P4 (MODULE 1)

COST AND MANAGEMENT ACCOUNTING

CA INTER | GROUP 2

CA INTER
P4: COST AND MANAGEMENT ACCOUNTING
INDEX

CHAPTER 01: BASIC CONCEPTS

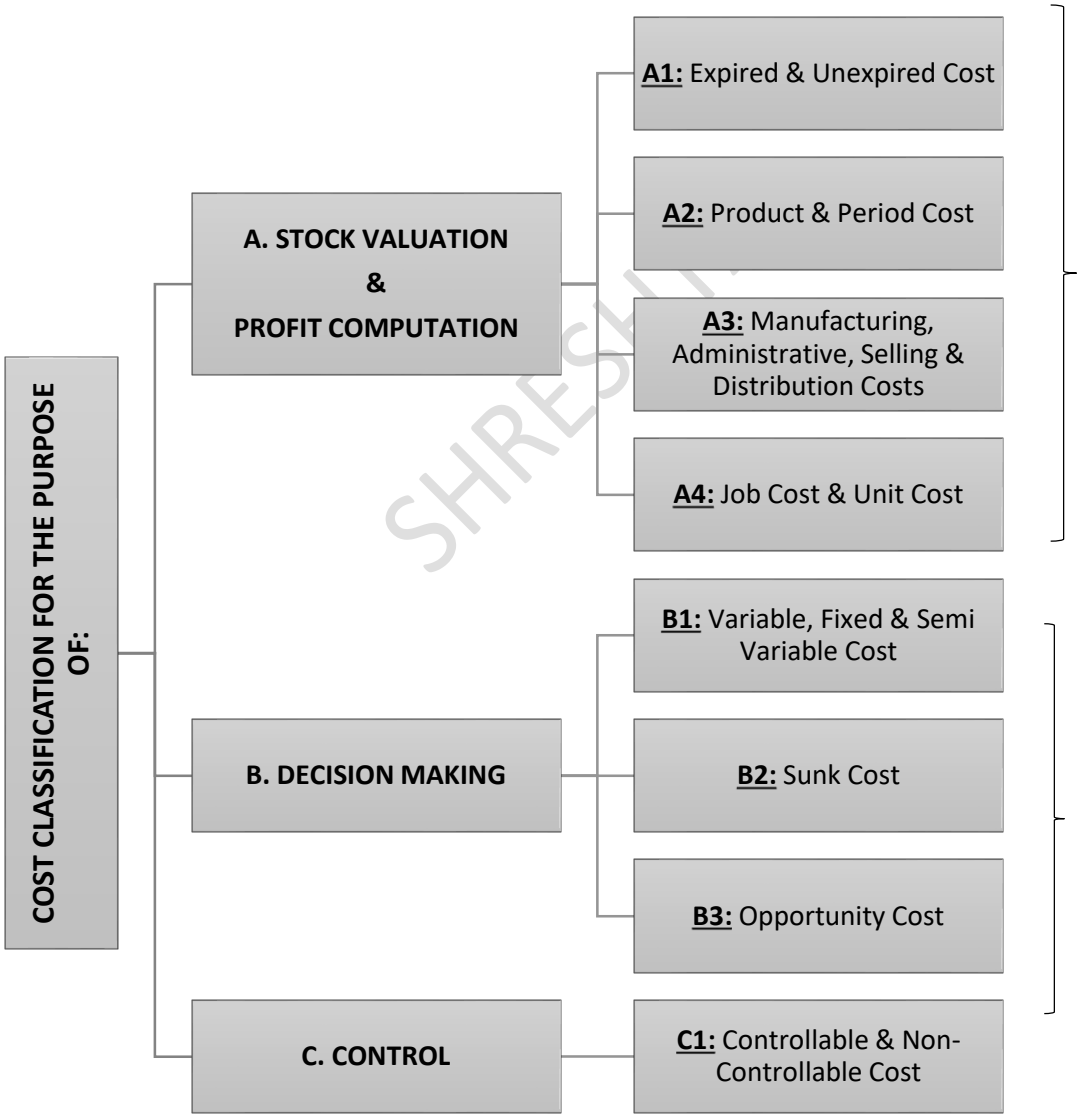
WHAT IS COST?

Cost means resources sacrificed for the purpose of carrying on business/profession which can be quantified in monetary terms.

It should be noted that there are three key terms in the above definition:

- **Sacrifice** of Resources
- Relating to **Business/Profession**
- Quantifiable in **Monetary Terms**

COST CLASSIFICATION



NOTE:

The above Cost Classification has been done by the faculty for a logical understanding of the subject.

A1. EXPIRED COST & UNEXPIRED COST

Expired Costs are those costs which are charged against revenue.

Unexpired Costs are those costs which are carried forward to the next accounting period through stocks.

A2. PRODUCT COST & PERIOD COST

Product Costs are those costs which are considered for Stock Valuation.

Period Costs are those costs which are not considered for Stock Valuation and expire fully in the current period.

A3. MANUFACTURING, ADMINISTRATIVE AND SELLING & DISTRIBUTION COSTS

Manufacturing Costs are those costs that are incurred from the purchase of Raw Materials till the primary packing of Finished Goods. In other words, Manufacturing Costs are all the costs that are incurred inside the factory and comprise Material Costs, Labour costs & Production Overheads.

Administrative Costs are those costs that are incurred in respect of activities relating to the general management and administration of an entity.

Selling Costs are the expenses related to the sale of products or services and include all indirect expenses incurred in selling the products or services.

Distribution Costs are the costs incurred in handling a product or service from the time it is ready for dispatch or delivery until it reaches the ultimate consumer.

A4. JOB COST & UNIT COST

Job Costing is the system that traces costs to specific jobs, contracts, or lots of goods where costs are ascertained on an individual basis.

Unit Costing is the system that collects costs incurred in a particular period to produce goods, the per unit cost of which is ascertained on an average basis.

B1. VARIABLE COSTS, FIXED COSTS & SEMI-VARIABLE COSTS

Variable Costs are costs that vary with a measure of activity. Variable Costs are costs which tend to directly vary with the volume of activity.

Fixed Costs are costs which do not vary with the change in the volume of activity. They remain constant irrespective of the volume level.

Semi-Variable Costs are costs containing both fixed and variable components which get partly affected by a change in the level of activity

B2. SUNK COSTS

These are costs that have been irreversibly incurred or committed and cannot, therefore, be considered relevant to a decision. Sunk costs may also be termed irrecoverable costs.

B3. OPPORTUNITY COSTS

It is the value of the best alternative course of action that was not chosen. In other words, it is what could have been accomplished with the resources used in the course of action if they were employed in the next best alternative. It represents opportunities for gone.

C1. CONTROLLABLE COST & NON-CONTROLLABLE COSTS

Controllable Costs are those costs which are subject to direct control at some level of managerial supervision. Non-controllable Costs are those costs which are not subject to control at any level of managerial supervision.

QUESTIONS FOR CLASSROOM DISCUSSION

PROBLEM – 1

ABC Pistons Ltd. operates an automobile service facility that specializes in replacing pistons on compact cars. The following table shows the costs incurred during a month when 600 pistons were replaced.

PARTICULARS	PISTON REPLACEMENTS		
	500	600	700
Fixed costs	a	₹ 42,000	b
Variable costs	c	₹ 30,000	d
Total costs	e	₹ 72,000	f
Cost per Piston Replacement:			
Fixed costs	g	h	i
Variable cost	j	k	l
Total cost per piston replacement	m	n	o

Required: Fill in the missing amounts, labelled a. through (o), in the table.

PROBLEM – 2

A single-product manufacturing company gives the following budgetary details for a year when production is maintained at 80,000 units (80%).

Particulars	Cost per unit (₹)
Direct materials	40
Direct labour	25
Production overheads (60% fixed)	15
Administration overheads (100% fixed)	5
Selling and distribution overhead (60% variable)	10

Prepare the company's budgetary details per unit and in total when it works at 90% capacity.

PROBLEM – 3

A newly established manufacturing company has an installed capacity to produce 1,00,000 units of a consumer product annually. However, its practical capacity is only 90%. The actual capacity utilization may be substantially lower, as the firm is new to the market and demand is uncertain.

The following budget has been prepared for 90% capacity utilization:

Particulars	Cost per unit (₹)
Direct materials	12
Direct labour	8
Direct expenses	5
Production overheads (40% variable)	10
Administration overheads (100% fixed)	5
Selling and distribution (50% variable)	6

You are required to prepare a budget at 60%, 70% and 80% levels of capacity utilization giving clearly the unit variable cost, the unit fixed cost and the total cost under various heads at all the above levels.

PROBLEM – 4

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 Forman of the Shop is paid 10% of the savings as a bonus when in any month the indirect manufacturing cost incurred is less than the budgeted provision.

The Forman has put out in a claim that he should be paid a bonus of ₹ 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 Costs	Budgeted exp in (₹) for 8,000 units	Budgeted expenses in (₹) for 10,000 units	Actual cost in (₹)
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
Total	**₹ 5,290**	**₹ 5,875**	**₹ 4,990**

Do you agree with the works Manager? Is the Forman entitled to any bonus for the performance in January? Substantiate your answer with facts and figures.

PROBLEM – 5

Several costs incurred by Marina Beach Golf Equipment, Ltd., are listed below. For each cost, indicate which of the following classification best describe the cost.

More than one classification may apply to the same cost item. For example, a cost may be both a variable cost and a product cost.

Cost Classifications:

1. Variable
2. Fixed
3. Period
4. Product
5. Administrative
6. Selling
7. Manufacturing
8. Research and development
9. Direct material
10. Direct labour
11. Manufacturing overhead

Cost Items:

1. Metal used in golf clubs.
2. Salary of plant manager.
3. Cost of natural gas used to heat the factory.
4. Commissions paid to sales personnel.
5. Wages paid to employees who assemble golf bags.
6. Salary of an engineer who is working on a prototype of a new solar-powered golf cart.
7. Depreciation on the word processing equipment used by the company president's secretary.

CHAPTER 02: COST SHEET

INTRODUCTION

A Cost Sheet or Cost Statement is "a document which provides a detailed cost information. In a typical cost sheet, cost information is presented on the basis of functional classification. However, other classification may also be adopted as per the requirements of users of the information.

FUNCTIONAL CLASSIFICATION OF ELEMENTS OF COST

Under this classification, costs are divided according to the function for which they have been incurred. The following are the classification of costs based on functions:

i. Direct Material Cost
ii. Direct Employee (Labour) Cost
iii. Direct Expense
iv. Production/ Manufacturing Overheads
v. Administration Overheads
vi. Selling Overheads
vii. Distribution Overheads
viii. Research and Development costs etc.

COST HEADS IN A COST SHEET

The costs as classified on the basis of functions are grouped into the following cost heads in a cost sheet:

i. Prime Cost
ii. Cost of Production
iii. Cost of Goods Sold
iv. Cost of Sales

PRIME COST

Prime cost represents the total of direct materials costs, direct employee (labour) costs and direct expenses.

The total of cost for each element has to be calculated separately.

Direct Material Cost	xxx
Direct Employees (Labour) Cost	xxx
Direct Expenses	xxx
Prime Cost	xxx

Direct Material Cost

It is the cost of direct material consumed. The cost of direct material consumed is calculated as follows:

Opening Stock of Material	xxx
Add: Additions/ Purchases	xxx
less: Closing stock of Material	(xxx)
Direct materials Consumed	**xxx**

The valuation of materials purchased and issued for production shall be done as per methods discussed in the Chapter 'Material Cost. Few examples are:

a. Cost of material;

b. Freight inwards;

c. Insurance and other expenditure directly attributable to procurement;

d. Trade discounts or rebates (to be deducted);

e. Duties & Taxes (if input tax credit is not available/ availed) etc.

Direct Employee (Labour) Cost

It is the total of payment made to the employees who are engaged in the production of goods and provision of services. Employee cost is also known as Labour cost; it includes the following:

a. Wages and salary;

b. Allowances and incentives;

c. Payment for overtimes;

d. Bonus/ ex-gratia;

e. Employer's contribution to welfare funds such as Provident fund and other similar funds;

f. Other benefits (medical, leave with pay, free or subsidized food, leave travel concession and provisions for retirement benefits) etc.

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. Cost of utilities such as power & fuel, steam etc.;

ii. Royalty paid/ payable for production or provision of service;

iii. Hire charges paid for hiring specific equipment;

iv. Fee for technical assistance and know-how;

v. Amortized cost of moulds, patterns, patents etc.;

vi. Cost for product/ service specific design or drawing;

vii. Cost of product/ service specific software;

viii. Other expenses which are directly related with the production of goods or provision of service.

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.

Particulars	Amount (₹)
Prime Cost	xxx
Add: Factory Overheads	xxx
GROSS WORKS COSTS	xxx
Add: Opening stock of Work-in-process	xxx
Less: Closing stock of Work-in-process	xxx
FACTORY OR WORKS COSTS	xxx
Add: Quality Control Cost	xxx
Add: Research & Development cost (Process related)	xxx
Add: Administrative Overheads related with production	xxx
Less: Credit for recoveries (miscellaneous income)	xxx
Add: Packing Cost (Primary packing)	xxx
COST OF PRODUCTION	xxx

Factory Overheads:

It is also known as works/production/ manufacturing overheads. It includes the following indirect costs:

i. Consumable stores and spares;

ii. Depreciation of plant and machinery, factory building etc.

iii. Lease rent of production assets;

iv. Repair and maintenance of plant and machinery, factory building etc.

v. Indirect employees cost related with production activities;

vi. Drawing and Designing department cost;

vii. Insurance of plant and machinery, factory building, stock of raw material & WIP etc.

viii. Amortized cost of jigs, fixtures, tooling etc.

ix. Service department cost such as Tool Room, Engineering & Maintenance, Pollution Control etc.

Stock of Work-in-process:

The cost of opening and closing stock of work- in-process (WIP) is adjusted to arrive at factory/ works cost. The WIP stock is valued on the basis of percentage of completion in respect of each element of cost. Students may refer the 'Chapter- Process & Operation Costing' to know the WIP valuation methods.

Quality Control Cost:

This is the cost of resources consumed towards quality control procedures.

Research & Development Cost:

It includes only those research and development related cost which is incurred for the improvement of process, system, product or services.

Administrative Overheads:

It includes only those administration overheads which are related to production. The general administration overhead is not included in production cost.

Credit for Recoveries

The realized or realizable value of scrap or waste is deducted as it reduces the cost of production.

Packing Cost (primary)

Packing material which is essential to hold and preserve the product for its use by the customer.

COST OF GOODS SOLD

It is the cost of production for goods sold. It is calculated after adjusting the values of opening and closing stocks of finished goods. It can be calculated as below:

Cost of Production	xxx
Add: Cost of Opening stock of finished goods	xxx
Less: Cost of Closing stock of finished goods	(xxx)
Cost of Goods Sold	xxx

COST OF SALES

It is the total cost of a product incurred to make the product available to the customer or consumer. It includes Cost of goods sold, administration and marketing expenses. It is calculated as below:

Cost of Goods Sold	xxx
Add: Administrative Overheads (General)	xxx
Add: Selling Overheads	xxx
Add: Packing Cost (secondary)	xxx
Add: Distribution Overheads	xxx
Cost of Sales	xxx

Administrative Overheads:

It is the cost related with general administration of the entity. It includes the followings:

a. Depreciation and maintenance of, building, furniture etc. of corporate or general management.

b. Salary of administrative employees, accountants, directors, secretaries etc.

c. Rent, rates & taxes, insurance, lighting, office expenses etc.

d. Indirect materials- printing and stationery, office supplies etc.

e. Legal charges, audit fees, corporate office expenses like directors' sitting fees, remuneration and commission, meeting expenses etc.

Selling Overheads:

It is the cost related with sale of products or services. It includes the following costs:

a. Salary and wages related with sales department and employees directly related with selling of goods.

b. Rent, depreciation, maintenance and other cost related with sales department.

c. 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 Overheads

It includes the cost related with making the goods available to the customers. The costs are:

a. Salary and wages of employees engaged in distribution of goods.

b. Transportation and insurance costs related with distribution.

c. Depreciation, hire charges, maintenance and other operating costs related with distribution vehicles etc.

COST SHEET/STATEMENT

Specimen Format of Cost Sheet for a Manufacturing entity

	Particulars	Total Cost (Rs.)	Cost per unit (Rs.)
1.	**Direct materials consumed:**	**xxx**	**xxx**
	Opening Stock of Raw Material	xxx	xxx
	Add: Additions/ Purchases	xxx	xxx
	Less: Closing stock of Raw Material	(xxx)	(xxx)
2.	Direct employee (labour) cost	xxx	xxx
3.	Direct expenses	xxx	xxx
4.	**Prime Cost (1+2+3)**	**xxx**	**xxx**
5.	Add: Works/ Factory Overheads	xxx	xxx

6.	**Gross Works Cost (4+5)**	**xxx**	**xxx**
7.	Add: Opening Work in Process	xxx	xxx
8.	Less: Closing Work in Process	(xxx)	(xxx)
9.	**Works/ Factory Cost (6+7-8)**	**xxx**	**xxx**
10.	Add: Quality Control Cost	xxx	xxx
11.	Add: Research and Development Cost	xxx	xxx
12.	Add: Administrative Overheads (relating to production activity)	xxx	xxx
13.	Add: Packing cost (primary)	xxx	xxx
14.	Less: Credit for Recoveries/Scrap/By-Products/ misc. income	(xxx)	(xxx)
15.	**Cost of Production (9+10+11+12+13-14)**	**xxx**	**xxx**
16.	Add: Opening stock of finished goods	xxx	xxx
17.	Less: Closing stock of finished goods	(xxx)	(xxx)
18.	**Cost of Goods Sold (15+16-17)**	**xxx**	**xxx**
19.	Add: Administrative Overheads (General)	xxx	xxx
20.	Add: Marketing Overheads:	xxx	xxx
	- Selling Overheads	xxx	xxx
	- Distribution Overheads	xxx	xxx
21.	**Cost of Sales (18+19+20)**	**xxx**	**xxx**

TREATMENT OF VARIOUS ITEMS OF COST IN COST SHEET/STATEMENT

Abnormal costs:

Any abnormal cost, where it is material and quantifiable, shall not form part of cost of production or acquisition or supply of goods or provision of service. Examples of abnormal costs are:

a. Cost pertaining to or arising out of a pandemic e.g. COVID-19
b. Cost associated with employees due to sudden lockdown.

Subsidy/Grant/Incentives:

Any such type of payment received/ receivable are reduced from the cost objects to which such amount pertains.

Penalty, fine, damages, and demurrage:

These types of expenses do not form part of cost.

Interest and other finance costs:

Interest, including any payment in the nature of interest for use of non-equity funds and incidental cost that an entity incurs in arranging those funds. Interest and finance charges are not included in cost of production. Interest and Financing Charges shall be presented in the cost statement as a separate item of cost of sales.

Advantages of Cost Sheet or Cost Statements

The main advantages of a Cost Sheet are as follows:

i. It provides the total cost figure as well as cost per unit of production.

ii. It helps in cost comparison.

iii. It facilitates the preparation of cost estimates required for submitting tenders.

iv. It provides sufficient help in arriving at the figure of selling price.

v. It facilitates cost control by disclosing operational efficiency.

QUESTIONS FOR CLASSROOM DISCUSSION

PROBLEM – 1

Farewell Company is a metal and wood cutting manufacturer, selling products to the home construction market. Consider the following data for the year 20x1:

S No	PARTICULARS	AMOUNT
1	Sandpaper	₹ 2,000
2	Materials-handling costs	₹ 70,000
3	Lubricants and coolants	₹ 5,000
4	Miscellaneous indirect manufacturing Labour	₹ 40,000
5	Direct manufacturing labour	₹ 3,00,000
6	Direct materials, January 1, 20x1	₹ 40,000
7	Direct materials, December 31, 20x1	₹ 50,000
8	Finished goods, January 1, 20x1	₹ 1,00,000
9	Finished goods, December 31, 20x1	₹ 1,50,000
10	Work in process, January 1, 20x1	₹ 10,000
11	Work in process, December 31, 20x1	₹ 14,000
12	Plant-leasing costs	₹ 54,000
13	Depreciation – plant equipment	₹ 36,000
14	Property taxes on plant equipment	₹ 4,000
15	Fire insurance on plant equipment	₹ 3,000
16	Direct materials purchased	₹ 4,60,000
17	Revenues	₹ 13,60,000
18	Marketing promotions	₹ 60,000
19	Marketing salaries	₹ 1,00,000
20	Distribution costs	₹ 70,000
21	Customer-service costs	₹ 1,00,000

Required:

1. Prepare an income statement with a separate supporting schedule of cost of goods manufactured. For all manufacturing items, indicate by V or F whether each is basically a variable cost or a fixed cost (where the cost object is a product unit). If in doubt, decide on the basis of whether the total cost will change substantially over a wide range of units produced.
2. Suppose that both the direct materials and plant-leasing costs are tied to the production of 9,00,000 units. What is the unit cost for the direct materials assigned to each unit produced? What is the unit cost of the plant- leasing costs? Assume that the plant-leasing costs are a fixed cost.

3. Repeat the computation in requirement 2 for direct materials and plant-leasing costs, assuming that the costs are being predicted for the manufacturing of 10,00,000 units next year. Assume that the implied cost-behavior patterns persist.
4. As a management consultant, explain concisely to the president why the unit costs for direct materials did not change in requirements 2 and 3 but the unit costs for plant-leasing costs did change.

