio:

$$= \frac{\text{Actual Hours worked}}{\text{Budgeted hours}} \times 100$$

$$= \frac{6{,}000 \text{ hrs}}{6{,}400 \text{ hrs}} \times 100$$

$$= \mathbf{93.75\%}$$

4. Efficiency Ratio:

$$= \frac{\text{Standard hours required}}{\text{Actual hours worked}} \times 100$$

$$= \frac{7{,}000 \text{ hrs}}{6{,}000 \text{ hrs}} \times 100$$

$$= \mathbf{116.67\%}$$

5. Activity Ratio:

= Actual usage of budgeted capacity ratio x Efficiency Ratio

= 93.75% x 116.67%

= **109.375%**

(OR)

$$= \frac{\text{Standard hours for actual output}}{\text{Budgeted hours}} \times 100$$

$$= \frac{7{,}000 \text{ hrs}}{6{,}400 \text{ hrs}} \times 100$$

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= **109.375%**

6. Calendar Ratio

$$= \frac{\text{Actual no. of days}}{\text{Budgeted no. of days}} \times 100$$

$$= \frac{19}{20} \times 100$$

= **95%**

11. Illustration (RTP Nov 22) (Added for Student Practice, Not Covered in Videos)

Following information is available for DK and Co.:

Standard working hours	9 hours per day of 5 days per week
Maximum capacity	50 employees
Actual working	40 employees
Actual hours expected to be worked per four week	7,200 hours
Std. hours expected to be earned per four weeks	9,000 hours
Actual hours worked in the four- week period	6,750 hours
Standard hours earned in the four- week period	7,875 hours.

The related period is of 4 weeks. In this period there was a one special day holiday due to national event.

You are required to CALCULATE the following ratios:

(i) Efficiency Ratio
(ii) Activity Ratio
(iii) Calendar Ratio
(iv) Standard Capacity Usage Ratio
(v) Actual Capacity Usage Ratio
(vi) Actual Usage of Budgeted Capacity Ratio

Solution:

Maximum Capacity in a budget period
= 50 Employees × 9 Hrs. × 5 Days × 4 Weeks = 9,000 Hrs.

Budgeted Hours
= 40 Employees × 9 Hrs. × 5 Days × 4 Weeks = 7,200 Hrs.

Actual Hrs.
= 6,750 Hrs.

Standard Hrs. for Actual Output
= 7,875 Hrs.

Budget No. of Days
= 20 Days (4 Weeks x 5 Days)

Actual No. of Days
= 20 – 1 = 19 Days

(i) Efficiency Ratio $= \frac{\text{Standard Hrs}}{\text{Actual Hrs}} \times 100 = \frac{7{,}875 \text{ hours}}{6{,}750 \text{ hours}} \times 100 = 116.67\%$

(ii) Activity Ratio $= \frac{\text{Standard Hrs}}{\text{Budgeted Hrs}} \times 100 = \frac{7{,}875 \text{ hours}}{7{,}200 \text{ hours}} \times 100 = 109.375\%$

(iii) Calendar Ratio $= \frac{\text{Available working days}}{\text{Budgeted working days}} \times 100 = \frac{19 \text{ days}}{20 \text{ days}} \times 100 = 95\%$

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(iv) Standard Capacity Usage Ratio $= \frac{\text{Budgeted Hrs}}{\text{Max. possible Hrs in the budgeted period}} \times 100$

$= \frac{7{,}200 \text{ hours}}{9{,}000 \text{ hours}} \times 100 = 80\%$

(v) Actual Capacity Usage Ratio $= \frac{\text{Actual Hrs worked}}{\text{Max. possible working Hrs in a period}} \times 100$

$= \frac{6{,}750 \text{ hours}}{9{,}000 \text{ hours}} \times 100 = 75\%$

(vi) Actual Usage of Budgeted Capacity Ratio $= \frac{\text{Actual working Hrs}}{\text{Budgeted Hrs}} \times 100$

$= \frac{6{,}750 \text{ hours}}{7{,}200 \text{ hours}} \times 100 = 93.75\%$

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