PROBLEM – 2

LG Manufacturing Corporation began operations at the beginning of the current year. One of the company's products, a refrigeration element, sells for ₹ 185 per unit. Information related to the current year's activities follows:

Variable costs per unit:	
Direct material	₹ 20
Direct Labour	₹ 37
Manufacturing overhead	₹ 48
Annual fixed costs:	
Manufacturing overhead	₹ 6,00,000
Selling and administrative	₹ 8,60,000
Production and sales activity:	
Production (units)	24,000
Sales (units)	20,000

LG carries its finished goods inventory at the average unit cost of production and is subject to a 30% income tax rate. There was no work in process at year-end.

Required:

1. Determine the cost of the December 31 finished goods inventory.
2. Compute LG's net income for the current year ended December 31.
3. If next year's production decreases to 23,000 units and general cost behaviour patterns do not change, what is the likely effect on:
   - The direct-Labour cost of 37 per unit? Why?
   - The fixed manufacturing overhead cost of 6,00,000? Why?
   - The fixed selling and administrative cost of 8,60,000? Why?
   - The average unit cost of production?

PROBLEM – 3

Prepare a cost sheet and compute the income for the given period.

Opening stock of Raw materials	10,000 kgs @ ₹ 20 per kg
Purchases	50,000 kgs @ ₹ 25 per kg
Consumption during the period	55,000 kgs
Direct wages	₹ 6,75,000
Production overheads	₹ 10,00,000
Work in process	Nil
Opening finished goods	1,000 units @ ₹ 550
Production	5,000 units
Units sold	4,500 units @ ₹ 750 per unit
Administration expenses	₹ 2,50,000
Selling expenses	₹ 3,00,000

PROBLEM – 4

Easy feet Shoe Co. manufactures two types of shoes A and B. production costs for the year ended 31st March 20X1 were:

Direct materials	₹ 15,00,000
Direct wages	₹ 8,40,000
Production overhead	₹ 3,60,000

There was no work in progress at the beginning or at the end of the year. It is given that

a. Direct material in type A shoes consists twice as much as that in type B shoes.

b. The direct wages for type B were 60% of those for type A shoes.

c. Production overhead was the same per pair of A and B types.

d. Administrative overhead for each type was 150% of direct wages.

e. Selling cost was ₹ 1.50 per pair.

f. Production during the year was:

- Type A 40,000 pairs of which 36,000 were sold.
- Type B 1,20,000 pairs of which 1,00,000 were sold.

g. The Selling price was ₹44 for type A and ₹28 per pair for type B.

Prepare a Statement showing Cost and Profit for each pair of each type.

PROBLEM – 5

Bright Shoe Polish Company manufactures Black and Brown Polish in one standard size of tin retailing at ₹ 12.00 and ₹ 13.30 respectively. The following information is supplied to you –

PARTICULARS	OPENING STOCK	CLOSING STOCK	SALES
Black Polish	2,400 Tins	5,400 Tins	72,000 Tins
Brown Polish	8,000 Tins	3,000 Tins	30,000 Tins

Cost Details:

Direct Materials:	
Polish	₹2,46,000
Tins	₹1,20,000
Direct Wages	₹ 2,04,000
Production Overhead	₹ 3,06,000
Administration and Selling Overhead	₹ 1,02,000

The Opening Stock of Black and Brown Polish was valued at its Production Cost.

The Cost of Raw Materials for Brown Polish is 10% higher than that for Black, but there is no difference in the cost of tins.

Direct Wages for Brown Polish are 8% higher than those of Black Polish and Production OH are considered to vary with Direct Wages.

Administration and Selling OH are absorbed at a uniform rate per tin of polish sold.

Required:

Prepare a statement to show the Cost and Profit per tin of polish.

PROBLEM – 6

On April 12, after the close of business, Chung Brothers had a devastating fire that destroyed the company's work-in-process and finished- goods inventories. Fortunately, all raw materials escaped damage because materials owned by the firm were stored in another warehouse.

The following information is available:

PARTICULARS	AMOUNT
Sales revenue through April 12	₹3,30,000
Income before taxes through April 12	₹68,000
Direct labor through April 12	₹1,20,000
Cost of goods available for sale, April 12	₹2,75,000
Work-in-process inventory, January 1	₹21,000
Finished-goods inventory, January 1	₹37,000
Gross margin	30% of sales

Chung's accountants determined that the cost of direct materials used normally averages 25 per cent of prime costs (i.e., direct material + direct Labour). In addition, manufacturing overhead is 50 per cent of the firm's total production costs. (Networks cost)

Required:

Chung Brothers are in the process of negotiating a settlement with its insurance company. Prepare an estimate of the cost of work-in-process and finished goods inventories that were destroyed by the fire.

PROBLEM – 7

A distraught employee, Vinayak, put a torch to a manufacturing plant on a blustery February 26. The resulting blaze completely destroyed the plant and its contents. Fortunately, certain accounting records were kept in another building. They reveal the following for the period from January 1, 20X1, to February 26, 20X1:

Direct materials purchases	₹1,60,000
Work in process 1/1/20X1	₹34,000
Direct materials 1/1/20X1	₹16,000
Finished goods 1/1/20X1	₹30,000
Indirect manufacturing costs	40% of conversion costs
Revenues	₹5,00,000
Direct manufacturing labor	₹1,80,000
Prime costs	₹2,94,000
Gross margin percentage based on revenues	20%
Cost of goods available for sale	₹4,50,000

The loss is fully covered by insurance. The insurance company wants to know the historical cost of the inventories as a basis for negotiating a settlement, although the settlement is actually to be based on replacement cost, not historical cost.

Required:

Calculate the cost of:

1. Finished goods inventory, 26/2/20X1.
2. Work-in-process inventory, 26/2/20X1.
3. Direct materials inventory, 26/2/20X1.

PROBLEM – 8

From the following particulars, prepare a Cost Statement showing the component of Total Cost and the Profit for the year ended 31 December.

PARTICULARS	ON 1st JANUARY	ON 31st DECEMBER
Stock of Raw Materials	₹ 4,00,000	₹ 5,00,000
Stock of Finished Goods	₹ 60,000	₹ 1,50,000
Stock of Work-In-Progress	₹ 1,50,000	₹ 1,00,000

PARTICULARS	AMOUNT	PARTICULARS	AMOUNT
Raw Materials Purchased	₹ 47,50,000	Sales for the year	₹ 90,00,000
Carriage Inwards	₹ 1,25,000	Selling Expenses	₹ 92,500
Wages	₹ 17,50,000	General Expenses	₹ 3,20,000
Works Manager's Salary	₹ 3,00,000	Debenture Interest	₹ 50,000
Salary-Factory Employees	₹ 3,00,000	Dividend Paid	₹ 10,000
Salary-Office Staff	₹ 2,00,000	Income-Tax Provision	₹ 5,000
Salary-Salesmen	₹ 1,00,000	Goodwill written off	₹ 1,00,000
Factory Rent & Insurance	₹ 72,500	Goods and Services Tax Collected and Paid	₹ 1,60,000
Power Expenses	₹ 95,000	Transfer to Machinery Replacement Fund	₹ 1,00,000
Other Production Expenses	₹ 4,20,000	Interest on Loan	₹ 75,000
Bad Debts written off	₹ 15,000	Bank Charges	₹ 5,000
Loose Tools written off	₹ 10,000	Discount Allowed	₹ 27,000
Quality Control Cost	₹ 15,000	Research and Development Cost	₹ 15,000

PROBLEM – 9

Arnav Inspat Udyog Ltd. has the following expenditures for the year ended 31st March, 20x1:

Sl. No.	PARTICULARS	AMOUNT	AMOUNT
1	Raw materials purchased		₹10,00,00,000
2	GST paid on the above purchases @18% (eligible for input tax credit)		₹ 1,80,00,000
3	Freight inwards		₹ 11,20,600
4	Wages paid to factory workers		₹ 29,20,000
5	Contribution made towards employees' PF & ESIS		₹ 3,60,000
6	Production bonus paid to factory workers		₹ 2,90,000
7	Royalty paid for production		₹ 1,72,600
8	Amount paid for power & fuel		₹ 4,62,000

9	Amount paid for purchase of moulds and patterns (life is equivalent to two years production)		₹ 8,96,000
10	Job charges paid to job workers		₹ 8,12,000
11	Stores and spares consumed		₹ 1,12,000
12	Depreciation on:		
	Factory building	₹ 84,000	
	Office building	₹ 56,000	
	Plant & Machinery	₹ 1,26,000	
	Delivery vehicles	₹ 86,000	₹ 3,52,000
13	Salary paid to supervisors		₹ 1,26,000
14	Repairs & Maintenance paid for:		
	Plant & Machinery	₹ 48,000	
	Sales office building	₹ 18,000	
	Vehicles used by directors	₹ 19,600	₹ 85,600
15	Insurance premium paid for.		
	Plant & Machinery	₹ 31,200	
	Factory building	₹ 18,100	
	Stock of raw materials & WIP	₹ 36,000	₹ 85,300
16	Expenses paid for quality control check activities		₹ 19,600
17	Salary paid to quality control staffs		₹ 96,200
18	Research & development cost paid for improvement in production process		₹ 18,200
19	Expenses paid for pollution control and Office engineering & maintenance		₹ 26,600
20	Expenses paid for administration of factory work		₹ 1,18,600
21	Salary paid to functional mangers:		
	Production control	₹ 9,60,000	
	Finance & Accounts	₹ 9,18,000	
	Sales & Marketing	₹ 10,12,000	₹ 28,90,000
22	Salary paid to General Manager		₹ 12,56,000
23	Packing cost paid for:		
	Primary packing necessary to maintain quality	₹ 96,000	
	For re-distribution of finished goods	₹ 1,12,000	₹ 2,08,000
24	Interest and finance charges paid (for usage of non-equity fund)		₹ 7,20,000
25	Fee paid to auditors		₹ 1,80,000
26	Fee paid to legal advisors		₹ 1,20,000

27	Fee paid to independent directors		₹ 2,20,000
28	Performance bonus paid to sales staffs		₹ 1,80,000
29	Value of stock as on 1st April, 20x0:		
	Raw materials	₹ 18,00,000	
	Work-in-process	₹ 9,20,000	
	Finished goods	₹ 11,00,000	₹ 38,20,000
30	Value of stock on 31st March, 20x1:		
	Raw materials	₹ 9,60,000	
	Work-in-process	₹ 8,70,000	
	Finished goods	₹ 18,00,000	₹ 36,30,000

The amount realized by selling of scrap and waste generated during the manufacturing process is ₹ 86,000/-

From the above data you are required to PREPARE Statement of cost for Arnav Inspat Udyog Ltd. for the year ended 31st March 20x1, showing (i) Prime cost, (ii) Factory cost, (iii) Cost of Production, (iv) Cost of goods sold and (v) Cost of sales

PROBLEM -10

XYZ, a Manufacturing Firm, has revealed the following information for September:-

PARTICULARS	1ST SEPTEMBER	30TH SEPTEMBER
Raw Materials	₹ 2,42,000	₹ 2,92,000
Work-in-Progress	₹ 2,00,000	₹ 5,00,000

The Firm incurred the following expenses for targeted production of 1,00,000 units during the month:

PARTICULARS	₹
Consumable Stores and Spares of Factory	₹ 3,50,000
Research and Development Cost for process improvements	₹ 2,50,000
Quality Control Cost	₹ 2,00,000
Packing Cost (secondary) per unit of goods sold	₹ 2
Lease Rent of Production Asset	₹ 2,00,000
Administrative Expenses (General)	₹ 2,24,000
Selling and Distribution Expenses	₹ 4,13,000
Finished Goods (Opening)	Nil
Finished Goods (Closing)	5,000 units

- Defective Output which is 4% of targeted production, realizes 61 per unit.
- Closing Stock is valued at Cost of Production (excluding Administrative Expenses)
- Cost of Goods Sold, excluding Administrative Expenses amounts to ₹78,26,000.

- Direct Employees Cost is 1/2 of the Cost of Material Consumed.
- Selling Price of the Output is 110 per unit.

Required:

1. Calculate the Value of Material Purchased.

2. Prepare Cost Sheet showing the Profit earned by the Firm.

PROBLEM -11

The following figures are extracted from the Trial Balance of G.K Co. on 31st March:

PARTICULARS	Dr.	Cr.
	₹	₹
Inventories:		
Finished Stock	80,000	
Raw Materials	1,40,000	
Work-in-Process	2,00,000	
Office Appliances	17,400	
Plant & Machinery	4,60,500	
Building	2,00,000	
Sales		7,68,000
Sales Return and Rebates	14,000	
Materials Purchased	3,20,000	
Freight incurred on Materials	16,000	
Purchase Returns		4,800
Direct employee cost	1,60,000	
Indirect employee cost	18,000	
Factory Supervision	10,000	
Repairs and factory up-keeping expenses	14,000	
Heat, Light and Power	65,000	
Rates and Taxes	6,300	
Miscellaneous Factory Expenses	18,700	
Sales Commission	33,600	
Sales Travelling	11,000	
Sales Promotion	22,500	
Distribution Dept.—Salaries and Expenses	18,000	
Office Salaries and Expenses	8,600	
Interest on Borrowed Funds	2,000	

Further details are available as follows:

i. Closing Inventories:	
Finished Goods	1,15,000
Raw Materials	1,80,000
Work-in-Process	1,92,000
ii. Outstanding expenses on:	
Direct employee cost	8,000
Indirect employee cost	1,200
Interest on Borrowed Funds	2,000
iii. Depreciation to be provided on:	
Office Appliances	5%
Plant and Machinery	10%
Buildings	4%
iv. Distribution of the following costs:	
Heat, Light and Power to Factory, Office and Distribution in the ratio 8: 1: 1.	
Rates and Taxes two-thirds to Factory and one-third to Office.	
Depreciation on Buildings to Factory, Office and Selling in the ratio 8: 1: 1.	

With the help of the above information, you are required to PREPARE a condensed Profit and Loss Statement of G.K Co. for the year ended 31st March along with supporting schedules of:

a. Cost of Sales.

b. Selling and Distribution Expenses.

c. Administration Expenses

PROBLEM – 12

A Ltd. Co. has the capacity to produce 1,00,000 units of a product every month.

Its works cost at varying levels of production is as under:

LEVEL (%)	WORK COST PER UNIT (₹)
10%	400
20%	390
30%	380
40%	370
50%	360
60%	350
70%	340

80%	330
90%	320
100%	310

Its fixed administration expenses amount to ₹ 1,50,000 and fixed marketing expenses amount to ₹ 2,50,000 per month respectively. The variable distribution cost amounts to ₹ 30 per unit.

It can sell 100% of its output at ₹ 500 per unit provided it incurs the following further expenditure:

1. It gives gift items costing ₹ 30 per unit of sale;
2. It has lucky draws every month giving the first prize of ₹ 50,000; 2nd prize of ₹ 25,000, 3rd prize of ₹ 10,000 and three consolation prizes of ₹ 5,000 each to customers buying the product.
3. It spends ₹ 1,00,000 on refreshments served every month to its customers;
4. It sponsors a television program every week at a cost of ₹ 20,00,000 per month.

It can market 30% of its output at ₹ 550 per unit without incurring any of the expenses referred to in a. to d. above.

PREPARE a cost sheet for the month showing total cost and profit at 30% and 100% capacity level

PROBLEM – 13

ML Auto Ltd is a manufacturer of auto components and the details of its expenses for the previous year are given below:

PARTICULARS	AMOUNT
Opening Stock of Material	₹ 1,50,000
Closing Stock of Material	₹ 2,00,000
Purchase of Material	₹ 18,50,000
Direct Labour	₹ 9,50,000
Factory Overhead	₹ 3,80,000
Administrative Overhead related to Production Activity	₹ 2,50,400

During next year, the Company has received an order from a Car Manufacturer where it estimates that the Cost of Material and Labour will be ₹ 8,00,000 and ₹ 4,50,000 respectively. ML Auto Ltd charges Factory OH as a Percentage of Direct Labour and Administrative OH related to Production, as a Percentage of Factory Cost based on previous year's cost. The cost of delivery of the components at the Customer's Premises is estimated at ₹45,000.

You are required to -

a. Calculate the Overhead Recovery Rates based on Actual Costs for the previous year.

b. Prepare a detailed Cost Statement for the order received in the next year, and the price to be quoted if the Company wants to earn a profit of 10% on Sales.

PROBLEM – 14

A Company produces a Machine and sells it for ₹ 3,000. There is an increase of 20% in the Cost of Material, 10% in Labour, and 10% in Overhead Cost. The only figures available are that Material Cost is 50% of Cost of Sales, Labour Cost is 30% of Cost of Sales and Overhead Cost is 20% of Cost of Sales. The anticipated increased cost in relation to the present Sales Price would cause a 30% decrease in the amount of the present Gross Profit.

What would be the Selling Price of the machine to give the same percentage of Gross Profit as before?

PROBLEM – 15

In a manufacturing Company, Factory Overheads are charged as fixed percentage basis on Direct Labour and Selling Overheads are charged on the basis of percentage of Factory Cost. The following data is available for the year ending 31 March.

Particulars	Product A	Product B
Direct Materials	₹ 19,000	₹ 15,000
Direct Labour	₹ 15,000	₹ 25,000
Sales	₹ 60,000	₹ 80,000
Profit	25% on Cost	25% on Sales price

Ignoring Administration OH, find out-

a. % of Factory OH on Direct Labour, and

b. % of Selling OH on Factory Cost

ADDITIONAL QUESTIONS FOR PRATICE

QFP 1 (Concept Similar to Problem – 4)

The following data relates to the manufacture of a standard product during the month of April:

Particulars	
Raw materials	₹ 1,80,000
Direct wages	₹ 90,000
Machine hours worked (hours)	10,000
Machine hour rate (per hour)	₹ 8
Administration overheads (general)	₹ 35,000
Selling overheads (per unit)	₹ 5
Units produced	4,000
Units sold	3,600
Selling price per unit	₹ 125

You are required to PREPARE a cost sheet in respect of the above showing:

a. Cost per unit

b. Profit for the month

QFP 2 (Concept Similar to Problem – 2)

The following information has been obtained from the records of ABC Corporation for the period from June 1 to June 30.

Particulars	**On June 1 (₹)**	**On June 30 (₹)**
Cost of raw materials	₹ 60,000	₹ 50,000
Cost of work-in-process	₹ 12,000	₹ 15,000
Cost of stock of finished goods	₹ 90,000	₹ 1,10,000
Purchase of raw materials during June		₹ 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

QFP 3 (Concept Similar to Problem – 7)

The books of Adarsh Manufacturing Company present the following data for the month of April:

Direct Labour cost Rs. 17,500 being 175% of works overheads. Cost of goods sold excluding administrative expenses Rs. 56,000.

Inventory accounts showed the following opening and closing balances:

	April 1 (₹)	**April 30 (₹)**
Raw materials	8,000	10,600
Work-in-progress	10,500	14,500
Finished goods	17,600	19,000

Other data are:

	(₹)
Selling expenses	3,500
General and administration expenses	2,500
Sales for the month	75,000

You are required to:

FIND out the value of materials purchased.

PREPARE a cost statement showing the various elements of cost and also the profit earned

QFP 4 (Concept Similar to Problem – 9)

From the following particulars, you are required to PREPARE monthly cost sheet of Aditya Industries:

	(₹)
Opening Inventories:	
- Raw materials	12,00,000
- Work-in-process	18,00,000
- Finished goods (10,000 units)	9,60,000
Closing Inventories:	
- Raw materials	14,00,000
- Work-in-process	16,04,000
- Finished goods	?
Raw materials purchased	1,44,00,000

GST paid on raw materials purchased (ITC available)	7,20,000
Wages paid to production workers	36,64,000
Expenses paid for utilities	1,45,600
Office and administration expenses paid	26,52,000
Travelling allowance paid to office staffs	1,21,000
Selling expenses	6,46,000

Machine hours worked- 21,600 hours Machine hour rate- ₹ 8.00 per hour Units sold- 1,60,000 Units produced- 1,94,000 Desired profit- 15% on sales

CHAPTER 03: OVERHEADS – ABSORPTION COSTING METHOD

INTRODUCTION

Overheads are the expenditure which cannot be conveniently traced to or identified with any particular cost unit. Such expenses are incurred for output generally and not for a particular work order e.g., wages paid to watch and ward staff, heating and lighting expenses of factory etc.

CLASSIFICATION OF OVERHEADS

	Description	Example
By Function		
Factory or Manufacturing or Production Overhead	Manufacturing overhead is the indirect cost incurred for manufacturing or production activity in a factory. Manufacturing overhead includes all expenditures incurred from the procurement of materials to the completion of finished product.	**1.** Stock keeping expenses, **2.** Repairs and maintenance of plant, **3.** Depreciation of factory building, **4.** Indirect Labour, **5.** cost of primary packing **6.** Insurance of plant and machinery etc. Production overhead includes administration costs relating to production, factory, works or manufacturing.
Office and Administrative Overheads	Office and Administrative overheads are expenditures incurred on all activities relating to general management and administration of an organization. It includes formulating the policy, directing the organization and controlling the operations of an undertaking which is not related directly to production, selling, distribution, research or development activity or function.	**1.** Salary paid to office staffs, **2.** Repairs and maintenance of office building, **3.** Depreciation of office building **4.** postage and stationery, **5.** Lease rental in case of operating lease (in case of finance lease, lease rental excluding finance cost) **6.** accounts and audit expenses etc.
Selling and Distribution Overheads	**i.** Selling overhead: expenses related to sale of products and included all indirect expenses in sales management for the organization.	**1.** Salesmen commission, **2.** Advertisement cost, **3.** Sales office expenses etc.

	ii. Distribution overhead: cost incurred on making product available for sale in the market.	**1.** Delivery van expenses, **2.** Transit insurance, **3.** warehouse and cold storage expenses, **4.** secondary packing expenses etc.
By Nature		
Fixed Overhead	These are the costs which are incurred for a period, and which, within certain output and turnover limits, tend to be unaffected by fluctuations in the levels of activity (output or turnover). They do not tend to increase or de- crease with the changes in Output.	**1.** Salary paid to permanent employees, **2.** Depreciation of building and plant and equipment, **3.** Interest on capital, **4.** Insurance.
Variable Overhead	These costs tend to vary with the volume of activity. Any increase in the activity results in an increase in the variable cost and vice-versa.	**1.** Indirect materials, **2.** Power and fuel, **3.** lubricants, **4.** tools and spares etc.
Semi-Variable Overheads	These costs contain both fixed and variable components and are thus partly affected by fluctuations in the level of activity.	**1.** Electricity cost, **2.** water cost, **3.** telephone and internet expenses etc.
By Element		
Indirect materials	Materials which do not normally form part of the finished product (cost object) are known as indirect materials.	**1.** Stores used for maintaining machines and buildings (lubricants, cotton waste, bricks etc.) **2.** Stores used by service departments like power house, boiler house, canteen etc.
Indirect employee cost	Employee costs which cannot be allocated but can be apportioned to or absorbed by cost units or cost centres is known as indirect employee.	**1.** Salary paid to foreman and supervisor. **2.** Salary paid to administration staff etc.
Indirect expenses	Expenses other than direct expenses are known as indirect expenses, that cannot be directly, conveniently and wholly allocated to cost centres.	**1.** Rates & taxes, **2.** insurance, **3.** depreciation, **4.** advertisement expenses etc.

By Control		
Controllable costs	These are those costs which can be controlled by the implementation of appropriate managerial influence and proper policies.	**1.** Materials cost, **2.** wages and salary, **3.** power and fuel etc.
Uncontrollable costs	Overhead costs which cannot be controlled by the management even after the implementation of appropriate managerial influence and proper polices are known as uncontrollable costs.	**1.** Rates and taxes, **2.** Depreciation, **3.** Interest on borrowings.

ACCOUNTING AND CONTROL OF MANUFACTURING OVERHEADS

One method of working out the distribution of overheads over the various products could be to ascertain the amount of actual overheads and distribute them over the products. This, however, creates a problem since the actual amount of overheads can be known only after the financial accounts are closed. If we wait that long, the cost sheets lose their main advantages and utility to the management. All the decisions for which cost sheets are prepared are immediate decisions and cannot be postponed till the actual overheads are known. Therefore, some method has to be found by which overheads can be included in the cost of the products, as soon as prime cost, the cost of raw materials, direct employees and other direct expenses, is ascertained.

One method is to work out pre-determined rates for absorbing overheads. These rates are worked out before an accounting period begins by estimating the amount of overheads and the level of activity in the ensuing period. Thus, as soon as the prime cost of a product or a job is available, the various overheads are charged by these rates. Of course, this implies that the overheads are charged on an estimated basis. Later, when the actual overheads are known, the difference between the overheads charged to the products and actual overheads is worked out and adjusted.

Manufacturing Overheads:

Generally manufacturing overheads form a substantial portion of the total overheads. It is important, that such overheads should be properly absorbed over the cost of production. The following procedure may be adopted in this regard. The steps given below shows how factory overhead rates are estimated and overheads absorbed on that basis and the last one show how actual are compared with the absorbed amount.

Estimation and Collection of Manufacturing Overheads:

The first stage is to estimate the amount of overheads, keeping in view the past figures and adjusting them for known future changes. The sources available for the collection of factory overheads may include a. Invoices, b. Stores requisition, c. Wage analysis book d. Journal entries. etc.

Assignment of Manufacturing Overheads:

The guiding principle for assignment of manufacturing overheads to a cost object is the traceability of the overheads in an economically feasible manner.

Assignment of the manufacturing overhead is done on the basis of either of the following two principles:

i. **Cause and Effect**: Cause is the process or operation or activity and effect is the incurrence of cost.
ii. **Benefit received:** Manufacturing overheads are to be apportioned to various cost objects in proportion to the benefits received by them.

Cost Allocation

The term 'allocation' refers to the direct assignment of cost to a cost object which can be traced directly. It implies relating overheads directly to the various departments. The estimated amount of various items of manufacturing overheads should be allocated to various cost centres or departments.

Cost Apportionment

There are some items of estimated overheads (like the salary of the works manager) which cannot be directly allocated to the various departments and cost centres. Such un allocable expenses are to be spread over the various departments or cost centres on the basis of two principles. This is called apportionment.

Re-Apportionment

Up to the last stage all overheads are allocated and apportioned to all the departments- both production and service departments. Service departments are those departments which do not directly take part in the production of goods or providing services.

Absorption

After completing the distribution as stated above the overheads charged to department are to be recovered from the output produced in respective departments. This process of recovering overheads of a department or any other cost center from its output is called recovery or absorption.

Absorption of manufacturing overheads shall be as follows:

i. **Variable Manufacturing overheads:** The variable manufacturing overheads shall be absorbed on the basis of actual production.
ii. **Fixed Manufacturing overheads:** The fixed manufacturing overhead shall be absorbed on the basis of normal capacity.

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. So, the overheads are generally either under-absorbed or over-absorbed. The difference has to be adjusted keeping in view of such differences and the reasons therefore.

The whole discussion as above is meant to serve the following two purposes:

i. to charge various products and services with an equitable portion of the total amount of factory overheads; and

ii. to charge factory overheads immediately as the product or the job is completed without waiting for the figures of actual factory overheads.

STEPS FOR THE DISTRIBUTION OF OVERHEADS

Estimation and Collection of Overheads

The amount of overheads is required to be estimated. The estimation is usually done with reference to past data adjusted for known future changes. The overhead expenses are usually collected through a system of standing orders.

Allocation of Overheads Over Various Departments or Departmentalization of Overheads

Most of the manufacturing processes functions are performed in different departments of a factory. Some of the departments of the factory are engaged in production process while few may function as ancillary departments. The ancillary departments are service departments supporting the production departments in manufacturing, administration, selling & distribution of goods or services.

Advantages of Departmentalization

The collection of overheads department wise gives rise to the following advantages:

1. **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.
2. **Better Control:** For the purpose of controlling expenses in a department, it is obviously necessary that the figures in relation to each department should be separately available. It is one of the main principles of control that one should know for each activity how much should have been spent and how much is actually spent. If information about expenses is available only for factory as a whole, it will not be possible to know which department has been over spending.
3. **Ascertainment of Cost for each department:** From the point of view of ascertaining the cost of each job, the expenses incurred in the departments 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 charged with the appropriate share of indirect expenses. It is not necessary that a job must pass through all

the departments or that the work required in each department should be the same for all jobs. It is, therefore, necessary thatonly appropriate charge in respect of the work done in the department is made. This can be done only if overheads for each department are known separately.

4. **Suitable Method of Costing:** A suitable method of costing can be followed differently for each department e.g., batch costing when a part is manufactured, but single or output costing when the product is assembled.

Apportioning Overhead Expenses Over Various Departments

	Overhead Cost	Bases of Apportionment
1.	**i.** Rent and other building expenses **ii.** Lighting and heating (conditioning) **iii.** Fire precaution service **iv.** Air- conditioning	Floor area, or volume of department
2.	**i.** Perquisites **ii.** Labour welfare expenses **iii.** Time keeping **iv.** Personnel office **v.** Supervision	Number of workers
3.	**i.** Compensation to workers **ii.** Holiday pay **iii.** ESI and PF contribution **iv.** Perquisites	Direct wages
4.	General overhead	Direct Labour hour, or Direct wages, Machine hours.
5.	**i.** Depreciation of plant and machinery **ii.** Repairs and maintenance of plant and machinery **iii.** Insurance of stock	Capital values
6.	**i.** Power / steam consumption **ii.** Internal transport **iii.** Managerial salaries	Technical estimates
7.	Lighting expenses (light)	No. of light points, or Area or Metered units

8.	Electric power (machine operation)	Horse power of machines, or Number of machine hour, or value of machines or units consumed.
9.	**i.** Material handling **ii.** Stores overhead	Weight of materials, or volume of materials, or value of materials or unit of materials.

Difference between Allocation and Apportionment

Allocation	Apportionment
Allocation deals with the **whole items of cost, which are identifiable with any one department**. For example, indirect wages of three departments are separately obtained and hence each department will be charged by the respective amount of wages individually.	Apportionment deals with the **proportions of an item of cost** for example; the cost of the benefit of a service department will be divided between those departments which has availed those benefits.
Allocation is a direct process of charging expenses to different cost centres	Apportionment is an indirect process because there is a need for the identification of the appropriate portion of an expense to be borne by the different departments benefited.

RE-APPORTIONMENT OF SERVICE DEPARTMENT OVERHEADS OVER PRODUCTION DEPARTMENTS

Cost of the Service Departments:	Basis
1. Maintenance and Repair shop **2.** Planning and progress **3.** Tool room	Direct Labour hours, Machine hours, Direct Labour wages, Asset value x Hours worked
4. Canteen and Welfare **5.** Hospital and Dispensary **6.** Personnel Department	No of direct workers No. of employees etc.
7. Time-keeping	No. of card punched, No. of employees
8. Computer Section	Computer hours, Specific allocation to departments
9. Power House (electric lighting cost)	Floor area, Cubic content, No. electric of Points, Wattage.
10. Power House (electric power cost)	Horse power, Kwh, Horse power x Machine hours, Kwh × Machine hours
11. Stores Department	No. of requisitions, Weight or value of Materials issued.

12. Transport Department	Crane hours, Truck hours, Truck mileage, Truck tonnage, Truck ton- hours, Tonnage handled. No. of packages of Standard size
13. Fire Protection	Capital values
14. Inspection	Inspection hours

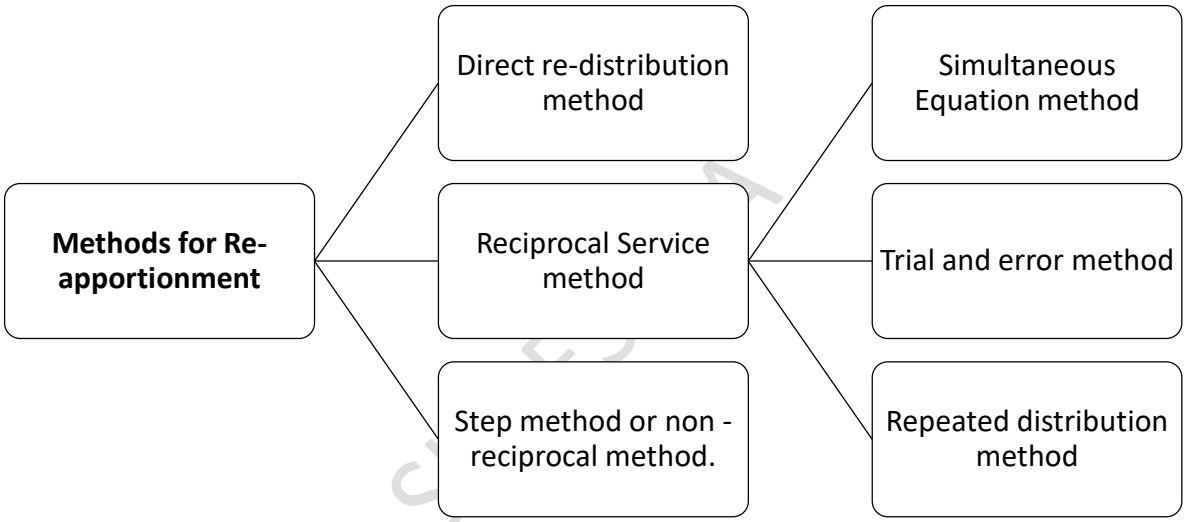
METHODS FOR RE-APPORTIONMENT

The re-apportionment of service department expenses over the production departments may be carried out by using any one of the following methods:

i. Direct re-distribution method.

ii. Step method of secondary distribution or non-reciprocal method.

iii. Reciprocal Service method.



Direct Re-Distribution Method

Service department costs under this method are apportioned over the production departments only, ignoring the services rendered by one service department to the other.

Step Method or Non-Reciprocal Method

This method gives cognizance to the services rendered by service department to another service department. Therefore, as compared to previous method, this method is more complicated because a sequence of apportionments has to be selected here. The sequence here begins with the department that renders maximum number of services to the other service department(s).

Reciprocal Service Method

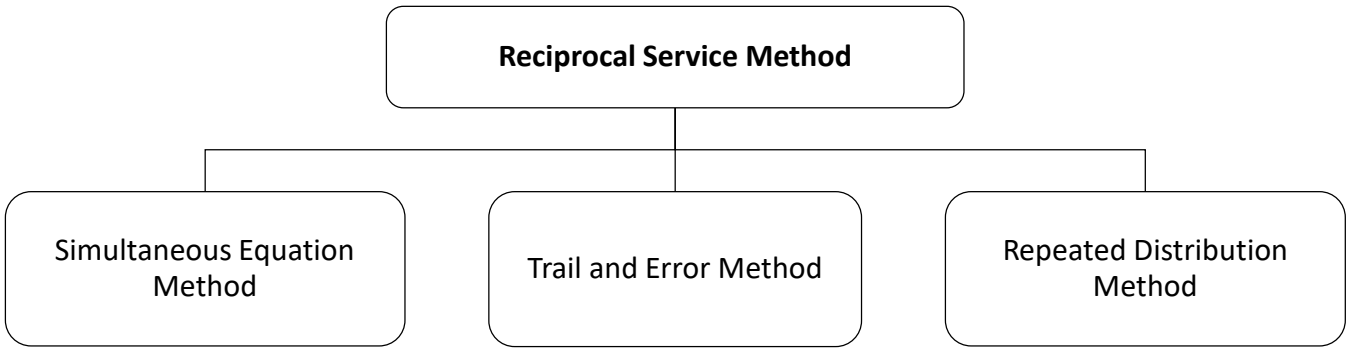
This method recognizes the fact that where there are two or more service departments they may render services to each other and, therefore, these inter-departmental services are to be given due weight while re-distributing the expenses of the service departments.

The methods available for dealing with reciprocal services are:

a. Simultaneous equation method;

b. Trial and error method;

c. Repeated distribution method.



a. Simultaneous Equation Method:

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

b. 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. 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.

c. Repeated Distribution Method:

Under this method, service departments' costs are distributed to other service and production departments on agreed percentages and this process continues to be repeated, till the figures of service departments are either exhausted or reduced to too small a figure.

METHODS OF ABSORBING OVERHEADS TO VARIOUS PRODUCTS OR JOBS

The method selected for charging overheads to products or jobs should be suchas will ensure:

i. That the total amount charged (or recovered) in a period does not differmaterially from the actual expenses incurred in the period and

ii. That the amount charged to individual jobs or products is equitable. In case offactory overhead, this means:

- **a.** that the time spent on completion of each job should be taken intoconsideration;
- **b.** that a distinction should be made between jobs done by skilled workersand those done by unskilled workers
- **c.** that jobs done by manual Labour and those done by machines should bedistinguished.

In addition, the methods should be capable of being used conveniently; and yield uniform result from period to period as far as possible; any change that is apparent should reflect a change in the underlying situation such as substitutionof human Labour by machines.

Several methods are commonly employed either individually or jointly for computing the appropriate overhead rate.

I. Percentage of direct materials,

II. Percentage of prime cost,

III. Percentage of direct Labour cost,

IV. Labour hour rate,

V. Machine hour rate and

VI. Rate per unit of Output

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:

$$\text{Overhead rate} = \frac{\text{Total Production Overheads of a Department}}{\text{Budgeted Direct Material cost of all products}} \times 100$$

Percentage of Prime Cost Method

This method is based on the fact that both materials as well as Labour contribute in raising factory overheads. Hence, the total of the two i.e. Prime cost should be taken as base for absorbing the factory overhead. The overhead rate in this method is computed by the following formals:

$$\text{Overhead rate} = \frac{\text{Total Production Overheads of a Department}}{\text{Prime cost}} \times 100$$

Percentage of Direct Labour Cost

Formula to be used under this method is:

$$\text{Overhead rate} = \frac{\text{Total Production Overheads of a Department}}{\text{Direct labour cost}} \times 100$$

Advantages	Disadvantages
i. The method is simple andeconomical to apply.	**i.** It gives rise to certain inaccuraciesdue to the time factor not being given full importance.
ii. The time factor is givenrecognition even if indirectly.	**ii.** Where machinery is used to some extent in the process ofmanufacture, an allowance for such a factor is not made.
iii. Total expenses recovered will not differ much from the estimated figure since totalwages paid are not likely to fluctuate much.	**iii.** It does not provide for varying skillsof workers

Labour Hour Rate Method

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. To calculate Labour hour rate, the amount of factory overheads is divided by the total number of direct Labour hours.

Formula to be used under this method is:

$$\text{Direct Labour Hour rate} = \frac{\text{Total Production Overheads of a Department}}{\text{Direct labour cost}} \times 100$$

Machine Hour Rate Method

Machine hour rate implies, cost of running a machine for an hour to producegoods. There are two methods of computing machine hour rates:

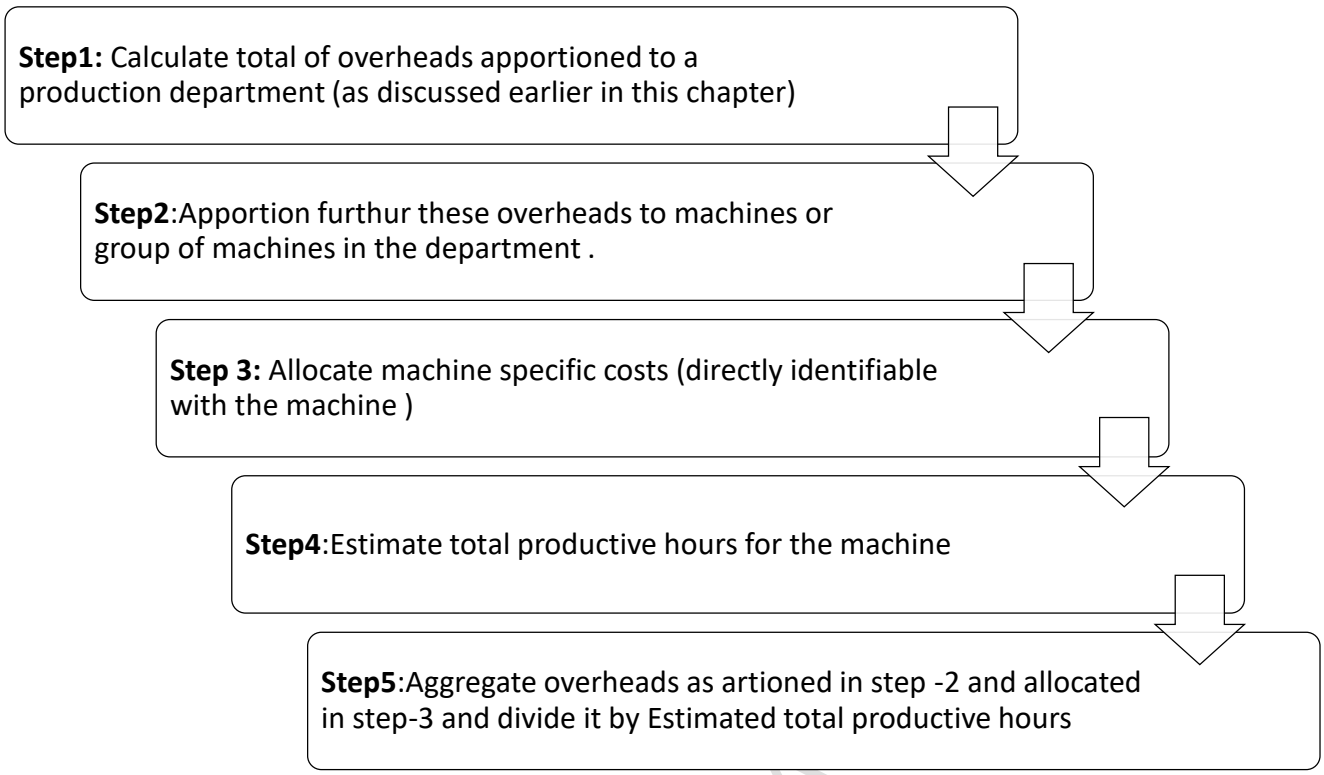
Direct Machine hour rate

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

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 particular machine or group of machines.

The steps involved in determining of Machine hour rate are as follows:



Advantages and disadvantages of Machine hour rate:

Advantages	Disadvantages
1. Where machines are the main factor of production, it is usually the best method of chargingmachine operating expenses to production.	**1.** Additional data concerning the operation time of machines, not otherwise necessary, must be recorded and maintained.
2. The under-absorption of machine overheads wouldindicate the extent to which the machines have been idle.	**2.** As general department rates for all the machines in a department may be suitable, thecomputation of a separate machine hour rate for each machine or group of machines would mean further additional work.
3. It is particularly advantageous where one operator attends to several machines (e.g. automatic screw manufacturing machine), or where several operators are engaged on the machine e.g. the belt press used in making conveyer belts.	

TYPES OF OVERHEAD RATES

Type of Overhead Rates			
1. Normal Rate	**2. Pre-determined Rate**	**3. Blanket Rate**	**4. Departmental Rate**

Normal Rate: This rate is calculated by dividing the actual overheads byactual base. It is also known as actual rate. It is calculated by the following formula:

$$\text{Normal overhead Rate} = \frac{\text{Actual amount of overheads}}{\text{Actual base}}$$

Pre-determined Overhead Rate: This rate is determined in advance by estimating the amount of the overhead for the period in which it is to be used. It is computed by the following formula:

$$\text{Pre-determined Rate} = \frac{\text{Budgeted amount of overheads}}{\text{Budgeted base}}$$

The amount of overhead rate of expenses for absorbing them to production may be estimated on the following three bases.

1. The figure of the **previous year or period may be adopted** as the overhead rate to be charged to production in the current year. The assumption is that the value of production as well as overheads will remain constant or that the two will change, proportionately.
2. The overhead rate for the year may be determined on the basis of **estimated expenses and anticipated volume of production activity.**
   For instance, if expenses are estimated at Rs.10,000 and output at 4,000 units, the overhead rate will be Rs.2.50 per unit.
3. The **overhead rate for a year may be fixed** on the basis of the normal volume of the business.

Blanket Overhead Rate: Blanket overhead rate refers to the **computation of one single overhead rate for the whole factory.** It is to be distinguished from the departmental overhead rate which refers to a separate rate for each individual cost centre or department. The use of blanket rate may be proper in certain factories producing only one major product in a continuous process or where the work performed in every department is fairly uniform or standardized. This overhead rate is computed as follows:

$$\text{Blanket Rate} = \frac{\text{Total overheads for the factory}}{\text{Total number of units of base for the factory}}$$

A blanket rate should be applied in the following cases:

1. Where only one major product is being produced.
2. Where several products are produced, but
   - **a.** All products pass through all departments; and
   - **b.** All products are processed for the same length of time in each department.

Where these conditions do not exist, departmental rates should be used.

Departmental Overhead Rate: It refers to the computation of one single overhead rate for a particular production unit or department. Where the product lines are varied or machinery is used to a varying degree in the different departments, that is, where conditions throughout the factory are not uniform, the use of departmental rates is to be preferred.

This overhead rate is determined by the following formula:

$$\text{Departmental overhead Rate} = \frac{\text{Overheads of department or cost centre}}{\text{Corresponding base}}$$

TREATMENT OF UNDER-ABSORBED AND OVER–ABSORBED OVERHEADS IN COST ACCOUNTING

Overhead expenses are usually applied to production on the basis of pre-determined rates. Production overheads are to be determined in advance for fixing selling price, quote tender price and to formulate budgets etc.

$$\text{Pre-determined overhead rate} = \frac{\text{Estimated/Normal overheads for the period}}{\text{Budgeted Number of units during the period}}$$

The actual overhead rate will rarely coincide with the pre-determined overhead rate, due to variation in pre-determined overhead rate and actual overhead rate.Such a variation may arise due to any one of the following situations:

i. Estimated overheads for the period under consideration may remain the same or they coincide with actual overheads but the number of units produced during the period is either more or less in comparison with budgeted figure. In the former case actual overhead rate will be less and inthe latter case, actual overhead rate will be more than the pre-determined overhead rate, hence over-absorption and under-absorption will occurrespectively.

ii. Similarly, if the number of units actually produced during the period remains the same as budgeted figure but the actual overheads incurred are more or less than the estimated overheads for the period, then a situation of under-absorption or over-absorption will arise respectively.

iii. If changes occur in different proportion both in the actual overheads and in the number of units produced during the period, then a situation of under or over-absorption (depending upon the situation) will arise.

iv. If the changes in the numerator (i.e. in actual overheads) and denominator (i.e. in number of units produced) occur uniformly (without changing the proportion between the two) then a situation of neither under nor of over- absorption will arise.

Such over or under-absorption as arrived at under different situations may alsobe termed as overhead variance. The amount of over-absorption being represented by a credit balance in the accounts and the amount of under- absorption as a debit balance.

The Accounting Is Done As Follows:

In case of Under-absorption:

	ACCOUNTS	DR/CR	CALCULATION OF AMOUNT
1.	Stock of Finished goods A/c	Debit	Units of Finished stock × Supplementary rate per unit
2.	Stock of Semi-finished goods (WIP) A/c	Debit	Equivalent completed units × Supplementary rate per unit
3.	Cost of Sales A/c	Debit	Units sold × Supplementary rate per unit

In case of Over-absorption:

	ACCOUNTS	DR/CR	CALCULATION OF AMOUNT
1.	Stock of Finished goods A/c	Credit	Units of Finished stock × Supplementary rate per unit
2.	Stock of Semi-finished goods (WIP) A/c	Credit	Equivalent completed units × Supplementary rate per unit
3.	Cost of Sales A/c	Credit	Units sold × Supplementary rate per unit

ACCOUNTING AND CONTROL OF ADMINISTRATIVE OVERHEADS

Definition - According to CIMA Terminology, Administrative overhead is defined as "The sum of those costs of general management and of secretarial accountingand administrative services, which cannot be directly related to the production, marketing, research or development functions of the enterprise." According to this definition, administrative overhead constitutes the expenses incurred in connection with the formulation of policy directing the organization and controlling the operations of an undertaking. These overheads are also collectedand classified in the same way as the factory overheads.

Accounting of Administrative Overheads

There are three distinct methods of accounting of administrative overheads, which are briefly discussed below:

a. **Apportioning Administrative Overheads between Production and Sales Departments:** According to this method administrative overheads are apportioned over production and sales departments. The reason for the apportionment of overhead expenses over these departments, recognizes the fact that administrative overheads are incurred for the benefit of both of these departments. Therefore, each department should be charged with the proportionate share of the same. When this method is adopted, administrative overheads lose their identity and get merged with production and selling and distribution overheads.

Disadvantages:

1. It is difficult to find suitable bases of administrative overheadapportionment over production and sales departments.
2. Lot of clerical work is involved in apportioning overheads.
3. It is not justified to apportion total administrative overheads only over production and sales departments when other equally importantdepartment like finance is also there.

b. **Charging to Profit and Loss Account:** According to this method administrative overheads are charged to Costing Profit & Loss Account. The reason for charging to Costing Profit & Loss are firstly, the administrative overheads are concerned with the formulation of policies and thus are not directly concerned with either the production or the selling and distribution functions. Secondly, it is difficult to determine a suitable basis for apportioning administrative overheads over production and sales departments. Lastly, these overheads are the fixed costs. In view of these arguments, administrative overheads should be charged to Profit and Loss Account.

Disadvantages:

1. Cost of products is understated as administrative overheads are notcharged to costs.
2. The exclusion of administrative overheads from cost of products is against sound accounting principle.

c. **Treating Administrative Overheads as a separate addition to Cost of Production/ Sales:** This method considers administration as a separate function like production and sales and, as such costs relating to formulatingthe policy, directing the organization and controlling the operations are taken as a separate charge to the cost of the jobs or a product, sold along with the cost of other functions. The bases which are generally used for apportionment are:

i. Works cost
ii. Sales value or quantity
iii. Gross profit on sales
iv. Quantity produced
v. Conversion cost, etc.

Control of Administrative Overheads

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

i. **Classification and analysis of overheads by administrative departments according to their functions, and a comparison with the accomplished results:** According to this method the expenses incurred by each administrative department are collected under a standing order for each class of expenditure. These are compared with similar figures of the previous period in relation to accomplishment. Such a comparison will reveal efficiency or inefficiency of the concerned department.

   However, this method provides only a limited degree of control and comparison does not give useful results if the level of activity is not constant during the periods under comparison. To overcome this difficulty, overhead absorption rates may also be compared from period to period; the extent of over or under absorption will reveal the efficiency or otherwise of the department. It may be possible to compare the cost of a service department with that of similar services obtainable from outside and a decision may be taken whether it is economical to continue the departmentor entrust the work to outsiders.

ii. **Control through Budgets:** According to this method, administration budgets (monthly or annually) are prepared for each department. The budgeted figures are compared with actual ones to determine variances. The variances are analysed and responsibility assigned to the concerned department to control these variances.

iii. **Control through Standard:** Under this method, standards of performance are fixed for each administrative activity, and the actual performance is compared with the standards set. In this way, standards serve not only as yardstick of performance but also facilitate control of costs.

ACCOUNTING AND CONTROL OF SELLING AND DISTRIBUTION OVERHEADS

Selling cost or overhead expenses are the expenses incurred for the purpose of promoting the marketing and sales of different products. Distribution expenses, on the other hand, are expenses relating to delivery and dispatch of goods sold. Examples of selling and distribution expenses have been considered earlier in this booklet. From the definitions it is clear that the two types of expenses representtwo distinct type of functions. Some concerns group together these two types of overhead expenses into one composite class, namely, selling and distribution overhead, for the purpose of Cost Accounting.

Accounting of Selling and Distribution Overheads

The collection and accumulation of each expense is made by means of appropriate standing orders in the usual way. Where it is decided to apportion apart of the administrative overhead to the selling division the same should alsobe collected through appropriate standing orders.
As in the case of administrative overheads, it is not easy to determine an entirely satisfactory basis for computing the overhead rate for absorbing selling overheads. The bases usually adopted are:

a. Sales value of goods;
b. Cost of goods sold;
c. Gross Profit on sales; and
d. Number of orders or units sold.

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. The cost of production, however, is not as satisfactory basis as it may not have any direct relationship with the selling and distributioncost.

The basis of gross profit on sales results in a larger share of the selling overhead being applied to goods yielding a large margin of profit and vice versa. The basis therefore follows the principle of 'ability to pay, it may not reflect costs or incurred efforts.

An estimated amount per unit - The best method for absorbing selling and distributing expenses over various products is to separate fixed expenses from variable expenses. Apportion the fixed expenses according to the benefit derivedby each product and thus ascertaining the fixed expenses per unit.

We give below some of the fixed expenses and the basis of apportionment:

Expenses	Basis
Salaries in the Sales Department and of the sales men.	Estimated time devoted to the sale of various products.
Advertisement	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 on the basis of advertisement expenditure on each product.
Show Room expenses	Average space occupied by each product.
Rent of finished goods go downs and Expenses on own delivery vans	Average quantities delivered during a period.

If a suitable basis for apportioning expenses does not exist it may be apportionedin the proportion of sales of various products.

The total of fixed expenses apportioned in this manner, divided by the number of units sold or likely to be sold, will give the fixed expenses per unit. To this should be added the variable expenses which will be different for each product. These expenses are, packaging, freight outwards, insurance in transit, commissionpayable to salesmen, rebate allowed to customers, etc. All these items will be worked out per unit for each product separately. These items added to fixed expenses per unit will give an estimated amount of the selling and distribution expenses per unit.

Control of Selling and Distribution Overheads

Control of selling and distribution expenses is a difficult task. The reasons for this are as follows:

1. The incidence of selling and distribution overheads depends mainly on external factors, such as distance of market, extent and nature of competition, terms of sales, etc. which are beyond the control of management.
2. These overheads are dependent upon the customers, behaviour, their likingand disliking, tastes etc. Therefore, as such control over the overheads may result in loss of customers.
3. These expenses being of the nature of policy costs are not amenable tocontrol.

In spite of the above difficulties, the following methods may be used for controlling them.

a. **Comparison with past performance** - According to this method, selling and distribution overheads are compared with the figures of the previous period. Alternatively, the expenses may be expressed as a percentage of sales, and the percentages may be compared with those of the past period. This method is suitable for small concerns.
b. **Budgetary Control -** A budget is set up for selling and distribution expenses. The expenses are classified into fixed and variable. If necessary, a flexiblebudget may be prepared indicating the expenses at different levels of sales. The actual expenses are compared with the budgeted figures and in the case ofvariances suitable actions are taken.
c. **Standard Costing -** Under this method standards are set up in relation to the standard sales volume. Standards may be set up for salesmen, territories,products etc. Once the standards are set up, comparison is made between the actuals and standards: variances are enquired into and suitable action taken.

CONCEPTS RELATED TO CAPACITY

i. **Installed/ Rated capacity:** It refers to the maximum capacity of producing goods or providing services. Installed capacity is determined either on thebasis of technical specification or through a technical evaluation. **It is also known as theoretical capacity** and is could not be achieved in normal operating circumstances.

ii. **Practical capacity:** It is defined as **actually utilized capacity of a plant. Itis also known as operating capacity.** This capacity takes into account lossof time due to repairs, maintenance, minor breakdown, idle time, set up time, normal delays, Sundays and holidays, stock taking etc. Generally, practical capacity is taken between 80 to 90% of the rated capacity. It is also used as a base for determining overhead rates. Practical capacity is also called net capacity or available capacity.

iii. **Normal capacity:** Normal capacity is the **volume of production orservices achieved or achievable** on an average over a period under normal circumstances taking into account the reduction in capacity resulting from planned maintenance.

Normal capacity is determined as under:

Installed capacity		**xxx**
Adjustments for:		
i. Time lost due to scheduled preventive or plannedmaintenance	xxx	
ii. Number of shifts or machine hours or man hours		
iii. Holidays, normal shut down days, normal idle time	xxx	
iv. Normal time lost in batch change over	xxx	xxx
Normal Capacity		**xxx**

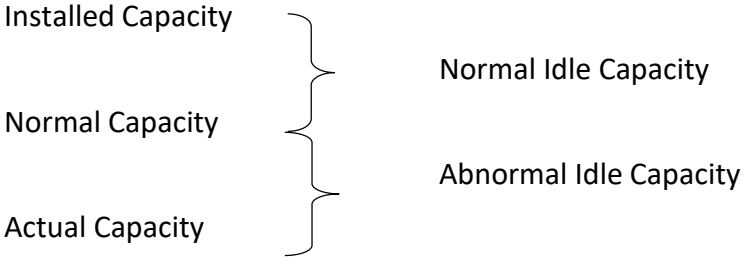
iv. **Actual capacity:** It is the capacity actually achieved during a given period. Itis presented as a percentage of installed capacity.

v. **Idle capacity:** It is that part of the capacity of a plant, machine or equipment which cannot be effectively utilized in production.

(a) Normal Idle Capacity: It is the difference between Installed capacity andNormal capacity.

(b) Abnormal Idle Capacity: It is the difference between Normal capacity and Actual capacity utilization where the actual capacity is lower than thenormal 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:

a. If the idle capacity cost is due to unavoidable reasons such as repairs, maintenance, changeover of job etc. a supplementary overhead rate may be used to recover the idle capacity cost. In this case, the costs are charged to the production capacity utilized.

b. If the idle capacity cost is due to avoidable reasons such as faulty planning, power failure etc.; the cost should be charged to costing profit and loss account.

c. If the idle capacity cost is due to seasonal factors, then, the cost should be charged to the cost of production by inflating overhead rates.

TREATMENT OF CERTAIN ITEMS IN COSTING

i. **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.

ii. **Depreciation:** Depreciation "is the diminution in the intrinsic value of an asset due to use and/or the lapse of time." Depreciation is thus the result of two factors viz., the use, and the lapse of time. We know that each fixed asset loses its intrinsic value due to their continuous use and as such the greater the use the higher is the amount of depreciation. The loss in the intrinsic value may also arise even if the asset in question is not in service.

Assignment of Depreciation:

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 i.e. (i) Cause and Effect and (ii) Benefit received.

iii. **Packing expenses: Cost of primary packing** necessary for protecting the product or for convenient handling, should **become a part of the production cost**. The **cost of packing to facilitate the transportation** ofthe product from the factory to the customer should **become a part of the distribution cost**. If the cost of special packing is at the request of the customer, the same should be charged to the specific work order or the job. The cost of fancy packing necessary to attract customers is an advertising expenditure. Hence, it is to be treated as a selling overhead.

iv. **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 givenin the form of overtime, extra shift duty allowance, holiday pay, pension facilities etc.

These indirect benefits stand to improve the morale, loyalty and stability of employees towards the organization. If the amount of fringe benefit 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.

v. **Expenses on removal and re-erection of machines:** Expenses are sometime incurred on removal and re-erection of machinery in factories. Such expenses may be incurred due to factors like change in the method of production; an addition or alteration in the factory building, change in theflow of production, etc. **All such expenses are treated as production overheads**. When amount of such expenses is large, it may be spread over a period of time. If such expenses are incurred due to faulty planning or some other abnormal factor, then they may be charged to costing Profit and Loss Account.

vi. **Bad debts:** There is no unanimity among different authors of Cost Accounting about the treatment of bad debts. One view is that 'bad debts' should be excluded from cost. According to this view bad debts are financial losses and therefore, they should not be included in the cost of a particularjob or product.

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 extra ordinarily large bad debts should not be included in cost accounts.

vii. **Training expenses:** Training is an essential input for industrial workers. Training expenses in fact includes wages of workers, costs incurred in running training department, loss arising from the initial lower production, extra spoilage etc. Training expenses of factory workers are treated as part of the cost of production. The training expenses of office; sales or distribution workersshould be treated as office; sales or distribution overhead as the case may be. Theseexpenses can be spread over various departments of the concern on the basis of thenumber of workers on 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.

viii. **Canteen expenses:** The subsidy provided or expenses borne by the firm in running the canteen should be regarded as a production overhead. If thecanteen is meant only for factory workers therefore these expenses should be apportioned on the basis of the number of workers employed in each department. If office workers also take advantage of the canteen facility, a suitable share of the expenses should be treated as office overhead.

ix. **Carriage and cartage expenses:** It includes the expenses incurred on the movement (inward and outwards) and transportation of materials and goods. Transportation expenses related to direct material may be included in the cost of direct material and those relating to indirect material (stores) may be treated as factory overheads. Expenses related to the transportation of finished goods may be treated as distribution overhead.

x. **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 on the basis of number of persons involved.

xi. **Night shift allowance:** Workers in the factories, which operate during night time are paid some extra amount known as 'night shift allowance'. This extra amount is generally incurred due to the general pressure of work beyond normal capacity level and is treated as production overhead and recoveredas such. 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 meetsome 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.

xii. **Research and Development Expenses:** The Terminology defines research expenses as "the expenses of searching for new or improved products, newapplication of materials, or new or improved methods." Similarly, development expenses are defined as "the expenses of the process which begins with the implementation of the decision to produce a new or improved product." If research is conducted in the methods of production, the research expenses should be charged to the production overhead; while the expenditure becomes a part of the administration overhead if research relates to administration. Similarly, market research expenses are charged to the selling and distribution overhead. Development costs incurred in connection with a particular product shouldbe charged directly to that product. Such expenses are usually treated as "deferred revenue expenses," and recovered as a cost per unit of the product when production is fully established. General research expenses of a routine nature incurred on new or improved methods of manufacture or the improvement of the existing products should be charged to the general overhead. Even in this case, if the amount involved is substantial it may be treated as a deferred revenue expenditure, and spread over the period during which the benefit would accrue. Expenses on fundamental research, not relating to any specific product, are treated as a part of the administration overhead. Where research proves a failure, the cost associated with it should be excluded from costs and charged to the costing Profit and Loss Account.

QUESTIONS FOR CLASSROOM DISCUSSION

PROBLEM – 1

The following figures are extracted from the accounts of a manufacturing concern for the month of September, 20x1 –

Particulars		**₹**
Indirect materials:		
- Production Dept.	P1	₹ 950
- Production Dept.	P2	₹ 1,200
- Production Dept.	P3	₹ 200
- Maintenance Dept.	S1	₹ 1,500
- Stores Dept.	S2	₹ 400
Indirect wages:		
- Production Dept.	P1	₹ 900
- Production Dept.	P2	₹ 1,100
- Production Dept.	P3	₹ 300
- Maintenance Dept.	S1	₹ 1,000
- Stores Dept.	S2	₹ 650
Power and light		₹ 6,000
Insurance on assets		₹ 1,000
Rent and rates		₹ 2,800
Meal charges		₹ 3,000

Depreciation on capital value of assets is 6% per annum. From the above information prepare a primary distribution summary with the following departmental data:

PARTICULARS	**PRODUCTION COST CENTRES**			**SERVICE COST CENTRES**	
	P1	**P2**	**P3**	**S1**	**S2**
Area (sq. m.)	4,000	4,000	3,000	2,000	1,000
Capital value of assets (000)	100	120	80	60	40
Kilowatt hours	4,000	4,400	1,600	1,500	500
Number of employees	90	120	30	40	20

PROBLEM – 2

A Ltd. manufactures a number of products. It has two production departments P1 and P2 and service departments S1 and S2. The estimated overhead costs for 20x1 and interdepartmental relationship matrix are as follows:

SERVICE PROVIDED BY	SERVICE PROVIDED TO			
	P1	**P2**	**S1**	**S2**
S1	40%	50%	-	10%
S2	50%	30%	20%	-
Estimated overhead (₹)	₹ 7,000	₹ 6,000	₹ 18,000	₹ 8,000

You are required to calculate overhead costs for P1 and P2 using -

a. Direct apportionment method;

b. Step method of apportionment –

- Apportioning S1 costs first, and
- Apportioning S2 costs first;

c. Reciprocal method of apportionment –

d. Repeated distribution method,

e. Simultaneous equations method, and

f. Trial & Error Method.

PROBLEM – 3

A factory is having three production departments A, B and C, and two service departments Boiler-house and pump room. The boiler-house has to depend upon the pump - room for supply of water and pump room in its turn is dependent on the boiler-house for the supply of steam power for driving the pump. The expenses incurred by the production departments during a period are A – ₹ 8,00,000; B – ₹ 7,00,000; and C – ₹ 5,00,000.

The expenses for the boiler-house are ₹ 2,34,000 and the pump - room – ₹ 3,00,000.

The expenses of the boiler-house and pump- room are apportioned to the production departments on the following basis

PARTICULARS	**A**	**B**	**C**	**B.H**	**P.R**
Expenses of boiler-house	20%	40%	30%	-	10%
Expenses of pump-room	40%	20%	20%	20%	-

Show clearly as to how the expenses of boiler- house and pump-room would be apportioned to A, B and C departments. Use algebraically equation.

PROBLEM – 4

A manufacturing company has two production departments P1 and P2, and three service departments, time-keeping, stores and maintenance. The departmental distribution summary showed the following expenses for December, 20x1:

PARTICULARS	AMOUNT (₹)
Production department P1	₹ 24,000
Production department P2	₹ 16,000
Service Dept.-Stores	₹ 5,000
Service Dept.-Time keeping	₹ 4,000
Service Dept.-Maintenance	₹ 3,000
Total	**₹ 52,000**

Additional information:

PARTICULARS	PRODUCTION DEPARTMENT		SERVICE DEPARTMENT		
	P1	P2	STORES	TIME KEEPING	MAINTENANCE
No. of employees	20	15	10	8	5
No. of requisitions	12	10	-	-	3
Machine hours	2400	600	-	-	-

Apportion the service department expenses to production cost centres P1 and P2.

PROBLEM – 5

An engine manufacturing company has two production departments:

A. Snow mobile engine and

B. Boat engine

and two service departments:

1. Maintenance and

2. Factory office

Budgeted cost and relevant cost drivers are:

DEPARTMENT	COST
Snow mobile	₹ 6,00,000
Boat engine	₹ 17,00,000
Maintenance	₹ 2,40,000
Factory office	₹ 3,00,000

Cost drivers are as under:

DEPARTMENT	FACTORY OFFICE DEPARTMENT	MAINTENANCE DEPARTMENT
COST DRIVER	**NUMBER OF EMPLOYEES**	**NUMBER OF WORK ORDERS**
Snow mobile engine department	1080 employees	570 orders
Boat engine department	270 employees	190 orders
Factory office department	--	40 orders
Maintenance department	150 employees	--
Total	1500 employees	800 orders

Required

I. Compute the Cost driver allocation percentage and then use these percentages to allocate the service department costs by using the Repeated Distribution method.

II. Compute the cost driver allocation percentage and then use these percentages to allocate the service department costs by using the non-Reciprocal services method-direct method.

PROBLEM – 6

Super class Co. Ltd. has three production departments X, Y and Z and two service departments A and B.

The following estimated figures for a certain period have been made available: -

PARTICULARS	AMOUNT (₹)
Rent and Rates	₹ 10,000
Lighting and Electricity	₹ 1,200
Indirect Wages	₹ 3,000
Power	₹ 3,000
Depreciation of Machinery	₹ 20,000
Other Expenses and Sundries	₹ 20,000

Following are further details which are also available: -

PARTICULARS	TOTAL	X	Y	Z	A	B
Floor Space (Sq. mts)	10,000	2,000	2,500	3,000	2,000	500
Light Points (Nos.)	120	20	30	40	20	10
Direct wages	₹ 20,000	₹ 6,000	₹ 4,000	₹ 6,000	₹ 3,000	₹ 1,000
Horsepower of machine	300	120	60	100	20	-
Cost of Machinery (₹)	₹ 1,00,000	₹ 24,000	₹ 32,000	₹ 40,000	₹ 2,000	₹ 2,000
Working hours		4,670	3,020	3,050	-	-

The expenses of the service departments A and B are to be allocated as follows: -

PARTICULARS	X	Y	Z	A	B
A	20%	30%	40%	-	10%
B	40%	20%	30%	10%	-

You are required to calculate the overhead absorption rate per hour in respect of the three production departments.

What will be the total cost of an article with a material cost of 80 and direct labour cost of 40 which passes through X, Y and Z for 2, 3 and 4 hours respectively?

PROBLEM – 7

AC Limited is a small company that undertakes a variety of jobs for its customers.

Budgeted profit and loss statement for the year ending 31 December 20x1.

PARTICULARS	AMOUNT (₹)	AMOUNT (₹)
Sales		₹ 7,50,000
Cost:		
Direct materials	₹ 1,00,000	
Direct wages	₹ 50,000	
Prime cost	₹ 1,50,000	
Fixed production overhead	₹ 3,00,000	
Production cost	₹ 4,50,000	
Selling, Distribution and Administration cost	₹ 1,60,000	₹ 6,10,000
Profit		₹ 1,40,000
Budgeted data:		
Labour hours for the year	25,000	

Machine hours for the year	15,000	
Number of jobs for the year	300	

An enquiry has been received, and the production department has produced estimates of the prime cost involved and of the hours required to complete job A57.

PARTICULARS	AMOUNT (₹)
Direct materials	₹ 250
Direct wages	₹ 200
Prime cost	₹ 450
Labour hours required	80
Machine hours required	50

You are required to:

A. Calculate by different methods six overhead absorption rates;

B. Calculate cost estimates for job A57 using in turn each of the six overhead absorption rates calculated in a..

PROBLEM – 8

ABC Ltd manufactures a single product and absorbs production overheads at a predetermined rate of ₹ 10 per machine hour.

At the end of the financial year, it has been found that actual production overheads incurred were ₹6,00,000. It included ₹ 45,000 on account of written off obsolete stores and ₹ 30,000 being the wages paid for the strike period under an award.

The production and sales data for the year are as under:

Finished goods produced: 20000 units

WIP [50% complete in all aspects]: 8,000 units

Goods sold: 18,000 units.

The actual machine hrs worked during the year was 48,000 hours. It has been found that one-third of the under absorption was due to lack of production planning and the rest were attributable to a normal increase in costs.

You are required to:

i. Calculate the amount of under absorption of production overheads during the year.

ii. Show the accounting treatment of under absorption of production overheads.

PROBLEM – 9

In a manufacturing unit, Overhead was recovered at a pre-determined rate of ₹ 20 per labour hour. The total Factory OH paid and the labour-hours actually worked were ₹ 45,00,000 and 2,00,000 labour-hours respectively. During this period 30,000 units were sold. At the end of the period, 5,000 units were held in stock while there was no Opening Stock of Finished Goods. Similarly, though there was no stock of uncompleted units at the beginning of the period, at the end of the period there were 10,000 uncompleted units, which may be reckoned at 50% complete.

The cost accountant was able to obtain the following other information:

1. Actual factory OH included the following items:
   - **a.** ₹ 1,25,000 paid to workers for a strike period under an award of the labour court.
   - **b.** ₹ 25,000 being a penalty paid for contravention of Central Excise Rules.
   - **c.** ₹ 40,000 being obsolete stores now written off.
   - **d.** ₹ 10,000 paid towards Consumables, relating to prior periods, now paid after settlement of a dispute.
2. ₹ 2,00,000 of Factory OH for the period was still payable and not yet accounted in the books.

On analysing the reasons, it was found that 60% of the unabsorbed OH were due to defective planning and the rest were attributable to an increase in OH costs. How would Unabsorbed OH be treated in cost accounts?

PROBLEM – 10

Your company uses an integrated accounting system and applies overheads on the basis of "pre-determined" rates. The following figures are extracted from the Trial balance as at 31st March.

PARTICULARS	AMOUNT (₹)	PARTICULARS	AMOUNT (₹)
Manufacture Overhead	₹ 4,26,544 Dr.	Work-in- Progress	₹ 1,41,480 Dr.
Manufacture Overhead applied	₹ 3,65,904 Dr.	FG stock	₹ 2,30,732 Dr.
		Cost of goods sold	₹ 8,40,588 Dr.

You are required to show the profit implications of treating under-absorption under the following methods:

A. Write off to Profit and Loss Account;

B. Adjustment to cost of sales and inventories of WIP and Finished goods.

PROBLEM – 11

A manufacturing company has four production departments. Overhead is absorbed to its production departments by means of department rates per direct labour hours.

In a particular year, there was a large difference between the overheads incurred and overhead absorbed.

On analysis, you get the following information:

PARTICULARS	DEPARTMENTS			
	1	2	3	4
Overhead incurred	₹ 12,320	₹ 44,385	₹ 18,180	₹ 16,720
Actual direct labour hour worked	30,800	80,700	40,400	30,400
Estimated department rate used	₹ 0.5	₹ 0.45	₹ 0.4	₹ 0.5
Total overhead absorbed	₹ 15,400	₹ 36,315	₹ 16,160	₹ 15,200
Direct labour hour contained in:				
Work- in-progress	3,000	10,400	1,900	7,200
Finished goods	4,300	8,300	4,000	2,900

You are required to:

a. Calculate for each department the direct labour hour rates of overhead incurred.

b. Calculate the extent to which the value of work-in-progress and finished goods be increased or decreased for each department for the year in view of the correct rate.

c. What will be the impact on the total profit of the company in view of the correction in b. above?

PROBLEM – 12

The Pipe Company manufacture two products, A and B during the first year of its operations. For purposes of product costing, an overhead rate of application of ₹ 1.70 per direct-labour hour was used, based on budgeted factory overhead of ₹ 3,40,000 and budgeted direct-labour hours of 2,00,000 as follows.

	BUDGETED OVERHEAD	BUDGETED HOURS
Department 1	₹ 2,40,000	1,00,000
Department 2	₹ 1,00,000	1,00,000
Total	**₹ 3,40,000**	**2,00,000**

The number of labour hours required to manufacture each of these products was:

	Product A	**Product B**
In Dept. 1	4	1
In Dept. 2	1	4
Total	**5**	**5**

At the end of the year, there was no work in process. There were, however, 2,000 and 6,000. Finished Units, respectively, of products A and B on hand. Assume that budgeted activity was attained.

i. What was the effect on the Company's income of using a plant wise overhead rate instead of departmental overhead rates?

ii. Assume that material and labour costs per unit of Product A were ₹ 10/- and that the selling price was established by adding 40 per cent to cover profit, what selling price results from the use of departmental against plant wise overhead rates?

iii. Explain why departmental overhead rates were generally preferable to plant wise rates.

PROBLEM – 13

A machine shop has 8 identical Drilling Machines manned by 6 operators. The machines cannot be worked without an operator wholly engaged on it. The original cost of all these 8 machines works out to ₹ 8 lakhs. These particulars are furnished for a six month period:-

Normal available hours per month	208
Absenteeism (without pay) - hours	18
Leave (with pay) – hours	20
Normal idle time unavoidable – hours	10
Average rate of wages per day of 8 hours	₹ 20
Production Bonus estimated on Wages	15%
Value of Power consumed	₹ 8,050
Supervision and Indirect Labour	₹ 3,300
Lighting and Electricity	₹ 1,200

The following particulars are for a year:

- Repairs and maintenance including consumables 3% on the value of machines.
- Insurance ₹ 40,000.
- Depreciation 10% on original cost.
- Other Sundry works expenses ₹ 12,000.
- General Management expenses allocated ₹ 54,530.

You are required to work out a comprehensive machine hour rate for the Machine Shop.

PROBLEM – 14

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 ₹ 4,20,000 per annum. The expenses regarding the machine are estimated as follows:

	(₹)
Rent for a 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:

Number of hours the machine was used:	**Job**		
	A	**B**	**C**
a. Without the use of the computer	600	900	-
b. With the use of the computer	400	600	1000

You are required to COMPUTE the machine hour rate

i. For the firm as a whole for the month when the computer was used and when the computer was not used

ii. For the individual Jobs A, B and C

PROBLEM – 15

In an engineering company, the factory overheads are recovered on a fixed percentage basis on direct wages and the administrative overheads arse absorbed on a fixed percentage basis on factory cost. The company has furnished the following data relating to two jobs undertaken by it in a period:

PARTICULARS	**Job 101 (₹)**	**Job 102 (₹)**
Direct materials	₹ 54,000	₹ 37,500
Direct wages	₹ 42,000	₹ 30,000
Selling price	₹ 1,66,650	₹ 1,28,250
Profit percentage on Total Cost	10%	20%

Required:

- COMPUTATION of percentage recovery rates of factory overheads and administrative overheads.
- CALCULATION of the amount of factory overheads, administrative overheads and profit for each of the two jobs.
- Using the above recovery rates DETERMINE the selling price of job 103. The additional data being:

Direct materials	₹ 24,000
Direct wages	₹ 20,000
Profit percentage on selling price	12-½ %

PROBLEM – 16

Job No. 198 was commenced on October 10, 20x1 and completed on November 1, 20x1. Materials used were 6,000 and labour charged directly to the job was 4,000. Other information is as follows:

Machine No. 215 used for 40 hours, the machine hour rate being ₹ 35.

Machine No. 160 used for 30 hours, the machine hour rate being ₹ 40. Six welders worked on the job for five days of 8 hours each. The Direct labour hour per welder is ₹ 20.

General expenses related to production not included for calculating either the machine hour or direct labour hour rate totalled ₹ 20,000, total direct wages for the period being ₹ 2,00,000. COMPUTE the works costs for job No. 198.

PROBLEM – 17

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 the percentage of total factory overheads to total factory wages. The relevant data for a month are given below.

DEPARTMENT	DIRECT MATERIAL (₹)	DIRECT WAGES (₹)	FACTORY OVERHEADS (₹)	DIRECT LABOUR HOURS	MACHINE HOURS
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:

DEPARTMENT	DIRECT MATERIAL (₹)	DIRECT WAGES (₹)	DIRECT LABOUR HOURS	MACHINE HOURS
Machining	1,200	240	60	180
Assembly	600	360	120	30
Packing	300	60	40	-

The factory adds 30% on the factory cost to cover administration and selling overheads and profit.

Required:

1. COMPUTE the overhead absorption rate as per the current policy of the company and determine the selling price of 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 (2) 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.

PROBLEM -18

A light engineering factory fabricates machine parts for customers. The factory commenced fabrication of 12 nos. Machine parts as per customers' specifications, the expenditure incurred on the job for the week ending 21st August, 20x1 is as tabulated below:

PARTICULARS	AMOUNT (₹)	AMOUNT (₹)
Direct materials (all items)		780
Direct labour (Manual) 20 hours @ ₹ 15 per hour		300
Machine facilities:		
Machine No. I: [4 hours @ ₹ 45]	180	
Machine No. II: [6 hours @ ₹ 65]	390	570
Total		1,650
Overheads @ ₹ 8 per hour on 20 manual hours		160
Total cost		₹ 1,810

The overhead rate of ₹ 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.

PROBLEM – 19

A Ltd. manufactures two products A and B. The manufacturing division consists of two production departments P_1 and P_2 and two service departments S_1 and S_2. Budgeted overhead rates are used in the production departments to absorb factory overheads to the products. The rate of Department P_1 is based on direct machine-hours, while the rate of Department P_2 is based on direct labour hours. In applying overheads, the pre-determined rates are multiplied by actual hours.

For allocating the service department costs to production departments, the basis adopted is as follows:

i. Cost of Department S_1 to Department P_1 and P_2 equally, and

ii. Cost of Department S_2 to Department P_1 and P2 in the ratio of 2:1 respectively.

The following budgeted and actual data are available:

Annual profit plan data:

Factory overheads budgeted for the year:

PRODUCTION DEPARTMENTS		SERVICE DEPARTMENTS	
P_1	P_2	S_1	S_2
₹ 25,50,000	₹ 21,75,000	₹ 6,00,000	₹ 4,50,000

Budgeted output in units:

Product A - 50,000; B - 30,000.

Budgeted raw-material cost per unit:

Product A - 120; Product B - 150.

Budgeted time required for production per unit:

Department P_1	Product A: 1.5 machine hours
	Product B: 1.0 machine hour
Department P_2	Product A: 2 Direct labour hours
	Product B: 2.5 Direct labour hours

Average wage rates budgeted in Department P_2 are:

Product A - ₹ 72 per hour and Product B - ₹ 75 per hour.

All materials are used in Department P_1 only.

Actual data: (for the month of July, 20x1)

Units actually produced: Product A: 4,000 units

Product B: 3,000 units

Actual direct machine hours worked in Department P_1:

On product A - 6,100 hours; Product B - 4,150 hours.

Actual direct labour hours worked in Department P_2:

On product A - 8,200 hours; Product B - 7,400 hours.

Costs actually incurred:	**Product A**	**Product B**
Raw materials	₹ 4,89,000	₹ 4,56,000
Wages	₹ 5,91,900	₹ 5,52,000
Overheads:		
Department P_1	₹ 2,31,000	
Department P2	₹ 2,04,000	
Department S_1	₹ 60,000	
Department S_2	₹ 48,000	

You are required to:

i. COMPUTE the pre-determined overhead rate for each production department.

ii. PREPARE a performance report for July 2020 that will reflect the budgeted costs and actual costs.

PROBLEM – 20

A company which sells four products, some of these are unprofitable. Company proposes to discontinue to sale one of these products. The following information is available regarding income, costs and activity for the year ended 31st March.

	Products			
	A	**B**	**C**	**D**
Sales (₹)	30,00,000	50,00,000	25,00,000	45,00,000

Cost of goods sold (₹)	20,00,000	45,00,000	21,00,000	22,50,000
Area of storage (Sq.ft.)	50,000	40,000	80,000	30,000
Number of parcels sent	1,00,000	1,50,000	75,000	1,75,000
Number of invoices sent	80,000	1,40,000	60,000	1,20,000

Selling and Distribution overheads and the basis of allocation are:

	Amount (₹)	**Basis of allocation to products**
Fixed Costs		
Rent & Insurance	3,00,000	Area of storage (Sq. ft.)
Depreciation	1,00,000	No. of Parcels sent
Salesmen's salaries & expenses	6,00,000	Sales Volume
Administrative wages and salaries	5,00,000	No. of invoices sent
Variable Costs:		
Packing wages & materials	Rs. 2 per parcel	
Commission	4% of sales	
Stationery	Rs. 1 per invoice	

You are required to PREPARE Costing Profit & Loss Statement, showing the percentage of profit or loss to sales for each product.

ADDITIONAL QUESTIONS FOR PRACTICE

QFP 1 (Concept Similar to Problem – 8)

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.

EXPLAIN how would unabsorbed overheads be treated in Cost Accounts?

QFP 2 (Concept Similar to Problem – 8)

In a factory, overheads of a particular department are recovered on the basis of Rs. 5 per machine hour. 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. SHOW the treatment of over/under-absorbed overhead in the cost accounts?

QFP 3 (Concept Similar to Problem – 8)

The total overhead expenses of a factory are Rs.4,46,380. Taking into account the normal working of the factory, overhead was recovered in production at Rs.1.25 per hour. The actual hours worked were 2,93,104. STATE how would you proceed to close the books of accounts, assuming that besides 7,800 units produced of which 7,000 were sold, there were 200 equivalent units in work-in-progress?

On investigation, it was found that 50% of the unabsorbed overhead was on account of increase in the cost of indirect materials and indirect labour and the remaining 50% was due to factory inefficiency.

QFP 4 (Concept Similar to Problem – 4)

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 overhead (Rs.)	Direct labour hours	No. of employees	Area in sq.m.
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 metres
- **S** Direct labour hours

You are required to:

a. PREPARE a schedule showing the distribution of overhead costs of the four 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.

QFP 5 (Concept Similar to Problem – 6)

The ABC Company has the following account balances and distribution of direct charges on 31st March.

	Total	Production Depts.		Service Depts.	
		Machine shop	Packing	Gen. Plant	Store & Maintenance
	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)
Allocated Overheads:					
Indirect labour	₹ 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 & payroll salary	₹10,000	–	–	₹10,000	–
Overheads to be apportioned:					
Power	₹8,000				
Rent	₹12,000				
Fuel and heat	₹6,000				
Insurance	₹1,000				
Trade License fees	₹2,000				
Depreciation	₹1,00,000				
	₹1,64,420	₹6,200	₹4,700	₹17,170	₹7,350

The following data were compiled by means of the factory survey made in the previous year:

	Floor Space (Sq ft)	**Radiator Sections**	**No. of Employees**	**Investment (Rs.)**	**H.P hours**
Machine Shop	2,000	45	20	6,40,000	3,500
Packing	800	90	10	2,00,000	500
General Plant	400	30	3	10,000	-
Store & Maintenance	1,600	60	5	1,50,000	1,000
	4,800	225	38	10,00,000	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 on the basis of number of employees

Prepare

i. An overhead distribution statements.

ii. Distribution of the service departments' expense to production departments.

QFP 6 (Concept Similar to Problem – 13)

A machine shop cost centre contains three machines of equal capacities. To operate these three machines nine operators are required i.e., three operators on each machine. Operators are paid Rs.20 per hour. The factory works for fourty eight hours in a week which includes 4 hours set up time. The work is jointly done by operators. The operators are paid fully for the fourty eight hours. In additions they are paid a bonus of 10 per cent of productive time. Costs are reported for this company on the basis of thirteen four-weekly period.

The company for the purpose of computing machine hour rate includes the direct wages of the operator and also recoups the factory overheads allocated to the machines. The following details of factory overheads applicable to the cost centre are available:

i. Depreciation 10% per annum on original cost of the machine. Original cost of each machine is Rs.52,000.

ii. Maintenance and repairs per week per machine are Rs.60.

iii. Consumable stores per week per machine are Rs.75.

iv. Power: 20 units per hour per machine at the rate of 80 paise per unit. No power is used during the set-up hours.

v. Apportionment to the cost centre: Rent per annum Rs.5,400, Heat and Light per annum Rs.9,720, foreman's salary per annum Rs.12,960 and other miscellaneous expenditure per annum Rs.18,000.

Required:

i. Calculate the cost of running one machine for a four-week period.

QFP 7 (Concept Similar to Problem – 13)

A machine costing Rs. 1,00,00,000 is expected to run for 10 years. At the end of this period its scrap value is likely to be Rs. 9,00,000. Repairs during the whole life of the machine are expected to be Rs. 18,00,000 and the machine is expected to run 4,380 hours per year on the average.

Its electricity consumption is 15 units per hour, the rate per unit being Rs. 5. The machine occupies one-fourth of the area of the department and has two points out of a total of ten for lighting.

The foreman has to devote about one sixth of his time to the machine. The monthly rent of the department is Rs. 30,000 and the lighting charges amount to Rs. 8,000 per month. The foreman is paid a monthly salary of Rs. 19,200. FIND OUT the machine hour rate, assuming insurance is @ 1% p.a. and the expenses on oil, etc., are Rs. 900 per month

CHAPTER 04: ACTIVITY BASED COSTING

INTRODUCTION

As discussed in the previous chapter i.e. Overheads, in Traditional Costing System, overhead costs are grouped together under cost center and then absorbed into product costs on either of the basis such as direct Labour hours, machine hours, volume etc. In certain cases, this traditional costing system gives inaccurate cost information.

Though, it should not be assumed that all traditional absorption costing systems are not accurate enough to give adequate information for pricing purposes or other long-run management decision purposes. Some traditional systems treat overheads in a detailed way and relate them to service cost centres as well as production cost centres.

The service centre overheads are then spread over the production cost centres before absorption rates are calculated. The main cause of inaccuracy is in the calculation of the overhead rate itself, which is usually based on direct Labour hours or machine hours. These rates assume that products that take longer to make, generate more overheads and so on.

Organizations, who do not wish to know how much it costs to make a product with precise accuracy, may be happy with traditional costing system. Others, however, fix their price on cost basis and need to determine it with reasonable accuracy. The latter organizations have been greatly benefitted from the development of activity-based costing (ABC), which is considered as a modern absorption costing method, and was evolved to give more accurate product costs.

Factors prompting the development of ABC

Various factors lead to the development of ABC include:

1. Growing overhead costs because of increasingly automated production
2. Increasing market competition, which necessitated more accurate product costs.
3. Increasing product diversity to secure economies of scope & increased market share.
4. Decreasing costs of information processing because of continual improvements and increasing application of information technology.

Usefulness/Suitability of ABC

ABC is particularly needed by organizations for product costing in the following situations:

1. **High amount of overhead**: When production overheads are high and form significant costs, ABC is more useful than traditional costing system.
2. **Wide range of products**: ABC is most suitable, when, there is diversity in the product range or there are multiple products.
3. **Presence of non-volume related activities**: When non-volume related activities e.g. material handling, inspection set-up, are present significantly and traditional system cannot be applied, ABC is a superior and better option. ABC will identify non-value-adding activities in the production process that might be a suitable focus for attention or elimination.

4. **Stiff competition**: When the organization is facing stiff competition and there is an urgent requirement to compute cost accurately and to fix the selling price according to the market situation, ABC is very useful. ABC can also facilitate in reducing cost by identifying non-value-adding activities in the production process that might be a suitable focus for attention or elimination.

MEANING AND DEFINITION

Activity Based Costing is an accounting methodology that assigns costs to activities rather than products or services. This enables resources & overhead costs to be more accurately assigned to products & services that consume them. ABC is a technique which involves identification of cost with each cost driving activity and making it as the basis for apportionment of costs over different cost objects/ jobs/ products/customers or services.

CIMA defines 'Activity Based Costing' as "An approach to the costing and monitoring of activities which involves tracing resource consumption and costing final outputs. Resources are assigned to activities, and activities to cost objects based on consumption estimates. The latter utilise cost drivers to attach activity costs to outputs."

MEANING OF TERMS USED IN ABC

1. **Activity:** Activity, here, refers to an event that incurs cost.
2. **Cost Object:** It is an item for which cost measurement is required e.g. a product or a customer.
3. **Cost Driver:** It is a factor that causes a change in the cost of an activity. There are two categories of cost driver.

Resource Cost Driver: It is a measure of the quantity of resources consumed by an activity. It is used to assign the cost of a resource to an activity or cost pool.

Activity Cost Driver: It is a measure of the frequency and intensity of demand, placed on activities by cost objects. It is used to assign activity costs to cost objects.

4. **Cost Pool:** It represents a group of various individual cost items. It consists of costs that have same cause and effect relationship. Example machine set-up.

Examples of Cost Drivers:

Business Functions	Cost Driver
Research and Development	Number of research projects Personnel hours on a project
Design of products, services and procedures	Number of products in design Number of parts per product Number of engineering hours
Customer Service	Number of service calls
	Number of products serviced Hours spent on servicing products
Marketing	Number of advertisements Number of sales personnel Sales revenue
Distribution	Number of units distributed Number of customers

COST ALLOCATION UNDER ABC

Under activity-based cost allocation overheads are attributed to products on the activity base. Traditionally, overhead costs are grouped together under cost centre and then absorbed into product costs on some basis such as direct Labour hours. Activity based costing identifies the activities which cause cost to be incurred and searches for fundamental cost drivers of these activities. Once the activities and their cost drivers have been identified this information can be used to assign overheads to cost objects (e.g. products) which have actually caused cost to be incurred.

TRADITIONAL ABSORPTION COSTING VS ABC

Cost Allocation under Traditional and Activity Based Costing System In traditional absorption costing overheads are first related to cost centres (Production & Service Centres) and then to cost objects, i.e., products. In ABC overheads are related to activities or grouped into cost pools. Then they are related to the cost objects, e.g., products. The two processes are, therefore, very similar, but the first stage is different, as ABC uses activities instead of functional departments (cost centres).

Difference between Activity Based Costing and Traditional Absorption Costing

Activity Based Costing	Traditional Absorption Costing
1. Overheads are related to activities and grouped into activity cost pools.	**1.** Overheads are related to cost centres / departments.

2. Costs are related to activities and hence are more realistic.	**2.** Costs are related to cost centres and hence not realistic of cost behaviour.
3. Activity–wise cost drivers are determined.	**3.** Time (Hours) are assumed to be the only cost driver governing costs in all departments.
4. Activity–wise recovery rates are determined and there is no concept of a single overhead recovery rate.	**4.** Either multiple overhead recovery rates (for each department) or a single overhead recovery rate may be determined for absorbing overheads.
5. Cost are assigned to cost objects, e.g., customers, products, services, departments, etc.	**5.** Costs are assigned to Cost Units i.e., to products, or jobs or hours.
6. Essential activities can be simplified and unnecessary activities can be eliminated. Thus, the corresponding costs are also reduced/ minimized. Hence ABC aids cost control.	**6.** Cost Centres/ departments cannot be eliminated. Hence, not suitable for cost control.

LEVEL OF ACTIVITIES UNDER ABC METHODOLOGY/COST HIERARCHY

These categories are generally accepted today, but were first identified by Cooper (1990). The categories of activities help to determine the type of activity cost driver required.

The categories of activities are:

Level of Activities	Meaning	Example
Unit level activities	These are those activities for which the consumption of resources can be identified with the number of units produced.	• The use of indirect materials/consumables tends to increase in proportion to the number of units produced. • The inspection or testing of every item produced, if this was deemed necessary or, perhaps more likely, every 100th item produced.
Batch level activities	The activities such as setting up of a machine or processing a purchase order are performed each time a batch of goods is produced. The cost of batch related	• Material ordering–where an order is placed for every batch of production • Machine set-up costs–where machines need resetting between each different batch of production.

	activities varies with number of batches made, but is common (or fixed) for all units within the batch.	• Inspection of products where the first item in every batch is inspected rather than every 100th item quoted above.
Product level activity	These are the activities which are performed to support different products in product line	• Designing the product, • Producing parts specifications • Keeping technical drawings of products up to date.
Facilities level activities	These are the activities which cannot be directly attributed to individual products. These activities are necessary to sustain the manufacturing process and are common and joint to all products manufactured	• Maintenance of buildings • Plant security

STAGES IN ACTIVITY BASED COSTING (ABC)

The different stages in ABC calculations are listed below:

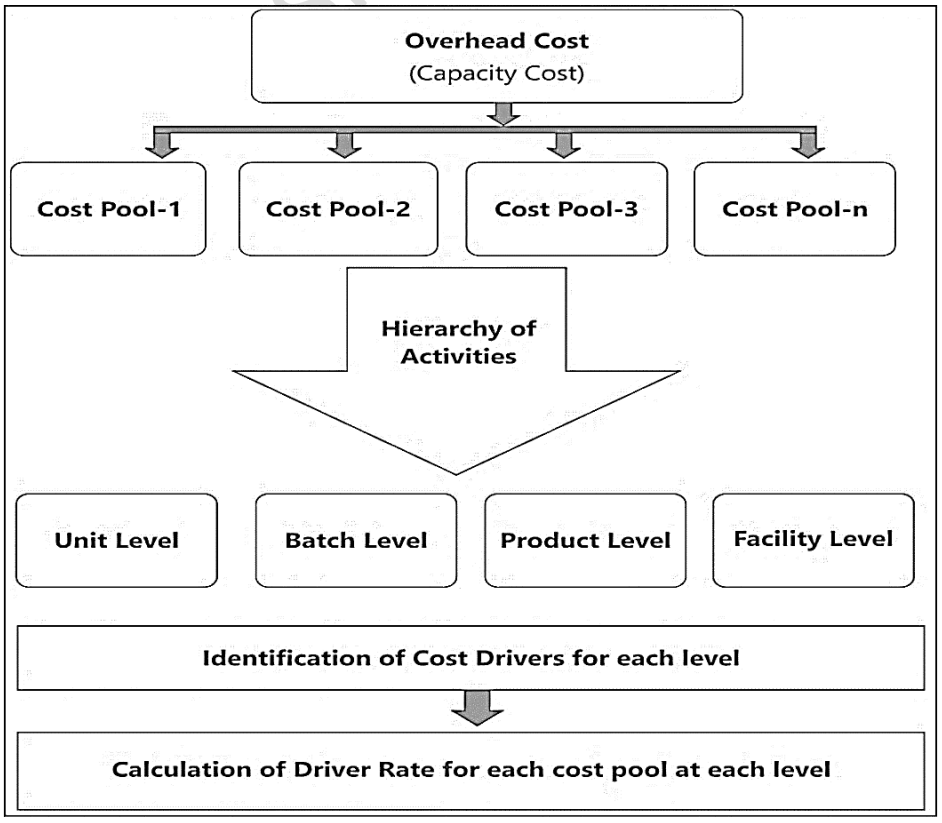
1. **Identify the different activities within the organization:**
   Usually, the number of cost centres that a traditional overhead system uses is quite small, say up to fifteen. In ABC, the number of activities will be much more, say 200; the exact number will depend on how the management subdivides the organization's activities. It is possible to break the organization down into many very small activities. But if ABC is to be acceptable as practical system it is necessary to use larger groupings, say, 40 activities may be used in practice. The additional number of activities over cost centres means that ABC should be more accurate than the traditional method regardless of anything else. Some activities may be listed as follows: -
   - Production schedule changes
   - Customer liaison
   - Purchasing
   - Production process set up
   - Quality control
   - Material handling
   - Maintenance
2. **Relate the overheads to the activities**, both support and primary, that caused them. This creates **'cost pools' or 'cost buckets**. This will be done using resource cost drivers that reflect causality.

3. **Support activities are then spread across the primary activities** on some suitable base, which reflects the use of the support activity. The base is the cost driver that is the measure of how the support activities are used.
4. **Determine the activity cost drivers** that will be used to relate the overheads collected in the cost pools to the cost objects/products. This is based on the factor that drives the consumption of the activity. The question to ask is – what causes the activity to incur costs? In production scheduling, for example, the driver will probably be the number of batches ordered.
5. **Calculate activity cost driver rates for each activity**, just as an overhead absorption rate would be calculated in the traditional system.

$$\text{Activity cost driver rate} = \frac{\text{Total cost of activity}}{\text{Activity driver}}$$

The activity driver rate can be used not only to identify cost of products, as in traditional absorption costing, but it can also be used for costing other cost objects such as customers/customer segments and distribution channels. The possibility of costing objects other than products is part of the benefit of ABC. The activity cost driver rates will be multiplied by the different amounts of each activity that each product/other cost object consumes.

The process of calculating cost driver rate is illustrated in diagrammatic presentation as below:



ADVANTAGES OF ACTIVITY BASED COSTING

The main advantages of using Activity Based Costing are:

i. More accurate costing of products/services.

ii. Overhead allocation is done on logical basis.

iii. It enables better pricing policies by supplying accurate cost information.

iv. Utilizes unit cost rather than just total cost

v. Help to identify non-value added activities which facilitates cost reduction.

vi. It is helpful to the organizations with multiple products.

vii. It highlights problem areas which require attention of the management.

LIMITATIONS OF ACTIVITY BASED COSTING

The main limitations using Activity Based Costing are:

i. It is more expensive, particularly in comparison with traditional costing system.

ii. It is not helpful to the small organizations.

iii. It may not be applied to organizations with limited products.

iv. Selection of the most suitable cost driver may not be easy/ may be difficult or complicated.

REQUIREMENTS IN ABC IMPLEMENTATION

A number of distinct practical stages are required in the ABC implementation which are given as below:

1. **Staff Training:** The co-operation of the workforce is critical to the successful implementation of ABC. Staff training should be done to create an awareness on the purpose of ABC.
2. **Process Specification:** Informal, but structured interviews with key members of personnel will identify the different stages of the production process, the commitment of resources to each, processing times and bottlenecks.
3. **Activity Definition:** The activities must be defined clearly in the early stage in order to manage the problems, if any, effectively. There might be overloading of information from the new data, but the same is needed in codification.
4. **Activity Driver Selection:** Cost driver for each activity shall be selected.
5. **Assigning Cost:** A single representative activity driver can be used to assign costs from the activity pools to the cost objects.

PRACTICAL APPLICATIONS OF ACTIVITY BASED COSTING

As a Decision-Making Tool

ABC can act as a decision making tool in the following ways:

i. ABC along with some other cost management technique can be utilized to improve performance and profitability of an organization.

ii. Wholesale distributors can gain significant advantage in the decision- making process through implementation of ABC concepts by correlating costs to various activities. Introduction of new product or vendor can be better decided through ABC.

iii. ABC can assist in decisions related to facility and resource expansion. Often the basis for relocation or opening of a new distribution center is based on **cost associations.** Reduction in freight or other logistic costs can offset the expense of the new facility, staff or equipment. The **ABC model** can identify the specific cost elements being targeted, providing a much clearer picture which aids in management actions.

iv. ABC augments decision support for human resources. Since the activity (and therefore costs) can be associated to an individual, new levels of financial performance can be determined. This might be evident in the case of branch management or sales.

v. Companies who wish to determine price based on cost plus markup basis find ABC method of costing very relevant and are able to determine competitive prices for their products.

As Activity Based Management

Meaning of Activity Based Management

The term Activity Based Management (ABM) is used to describe the cost management application of ABC**. The use of ABC as a costing tool to manage costs at activity level is known as Activity Based Management (ABM).** ABM is a discipline that focuses on the efficient and effective management of activities as the route to continuously improving the value received by customers. ABM utilizes cost information gathered through ABC.

Various analysis in Activity Based Management

The various types of analysis involved in ABM are as follows:

1. **Cost Driver Analysis:** The factors that cause activities to be performed need to be identified in order to manage activity costs. Cost driver analysis identifies the causal factors.
2. **Activity Analysis.**
   a. **Value-Added Activities (VA):** The value-added activities are those activities which are indispensable in order to complete the process. The customers are usually willing to pay (in some way) for these services. For example, polishing furniture by a manufacturer dealing in furniture is a value added activity.
   b. **Non-Value-Added Activities (NVA):** The NVA activity **represents work that is not valued by the external or internal customer**. NVA activities do not improve the quality or function of a product or service, but they can adversely affect costs and prices. Moving materials and machine set up for a production run are examples of NVA activities.
3. **Performance Analysis:** Performance analysis involves the **identification of appropriate measures to report the performance of activity centres** or other organizational units, consistent with each unit's goals and objectives.

Activity Based Management in Business

Activity Based Management can be used in the following ways

i. **Cost Reduction**: ABM helps the organisation to identify costs against activities and to find opportunities to streamline or reduce the costs or eliminate the entire activity, especially if there is no value added.

ii. **Business Process Re-engineering**: Business process re-engineering **involves examining business processes and making substantial changes to how organisation currently operates**. ABM is a powerful tool for measuring business performance, determining the cost of business output and is used as a means of identifying opportunities to improve process efficiency and effectiveness.

iii. **Benchmarking**: Benchmarking is a process of **comparing of ABC-derived activity costs of one segment of company with those of other segments**. It requires uniformity in the definition of activities and measurement of their costs.

iv. **Performance Measurement:** Many organisations are now focusing on activity performance as a means of facing competitors and managing costs by monitoring the efficiency and effectiveness of activities.

Area	Measure
Quality of purchased component	Zero defects
Quality of output	% yield
Customer awareness	Orders; number of complaints

Facilitate Activity Based Budgeting

Meaning of Activity Based Budgeting (ABB)

Activity based budgeting **analyse the resource input or cost for each activity**. It provides a framework for estimating the amount of resources required in accordance with the budgeted level of activity. Actual results can be compared with budgeted results to highlight both, in financial and non-financial terms, those activities with major discrepancies from budget for potential reduction in supply of resources. It is a planning and control system which seeks to support the objectives of continuous improvement. It means planning and controlling the expected activities of the organization to derive a cost-effective budget that meet forecast workload and agreed strategic goals. ABB is the reversing of the ABC process to produce financial plans and budgets.

Key Elements of ABB

The three key elements of activity based budgeting are as follows:-

- Type of work to be done
- Quantity of work to be done
- Cost of work to be done

Benefits of ABB

Few benefits of activity based budgeting are as follows:-

i. Activity Based Budgeting (ABB) can enhance accuracy of financial forecasts and increasing management understanding.

ii. When automated, ABB can rapidly and accurately produce financial plans and models based on varying levels of volume assumptions.

iii. ABB eliminates much of the needless rework created by traditional budgeting techniques.

Factors management consider in choosing a capacity level to compute the budgeted fixed overhead cost rate:

- Effect on product costing & capacity management
- Effect on pricing decisions.
- Effect on performance evaluation
- Effect on financial statements
- Regulatory requirements.
- Difficulties in forecasting.

QUESTIONS FOR CLASSROOM DISCUSSION

PROBLEM – 1

Indirect expenses expended by a Machine shop in a factory during a period amounted to ₹ 1,00,000. The machine running time for the period is 10,000 hours. The details of the utilization of the machine time are as follows:

PRODUCT	PRODUCTION	MACHINE TIMES
A	200 units	5000 hours
B	100 units	5000 hours

Trace the overhead cost per unit to the two products using the Traditional overhead absorption system.

The company collected more details relating to the activities performed by its Machine shop to enable tracing indirect costs using the ABC system.

ACTIVITY	COST POOL	COST DRIVER	COST DRIVER CONSUMPTION	
			Product A	Product B
Machine running	₹ 60,000	Machine hours	5000 hrs	5000 hrs
Set up	₹ 15,000	Setup time	3000 hrs	2000 hrs
Inspection	₹ 25,000	Inspection time	1500 hrs	3500 hrs
Total	**₹ 1,00,000**			

Trace the overhead cost per unit to the two products using the ABC system.

PROBLEM – 2

Having attended a CIMA course on Activity-Based Costing (ABC) you decide on an experiment by applying the principles of ABC to the four products currently made and sold by your company. Details of the four products and relevant information are given below for one period:

PRODUCT	A	B	C	D
Output in units	120	100	80	120
Costs per unit:				
Direct materials	₹ 40	₹ 50	₹ 30	₹ 60
Direct labour	₹ 28	₹ 21	₹ 14	₹ 21
Machine hours (per unit)	4	3	2	3

The four products are similar and are usually produced in production runs of 20 units and sold in batches of 10 units.

Using a machine hour rate currently absorb the production overhead, and the total of the production overhead for the period has been analysed as follows:

PARTICULARS	AMOUNT
Machine department costs (rent, depreciation and supervision)	₹ 10,430
Setup costs	₹ 5,250
Stores receiving	₹ 3,600
Inspection/Quality control	₹ 2,100
Materials handling and dispatch	₹ 4,620
Total	**₹ 26,000**

You have ascertained that the 'cost drivers' to be used are as listed below for the overhead cost shown:

COST	COST DRIVER
Set up costs	Number of production runs
Stores receiving	Requisition raised
Inspection/Quality control	Number of production runs
Materials handling and dispatch	Orders executed

The number of requisitions raised on the stores was 20 for each product and the number of orders executed was 42, each order being for a batch of 10 of a product.

You are required:

a. To calculate the total costs for each product if all overhead costs are absorbed on a machine hour basis;

b. To calculate the total costs for each product, using activity-based costing;

c. To calculate and list the unit product cost from your figures in a. and b. above, to show the differences and to comment briefly on any conclusions, which may be drawn which could have pricing and profit implications.

PROBLEM – 3

ABC Ltd. Manufactures two types of machinery equipment Y and Z and applies/absorbs overheads on the basis of direct-labour hour. The budgeted overheads and direct-labour hours for the month of December, 20x1 are ₹ 12,42,500 and 20,000 hours respectively.

The information about Company's products is as follows:

PARTICULARS	EQUIPMENT Y	EQUIPMENT Z
Budgeted Production volume	2,500 units	3,125 units
Direct Material cost	300 per unit	450 per unit
Direct labour cost		
Y : 3 hours @ 150 per hour; Z : 4 hours @ 150 per hour	450	600

ABC Ltd.'s overheads of ₹ 12,42,500 can be identified with three major activities:
Order Processing (₹ 2,10,000), machine processing (₹ 8,75,000), and product inspection (₹ 1,57,500). These activities are driven by the number of orders processed, machine hours worked, and inspection hours, respectively. The data relevant to these activities is as follows:

	ORDERS PROCESSED	MACHINE HOURS WORKED	INSPECTION WORKS
Y	350	23,000	4,000
Z	250	27,000	11,000
Total	600	50,000	15,000

Required:

1. Assuming use of direct-labour hours to absorb/apply overheads to production, compute the unit manufacturing cost of the equipment Y and Z, if the budgeted manufacturing volume is attained.
2. Assuming use of activity-based costing, compute the unit manufacturing costs of the equipment Y and Z, if the budgeted manufacturing volume is achieved.
3. ABC Ltd.'s selling prices are based heavily on cost. By using direct-labour hours as an application base, calculate the amount of cost distortion (under-costed or over-costed) for each equipment.

PROBLEM – 4

Deepak Ltd is a Warehousing and Distribution Company, which receives products from customers, stores the products and then re- packs them for distribution as required. There are three customers for whom the services are provided – John Ltd, George Ltd and Paul Ltd. The products from all three customers are similar in nature but have varying degrees of fragility.

Basic budget information has been gathered for the year to 30 June and is shown in the following table:

CUSTOMER	PRODUCTS HANDLED (CUBIC MTRS)
John Ltd	30,000
George Ltd	45,000
Paul Ltd	25,000

PARTICULARS	COSTS
Packing materials	₹ 19,50,000
Labour :	
- Basic	₹ 3,50,000
- Overtime	₹ 30,000
Occupancy	₹ 5,00,000
Administration and Management	₹ 60,000

Note:

Packing materials are used in re-packing each cubic metre of product for John Ltd, George Ltd and Paul Ltd in the ratio 1:2:3 respectively. This ratio is linked to the relative fragility of the goods for each customer.

Additional information has been obtained in order to enable unit costs to be prepared for each of the three customers using an activity-based costing approach.

The additional information for the year to 30 June has been estimated as follows:

1. Labour and overhead costs have been identified as attributable to each of three work centres - Receipts & Inspection, Storage and Packing as follows:

PARTICULARS	COST ALLOCATION PROPORTIONS		
	RECT & INSP	STORAGE	PACKING
	%	%	%
Labour:			
- Basic	15	10	75
- Overtime	50	15	35
Occupancy	20	60	20
Administration and Management	40	10	50

2. Studies have revealed that the fragility of different goods affects the receipt and inspection time needed for the products for each customer. Storage required is related to the average size of the basic incoming product units from each customer. The re-packing of goods for distribution is related to the complexity of packaging required by each customer.

The relevant requirements per cubic metre of product for each customer have been evaluated as follows:

PARTICULARS	John Ltd	George Ltd	Paul Ltd
Receipt and inspection (minutes)	5	9	15
Storage (sq. mts)	0.3	0.3	0.2
Packing (minutes)	36	45	60

Required:

Calculate the budgeted average cost per cubic metre of packaged products for each customer in each of the following two circumstances:

1. Where only the basic budget information is to be used,
2. Where the additional information enables an activity-based costing approach to be applied.

PROBLEM – 5

Family Store wants information about the profitability of individual product lines: Soft drinks, Fresh produce and Packaged food. Family store provides the following data for the current year for each product line:

	Soft drinks	Fresh produce	Packaged food
Revenues	₹ 39,67,500	₹ 1,05,03,000	₹ 60,49,500
Cost of goods sold	₹ 30,00,000	₹ 75,00,000	₹45,00,000
Cost of bottles returned	₹ 60,000	₹ 0	₹ 0
Number of purchase orders placed	360	840	360
Number of deliveries received	300	2,190	660
Hours of shelf-stocking time	540	5,400	2,700
Items sold	1,26,000	11,04,000	3,06,000

Family store also provides the following information for the current year:

Activity	Description of activity	Total Cost ₹	Cost-allocation base
Bottles returns	Returning of empty bottles	60,000	Direct tracing to soft drink line

Ordering	Placing of orders for purchases	7,80,000	1,560 purchase orders
Delivery	Physical delivery and receipt of goods	12,60,000	3,150 deliveries
Shelf stocking	Stocking of goods on store shelves and on- going restocking	8,64,000	8,640 hours of shelf-stocking time
Customer Support	Assistance provided to customers including check-out	15,36,000	15,36,000 items sold

Required:

i. Family store currently allocates support cost (all cost other than cost of goods sold) to product lines on the basis of cost of goods sold of each product line. CALCULATE the operating income and operating income as a % of revenues for each product line.

ii. If Family Store allocates support costs (all costs other than cost of goods sold) to product lines using and activity-based costing system, CALCULATE the operating income and operating income as a % of revenues for each product line.

PROBLEM – 6

RST Limited specializes in the distribution of pharmaceutical products. It buys from the pharmaceutical companies and resells to each of the three different markets.

I. General Supermarket Chains

II. Drugstore Chains

III. Chemist Shops

The following data for the month of April, 20x1 in respect of RST Limited has been reported:

PARTICULARS	**GENERAL SUPERMARKET CHAINS**	**DRUGSTORE CHAINS**	**CHEMIST SHOPS**
Average revenue per delivery	₹ 84,975	₹ 28,875	₹ 5,445
Average cost of goods sold per delivery	₹ 82,500	₹ 27,500	₹ 4,950
Number of deliveries	330	825	2,750

In the past, RST Limited has used gross margin percentage to evaluate the relative profitability of its distribution channels.

The company plans to use activity-based costing for analysing the profitability of its distribution channels.

The Activity analysis of RST Limited is as under:

ACTIVITY AREA	COST DRIVER
Customer purchase order processing	Purchase orders by customers
Line-items ordering	Line-items per purchase order
Store delivery	Store deliveries
Cartons dispatched to a stores	Cartons dispatched to a store per delivery
Shelf-stocking at customers store	Hours of shelf-stocking

The April, 20x1 operating costs (other than cost of goods sold) of RST Limited are ₹ 8,27,970. These operating costs are assigned to five activity areas. The cost in each area and the quantity of the cost allocation basis used in that area for April, 20x1 are as follows:

Activity Area	Total costs in April, 20x1	Total Units of Cost Allocation Base used in April, 20x1
Customer purchase order processing	₹ 2,20,000	5,500 orders
Line-item ordering	₹ 1,75,560	58,520 line items
Store delivery	₹ 1,95,250	3,905 store deliveries
Cartons dispatched to stores	₹ 2,09,000	2,09,000 cartons
Shelf-stocking at customer store	₹ 28,160	1,760 hours

Other data for April, 20x1 include the following:

PARTICULARS	GENERAL SUPERMARKET CHAINS	DRUGSTORE CHAINS	CHEMIST SHOPS
Total number of orders	385	990	4,125
Average number of line items per order	14	12	10
Total number of store deliveries	330	825	2,750
Average number of cartons shipped per store delivery	300	80	16
Average number of hours of shelf-stocking per store delivery	3	0.6	0.1

Required:

i. COMPUTE for April, 20x1 gross-margin percentage each of its three distribution channels and compute RST Limited's operating income.

ii. COMPUTE the April, 20x1 rate per unit of the cost-allocation base for each of the five activity areas.

iii. COMPUTE the operating income of each distribution channel in April, 20x1 using the activity-based costing information. Comment on the results. What new insights are available with the activity-based cost information?

iv. DESCRIBE four challenges one would face in assigning the total April, 20x1 operating costs of ₹ 8,27,970 to five activity areas

PROBLEM – 7

'Humara - Apna' bank offers three products, viz., deposits, Loans and Credit Cards. The bank has selected 4 activities for a detailed budgeting exercise, following activity-based costing methods.

The bank wants to know the product wise total cost per unit for the selected activities, so that prices may be fixed accordingly.

The following information is made available to formulate the budget:

Activity	**Present Cost** ₹	**Estimation for the budget period**
ATM Services:		
a. Machine Maintenance	4,00,000	All fixed, no change.
b. Rents	2,00,000	Fully fixed, no change.
c. Currency Replenishment Cos	1,00,000	Expected to double during budget period
	7,00,000	(This activity is driven by no. of ATM transactions)
Computer Processing	5,00,000	Half this amount is fixed and no change is expected. The variable portion is expected to increase to three times the current level. (This activity is driven by the number of computer transactions)
Issuing Statements	18,00,000	Presently, 3 lakh statements are made. In the budget period, 5 lakh statements are expected. For every increase of one lakh statement, one lakh rupees is the budgeted increase. (This activity is driven by the number of statements)

Computer Inquiries	2,00,000	Estimated to increase by 80% during the budget period. (This activity is driven by telephone minutes)

The activity drivers and their budgeted quantifies are given below:

Activity Drivers	Deposits	Loans	Credit Cards
No. of ATM Transactions	1,50,000	---	50,000
No. of Computer Processing Transactions	15,00,000	2,00,000	3,00,000
No. of Statements to be issued	3,50,000	50,000	1,00,000
Telephone Minutes	3,60,000	1,80,000	1,80,000

The bank budgets a volume of 58,600 deposit accounts, 13,000 loan accounts, and 14,000 Credit Card Accounts.

Required:

- CALCULATE the budgeted rate for each activity.
- PREPARE the budgeted cost statement activity wise.
- COMPUTE the budgeted product cost per account for each product using (i) and (ii) above.

PROBLEM – 8

MST Limited has collected the following data for its two activities. It calculates activity cost rates based on cost driver capacity.

ACTIVITY	COST DRIVER	KILOWATT HOURS	COST
Power	Kilowatt hours	50,000 kilowatt hours	₹ 2,00,000
Quality inspections	Number of inspections	10,000 inspections	₹ 3,00,000

The company makes three products M, S and T. For the year ended March 31, 20x1, the following consumption of cost drivers was reported:

PRODUCT	KILOWATT HOURS	QUALITY INSPECTIONS
M	10,000	3,500
S	20,000	2,500
T	15,000	3,000

Required:

I. COMPUTE the costs allocated to each product from each activity.

II. CALCULATE the cost of unused capacity for each activity.

III. DISCUSS the factors the management considers in choosing a capacity level to compute the budgeted fixed overhead cost rate.

ADDITIONAL QUESTIONS FOR PRACTICE

QFP 1 (Concept Similar to Problem – 2)

ABC Ltd. is a multiproduct company, manufacturing three products A, B and C. The budgeted costs and production for the year ending 31st March are as follows:

	A	B	C
Production quantity (Units)	4,000	3,000	1,600
Resources per Unit:			
- Direct Materials (Kg.)	4	6	3
- Direct Labour (Minutes)	30	45	60

The budgeted direct labour rate was Rs. 10 per hour, and the budgeted material cost was Rs. 2 per kg. Production overheads were budgeted at Rs.99,450 and were absorbed to products using the direct labour hour rate. ABC Ltd. followed the Absorption Costing System.

ABC Ltd. is now considering to adopt an Activity Based Costing system. The following additional information is made available for this purpose.

Budgeted overheads were analysed into the following:

	₹
Material handling	29,100
Storage costs	31,200
Electricity	39,150

The cost drivers identified were as follows:

Material handling	Weight of material handled
Storage costs	Number of batches of material
Electricity	Number of Machine operations

Data on Cost Drivers was as follows:

	A	B	C
For complete production:			
Batches of material	10	5	15
Per unit of production:			
Number of Machine operations	6	3	2

You are requested to:

1. PREPARE a statement for management showing the unit costs and total costs of each product using the absorption costing method.
2. PREPARE a statement for management showing the product costs of each product using the ABC approach.
3. STATE what are the reasons for the different product costs under the two approaches?

QFP 2 (Concept Similar to Problem – 2)

RST Limited specializes in the distribution of pharmaceutical products. It buys from the pharmaceutical companies and resells to each of the three different markets.

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ii. Drugstore Chains
iii. Chemist Shops

The following data for the month of April in respect of RST Limited has been reported:

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Average cost of goods sold per delivery	82,500	27,500	4,950
Number of deliveries	330	825	2,750

In the past, RST Limited has used gross margin percentage to evaluate the relative profitability of its distribution channels.

The company plans to use activity–based costing for analysing the profitability of its distribution channels.

The Activity analysis of RST Limited is as under:

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Line-item ordering	Line-items per purchase order
Store delivery	Store deliveries
Cartons dispatched to stores	Cartons dispatched to a store per delivery
Shelf-stocking at customer store	Hours of shelf-stocking

The April month's operating costs (other than cost of goods sold) of RST Limited are Rs. 8,27,970. These operating costs are assigned to five activity areas. The cost in each area and the quantity of the cost allocation basis used in that area for the month of April are as follows:

Activity Area	Total costs ₹	Total Units of Cost Allocation Base
Customer purchase order processing	2,20,000	5,500 orders
Line-item ordering	1,75,560	58,520 - line items
Store delivery	1,95,250	3,905 store deliveries
Cartons dispatched to store	2,09,000	2,09,000 cartons
Shelf-stocking at customer store	28,160	1,760 hours

Other data for the month of April include the following:

	General Supermarket Chains	Drugstore Chains	Chemist Shops
Total number of orders	385	990	4,125
Average number of line items per order	14	12	10
Total number of store deliveries	330	825	2,750
Average number of cartons shipped per store delivery	300	80	16
Average number of hours of shelf-stocking per store delivery	3	0.6	0.1

Required:

1. COMPUTE gross-margin percentage for each of its three distribution
2. channels and compute RST Limited's operating income.
3. COMPUTE the rate per unit of the cost-allocation base for each of the five activity areas.
4. COMPUTE the operating income of each distribution channel using the activity-based costing information. Comment on the results. What new insights are available with the activity-based cost information?
5. DESCRIBE four challenges one would face in assigning the total operating costs of Rs. 8,27,970 to five activity areas.

QFP 3 (Concept Similar to Problem – 5)

Alpha Limited has decided to analyse the profitability of its five new customers. It buys bottled water at Rs. 90 per case and sells to retail customers at a list price of Rs. 108 per case. The data pertaining to five customers are:

	Customers				
	A	B	C	D	E
Cases sold	4,680	19,688	1,36,800	71,550	8,775
Listed Selling Price	₹108	₹108	₹108	₹108	₹108
Actual Selling Price	₹108	₹106.20	₹99	₹104.40	₹97.20
Number of Purchase orders	15	25	30	25	30
Number of Customer visits	2	3	6	2	3
Number of deliveries	10	30	60	40	20
Kilometres travelled per delivery	20	6	5	10	30
Number of expedited deliveries	0	0	0	0	1

Its five activities and their cost drivers are:

Activity	**Cost Driver Rate**
Order taking	₹750 per purchase order
Customer visits	₹ 600 per customer visit
Deliveries	₹ 5.75 per delivery Km travelled
Product handling	₹ 3.75 per case sold
Expedited deliveries	₹2,250 per expedited delivery

Required:

1. COMPUTE the customer-level operating income of each of five retail customers now being examined (A, B, C, D and E). Comment on the results.
2. STATE what insights are gained by reporting both the list selling price and the actual selling price for each customer.

QFP 4 (General sum with tricky calculation)

BABYSOFT is a global brand created by Bio-organic Ltd. The company manufactures three ranges of beauty soaps i.e. BABYSOFT- Gold, BABYSOFT- Pearl, and BABYSOFT- Diamond. The budgeted costs and production for the month of December are as follows:

	BABYSOFT Gold	**BABYSOFT Pearl**	**BABYSOFT Diamond**
Production of soaps (Units)	4,000	3,000	2,000

Resources per Unit:	**Qty**	**Rate ₹**	**Qty**	**Rate ₹**	**Qty**	**Rate ₹**
Essential Oils	60 ml	200 / 100ml	55 ml	300 / 100 ml	65 ml	300 / 100 ml
Cocoa Butter	20 g	200 / 100 g	20 g	200 / 100 g	20 g	200 / 100 g
Filtered Water	30 ml	15 / 100ml	30 ml	15 / 100 ml	30 ml	15 / 100 ml
Chemicals	10 g	30 / 100g	12 g	50 / 100 g	15 g	60 / 100 g
Direct Labour	30 minutes	10 / hour	40 minutes	10 / hour	60 minutes	10 / hour

Bio-organic Ltd. followed an Absorption Costing System and absorbed its production overheads, to its products using direct labour hour rate, which were budgeted at Rs. 1,98,000.
Now, Bio-organic Ltd. is considering adopting an Activity Based Costing system.

For this, additional information regarding budgeted overheads and their cost drivers is provided below:

Particulars	₹	**Cost drivers**
Forklifting cost	58,000	Weight of material lifted
Supervising cost	60,000	Direct labour hours
Utilities	80,000	Number of Machine operations

The number of machine operations per unit of production are 5, 5, and 6 for BABYSOFT- Gold, BABYSOFT- Pearl, and BABYSOFT- Diamond respectively.
(Consider (i) Mass of 1 litre of Essential Oils and Filtered Water equivalent to
0.8 kg and 1 kg respectively (ii) Mass of output produced is equivalent to the mass of input materials taken together.)

You are requested to:

1. PREPARE a statement showing the unit costs and total costs of each product using the absorption costing method.
2. PREPARE a statement showing the product costs of each product using the ABC approach. STATE what are the reasons for the different product costs under the two approaches.

CHAPTER 05: COST ACCOUNTING SYSTEM

INTRODUCTION

Where cost and financial accounting records are integrated, the system so evolved is known as integrated or integral accounting system. In case cost and financial transactions are kept separately, the system is called Non-Integrated Accounting system or Cost Control System. While non-integrated system of accounting necessitates reconciliation between financial and cost accounts but no reconciliation is required under integrated accounting system.

NON-INTEGRATED ACCOUNTING SYSTEM

It is a system of accounting under which separate ledgers are maintained for both cost and financial accounts. This system is also known as cost ledger accounting system. Non-Integrated accounting systems contain fewer accounts as compared to financial accounting system due to the exclusion of purchases, expenses and also Balance Sheet items like fixed assets, debtors and creditors. Items of accounts which are excluded are represented by an account known as Cost ledger control account. The main accounts which are usually prepared when a separate Cost Ledger is maintained are as follows:

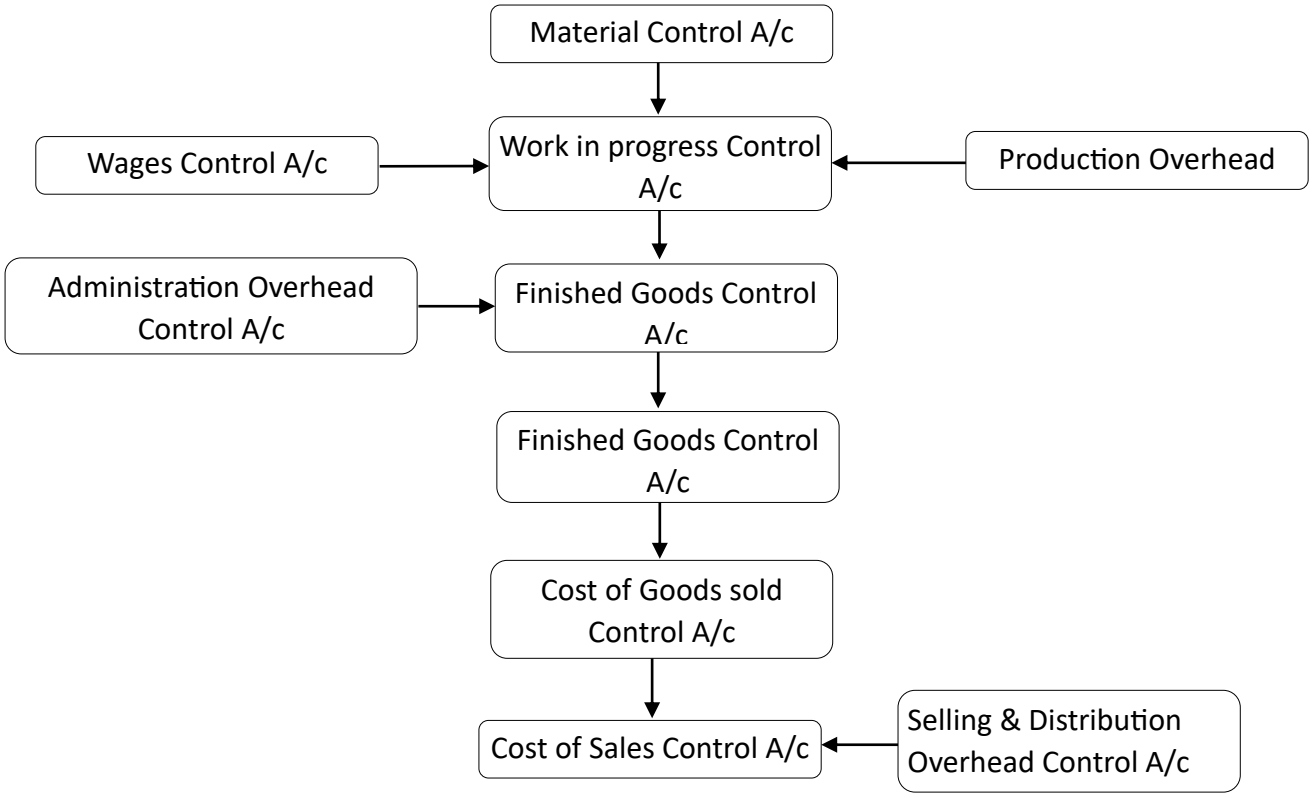
1. **Cost Ledger Control Account -** This account is also known as General Ledger Adjustment Account. This account is made to complete double entry. All items of expenditure are credited to this account. Sales are debited to this account and net profit/loss from Costing Profit & Loss Account is transferred to this account. The balance in this account at the end of the particular period represents the net total of all the balances of the impersonal accounts.
2. **Stores Ledger Control Account** – This account is debited for the purchase of material and credited for issue of materials from the stores. 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 & Loss Account. Entries are made on the basis of goods received notes and stores requisitions etc.
3. **Wages Control Account -** This account is debited with total wages paid (direct and indirect). 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.
4. **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 (absorbed) is credited to this Account. The difference

between overhead incurred and overhead recovered (i.e., Under Absorption or Over Absorption of Overheads) is transferred to Overheads Adjustment Account.

5. **Work-in-Process Control Account** - This account is debited with the total cost of production, which includes—direct materials, direct employee, direct expenses, production overhead recovered, and is credited with the amount of finished goods completed and transferred. The balance in this account represents total balances of jobs/works-in-process, as shown by several job accounts.
6. **Administrative Overhead Control Account** - This account is debited with overheads 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.
7. **Finished Goods Control Accounts** - This account is debited with the value of goods transferred from Work-in-process Control Account and 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.
8. **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. The difference between overheads incurred and recovered is transferred usually to Overhead Adjustment Account.
9. **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. The balance of this account is ultimately transferred to Sales Account or Costing Profit & Loss Account.
10. **Costing Profit & Loss Account** – This account is debited with cost of sales, 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.
11. **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.

Note: Sometimes, Overhead Adjustment Account is dispensed with and under/over absorbed overheads is directly transferred to Costing Profit & Loss Account from the respective overhead accounts.



INTEGRATED (OR INTEGRAL) ACCOUNTING SYSTEM

Integrated Accounts is the name given to a system of accounting, whereby **cost and financial accounts are 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 meet out fully the information requirement for Costing as well as for Financial Accounts. For Costing it provides information useful for ascertaining the cost of each product, job, process and operation of any other identifiable activity and for carrying necessary analysis. **Integrated accounts provide relevant information which is necessary for preparing profit and loss account and the balance sheet** as per the requirement of law and also helps in exercising effective control over the liabilities and assets of its business.

Advantages

The main advantages of Integrated Accounts are as follows:

a. **No need for Reconciliation**- The question of reconciling costing profit and financial profit does not arise, as there is only one figure of profit.
b. **Less efforts**- Due to use of one set of books, there is a significant saving in efforts made.
c. **Less time consuming**- No delay is caused in obtaining information as it is provided from books of original entry.
d. **Economical process**- It is economical also as it is based on the concept of "Centralization of Accounting function".

Essential pre-requisites for Integrated Accounts

The essential pre-requisites for integrated accounts include the following steps:

1. 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 prefers full integration of the entire accounting records.

2. A suitable coding system must be made available so as to serve the accounting purposes of financial and cost accounts.
3. An agreed routine, with regard to the treatment of provision for accruals, prepaid expenses, other adjustment necessary for preparation of interim accounts.
4. Perfect coordination should exist between the staff responsible for the financial and cost aspects of the accounts and an efficient processing of accounting documents should be ensured.

Under this system there is no need for a separate cost ledger. Of course, there will be a number of subsidiary ledgers; in addition to the useful Customers' Ledger and the Purchase Ledger, there will be: a. Stores Ledger; b. Stock Ledger and c. Job Ledger.

Features of Integrated Accounting System

Following are the main points of integrated accounting:

a. Complete analysis of cost and sales are kept.
b. Complete details of all payments in cash are kept
c. Complete details of all assets and liabilities are kept and this system does not use a notional account to represent all impersonal accounts

In non-integrated system, a cost ledger control account or general ledger adjustment account is used in cost ledger. But in the integrated accounting system, **general ledger adjustment account is eliminated** and detailed accounts for assets and liabilities are maintained. In other words, following accounts are used for "General Ledger Adjustment Account/ Cost Ledger Control Account" of non-integrated system:

a. Bank account
b. Receivables (Debtors) account
c. Payables (Creditors) account
d. Provision for depreciation account etc.

In integrated system, all accounts necessary for showing classification of cost will be used but **the cost ledger control account of non-integrated accounting is replaced by use of following accounts**:

a. Bank account
b. Receivables (Debtors) account
c. Payables (Creditors) account
d. Provision for depreciation account
e. Fixed assets account
f. Share capital account

RECONCILIATION OF COST AND FINANCIAL ACCOUNTS

When the cost and financial accounts are kept separately, it is imperative that these should be reconciled to make the cost accounts reliable. It is necessary for reconciliation of the two sets of accounts that sufficient details are available to locate the differences and the reasons for the same. It is, therefore, important that in the financial accounts, the expenses should be analysed in the same way as in the cost accounts.

The General Ledger Adjustment Account in the Cost Ledger may be studied to know the items which are included here and how differently these are presented in the financial accounts. The reconciliation of the balances of two sets of accounts is possible by preparing a Memorandum Reconciliation Account. In this account, the items charged in one set of accounts but not in the other or those charged in excess as compared to the other are identified and collected. These items of differences are either added or subtracted from the profit as shown by one of the accounts. Finally, the profits from two sets of accounts are reconciled. The procedure is similar to those which are followed for reconciling bank balance as per bank ledger with the balance as shown in bank statement.
It is important, however, to know the causes which, generally, give rise to differences in the Cost and Financial Accounts.

Causes of differences in Financial and Cost Accounts

1. **Items included in Financial Accounts only-**
   a. **Purely Financial Expenses:**
      i. Interest on loans or bank mortgages.
      ii. Expenses and discounts on issue of shares, debentures etc.
      iii. Other capital losses i.e., loss by fire not covered by insurance etc.
      iv. Losses on the sales of fixed assets and investments
      v. Income tax, donations, subscriptions
      vi. Expenses of the company's share transfer office, if any.

   b. **Purely Financial Income**
      i. Interest received on bank deposits, loans and investments
      ii. Dividends received
      iii. Profits on the sale of fixed assets and investments
      iv. Transfer fee received.
      v. Rent receivables

2. **Item included in Cost Accounts only (notional expenses):**
   i. Charges in lieu of rent where premises are owned

ii. Interest on capital at notional figure though not incurred

iii. Salary for the proprietor at notional figure though not incurred

iv. Notional Depreciation on the assets fully depreciated for which book value is nil.

3. Items whose treatment is different in the two sets of accounts:

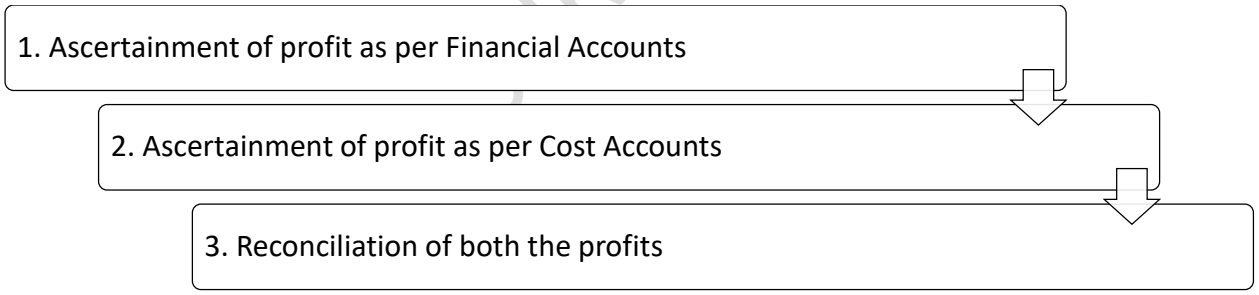
The objective of cost accounting is to provide information to management for decision making and control purposes while financial accounting conforms to external reporting requirements. Hence there are chances that certain items are treated differently in the two sets of accounts. For example, LIFO method for inventory valuation is not recommended by Accounting Standards for Financial Reporting purpose but this method may be adopted for cost accounting purpose if management feels it suitable for making any decision. Similarly cost accounting may use a different method of depreciation than what is allowed under financial accounting.

4. 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.



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.

QUESTIONS FOR CLASSROOM DISCUSSION

PROBLEM – 1

During the month of January the following transactions took place in A Co. Ltd:

PARTICULARS	AMOUNT
1. Material purchased:	
a. Credit purchases	₹ 9,000
b. Credit purchases for special job	₹ 400
c. Cash purchases	₹ 1,000
2. Returns to suppliers	₹ 500
3. Direct materials issued to production	₹ 6,000
4. Indirect materials issued	₹ 600
5. Materials return from production to stores	₹ 100
6. Materials transferred from Job No. 10 to Job No. 11	₹ 200

You are required to enter the transactions in the cost books.

PROBLEM – 2

Enter the following transactions in cost books:

PARTICULARS	AMOUNT	AMOUNT
Gross wages		₹ 10,000
Less: Deductions -		
Employees' State insurance	₹ 230	
Employees' provident fund	₹ 800	
Income-tax	₹ 200	₹ 1,230
Net cash		₹ 8,770

Provide employer's contribution to E.S.I. ₹ 250 and provident fund ₹ 800

The following particulars are obtained from the wages analysis book:

PARTICULARS	AMOUNT
Wages paid to direct Labour	₹ 8,000
Salaries paid to production staff	₹ 1,050
Salaries paid to administration staff	₹ 800
Salaries paid to selling and distribution staff	₹ 1,200

PROBLEM – 3

The following information is obtained from X Co., Ltd., during April, 20x1 –

PARTICULARS	AMOUNT (₹)
1. Overhead is incurred as under -	
a. Service supplied by creditors	**5,000**
b. Petty cash expenditure for miscellaneous expenses	**200**
Analysis of service reveals -	
Production overhead	2,000
Administration overhead	1,000
Selling and distribution overhead	2,000
Analysis of petty cash reveals -	
Production overhead	120
Administration overhead	10
Selling and distribution overhead	70
2. Overhead is absorbed as under -	
a. Production overhead	**1,900**
b. Administration overhead	**1,050**
c. Selling and distribution overhead	**2,000**

Enter the above transactions in the cost books.

PROBLEM – 4

The following balances are obtained from the books of XYZ Co., Ltd., on 1.1.20x1:

PARTICULARS	Dr. (₹)	Cr. (₹)
Stores ledger control account	₹ 5,000	
Work-in-progress ledger control account	₹ 2,000	
Finished goods ledger control account	₹ 1,000	
General ledger adjustment account		₹ 8,000
TOTAL	**₹ 8,000**	**₹ 8,000**

The following information is received at the end of the year –

PARTICULARS	AMOUNT	AMOUNT
Purchase for stores		₹ 29,500
Purchase for special jobs		₹ 1,800
Returned to suppliers from stores		₹ 200
Direct wages	₹ 20,500	

Indirect factory wages	₹ 4,500	
Salaries to administration staff	₹ 3,400	
Salaries to selling and distribution staff	₹ 2,400	
Abnormal idle time	₹ 300	₹ 31,100
Direct expense		₹ 2,200
Production expenses		₹ 5,100
Administration expenses		₹ 4,100
Selling and distribution expenses		₹ 2,600
Stores and issued to production		₹ 30,500
Materials lost from stores by theft		₹ 400
Stores issued to maintenance account		₹ 1,300
Production overhead applied to production		20% on prime cost
Administration overhead applied to finished goods		₹ 7,200
Selling and distribution overhead applied to cost of sales		6% on sales value
Finished goods produced during the year		₹ 66,000
Goods sold during the period – at sales value		₹ 80,000
Goods sold during the period – at cost		₹ 69,500

You are required to record the entries in the cost ledger for the year and prepare a trial balance.

PROBLEM – 5

As on 31st March, the following balances existed in a firm's Cost Ledger:

	Dr.	**Cr.**
	₹	**₹**
Stores Ledger Control A/c	3,01,435	
Work-in-Process Control A/c	1,22,365	
Finished Stock Ledger Control A/c	2,51,945	
Manufacturing Overhead Control 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:

	₹
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 to production	77,200

You are required to PASS the Journal Entries; write up the accounts and schedule the balances, stating what each balance represents.

PROBLEM – 6

The following are the extracts of balances of X Co. Ltd., in its integrated ledgers on 1st January, 20x1:-

PARTICULARS	DEBIT	CREDIT
Stores Control account	₹ 36,000	
Work-in-progress account	₹ 34,000	
Finished goods account	₹ 26,000	
Cash at bank	₹ 20,000	
Creditors control account		₹ 16,000
Fixed assets account	₹ 1,10,000	
Debtors control account	₹ 24,000	
Share capital account		₹ 1,60,000
Depreciation provision account		₹ 10,000
Profit and loss account		₹ 64,000
Total	**₹ 2,50,000**	**₹ 2,50,000**

Transaction for the twelve months ended 31st December 20x1 was:

PARTICULARS	AMOUNT (₹)	REMARKS
Wages – direct paid	1,74,000	
Wages – indirect paid	10,000	
Stores purchased on credit	2,00,000	
Stores issued to repair order	4,000	
Stores issued to production	2,20,000	
Goods finished during the period at cost	4,30,000	
Goods sold at sales value (on credit)	6,00,000	

Goods sold at cost	4,40,000	
Production overhead recovered	96,000	
Production overhead	80,000	Paid for by cheque
Administration overhead	24,000	
Selling and distribution overhead	28,000	
Depreciation (works)	2,600	
Payments to suppliers	2,02,000	By cheque
Payments from customers	5,80,000	
Rates prepaid included in production overhead incurred	600	
Purchases of fixed assets	4,000	
Charitable donation	2,000	
Fines paid	1,000	
Interest on bank loan	200	
Income – tax	40,000	

You are required to write up the accounts in the integral ledger and make out a trial balance. The administration overhead is written off to profit and loss account.

PROBLEM – 7

A fire destroyed some accounting records of a company. You have been able to collect the following from the spoilt papers/records and as a result of consultation with accounting staff for the period of January, 20x1:

Incomplete Ledger Entries:

Materials Control A/c

PARTICULARS	AMOUNT	PARTICULARS	AMOUNT
To Balance b/d	₹ 32,000		

Work-in-Process Control A/c

PARTICULARS	AMOUNT	PARTICULARS	AMOUNT
To Balance b/d	₹ 9,200	By Finished Goods Control A/c	₹ 1,51,000

Payables (Creditors) A/c

PARTICULARS	AMOUNT	PARTICULARS	AMOUNT
		By Balance b/d	₹ 16,400

To Balance c/d	₹ 19,200		

Manufacturing Overheads Control A/c

PARTICULARS	AMOUNT	PARTICULARS	AMOUNT
To Bank A/c (Amount spent)	₹ 29,600		

Finished Goods Control A/c

PARTICULARS	AMOUNT	PARTICULARS	AMOUNT
To Balance b/d	₹ 24,000		
		By Balance c/d	₹ 30,000

Additional Information:

1. The bank book showed that ₹ 89,200 has been paid to creditors for raw material.
2. Ending inventory of work-in-process included materials of ₹ 5,000 on which 300 direct labour hours have been booked against wages and overheads.
3. The job card showed that workers have worked for 7,000 hours. The wage rate is ₹ 10 per labour hour.
4. Overhead recovery rate was ₹4 per direct labour hour.

You are required to COMPLETE the above accounts in the cost ledger of the company.

PROBLEM – 8

The following incomplete accounts are furnished to you for the month ended 31st October, 20x2.

Stores Ledger Control Account		
1.10.20x2	To Balance	₹ 54,000
Work in Process Control Account		
1.10. 20x2	To Balance	₹ 6,000
Finished Goods Control Account		
1.10. 20x2	To Balance	₹ 75,000
Factory Overheads Control Account		
Total debits for October, 20x2		₹ 45,000
Factory Overheads Applied Account		
Cost of Goods Sold Account		
Creditors for Purchases Account		
1.10. 20x2	By Balance	₹ 30,000

Additional information:

1. The factory overheads are applied by using a budgeted rate based on direct Labour hours The budget for overheads for 20x2 is ₹ 6,75,000 and the budget of direct Labour hours is 4,50,000.
2. The balance in the account of creditors for purchases on 31.10. 20x2 is ₹15,000 and the payments made to creditors in October, 20x2 amount to ₹ 1,05,000.
3. The finished goods inventory as on 31st October, 20x2 is ₹ 66,000.
4. The cost of goods sold during the month was ₹ 1,95,000.
5. On 31st October, 20x2 there was only one unfinished job in the factory. The cost records show that ₹ 3,000 (1,200 direct Labour hours) of direct Labour cost and ₹ 6,000 of direct material cost had been charged.
6. A total of 28,200 direct Labour hours were worked in October, 20x2. All factory workers earn same rate of pay.
7. All actual factory overheads incurred in October, 20x2 have been posted.

You are required to FIND:

a. Materials purchased during October, 20x2.
b. Cost of goods completed in October, 20x2.
c. Overheads applied to production in October, 20x2.
d. Balance of Work-in-Process Control A/c on 31st October, 20x2.
e. Direct Materials consumed during October, 20x2.
f. Balance of Stores Ledger Control Account on 31st October, 20x2.
g. Over absorbed or under absorbed overheads for October, 20x2

PROBLEM – 9

M/s. H.K. Piano Company showed a net loss of ₹ 4,16,000 as per their financial accounts for the year ended 31st March. The cost accounts, however, disclosed a net loss of ₹ 3,28,000 for the same period. The following information were revealed as a result of scrutiny of the figures of both the sets of books:

		₹
i.	Factory Overheads under-recovered	6,000
ii.	Administration Overheads over-recovered	4,000
iii.	Depreciation charged in financial accounts	1,20,000
iv.	Depreciation recovered in costs	1,30,000
v.	Interest on investment not included in costs	20,000
vi.	Income-tax provided	1,20,000
vii.	Transfer fees (credit in financial books)	2,000
viii.	Stores adjustment (credit in financial books)	2,000

PREPARE a Memorandum reconciliation account.

PROBLEM – 10

The following figures are available from the financial records of ABC Manufacturing Co. Ltd. for the year ended 31st March.

	₹
Sales (20,000 units)	25,00,000
Materials	10,00,000
Wages	5,00,000
Factory Overheads	4,50,000
Administrative Overhead (production related)	2,60,000
Selling and Distribution Overheads	1,80,000
Finished goods (1,230 units)	1,50,000

	₹	₹
Work-in-Process:		
Materials	30,000	
Labour	20,000	
Factory overheads	20,000	70,000
Goodwill written off		2,00,000
Interest on loan taken		20,000

In the Costing records, factory overhead is charged at 100% of wages, administrative overhead 10% of factory cost and selling and distribution overhead at the rate of ₹ 10 per unit sold.

PREPARE a statement reconciling the profit as per cost records with the profit as per financial records.

PROBLEM – 11

Following are the figures extracted from the Cost Ledger of a manufacturing unit.

	₹
Stores:	
Opening balance	15,000
Purchases	80,000
Transfer from WIP	40,000
Issue to WIP	80,000
Issue to repairs and maintenance	10,000
Sold as a special case at cost	5,000

Shortage in the year	3,000
Work-in-Process:	
Opening inventory	30,000
Direct Labour cost charged	30,000
Overhead cost charged	1,20,000
Closing Balance	20,000
Finished Products:	
Entire output is sold at 10% profit on actual cost from Work-in- Process.	
Others:	
Wages for the period	35,000
Overhead Expenses	1,25,000

ASCERTAIN the profit or loss as per financial account and cost accounts and reconcile them.

PROBLEM – 12

The following figures have been extracted from the Financial Accounts of a manufacturing firm for the first year of its operation:

	₹
Direct Material Consumption	50,00,000
Direct Wages	30,00,000
Factory Overheads	16,00,000
General Administrative Overheads	7,00,000
Selling and Distribution Overheads	9,60,000
Bad Debts	80,000
Preliminary expenses written off	40,000
Legal Charges	10,000
Dividends Received	1,00,000
Interest received on Deposits	20,000
Sales (1,20,000 units)	1,20,00,000
Closing Stock:	
Finished Goods (4,000 units)	3,20,000
Work-in-Process	2,40,000

The cost accounts for the same period reveal that the direct material consumption was ₹56,00,000. Factory overhead is recovered at 20% on prime cost. Administration overhead is recovered at ₹6 per unit of goods sold. Selling and Distribution overheads are recovered at ₹8 per unit sold.
PREPARE the Profit and Loss Accounts both as per financial records and as per cost records. RECONCILE the profits as per the two records.

PROBLEM – 13

The following information is available from the financial books of a company having a normal production capacity of 60,000 units for the year ended 31st March, 20x1:

1. Sales ₹ 10,00,000 (50,000 units).
2. There was no opening and closing stock of finished units.
3. Direct material and direct wage costs were ₹ 5,00,000 and ₹ 2,50,000 respectively.
4. Actual factory expenses were ₹ 1,50,000 of which 60% are fixed.
5. Actual administrative expenses related to production activities were ₹ 45,000 which are completely fixed.
6. Actual selling and distribution expenses were ₹ 30,000 of which 40% are fixed.
7. Interest and dividends received ₹ 15,000.

You are required to:

a. Find out profit as per financial books for the year ended 31st March, 20x1;
b. PREPARE the cost sheet and ascertain the profit as per cost accounts for the year ended 31st March, 20x1 assuming that the indirect expenses are absorbed on the basis of normal production capacity; and
c. PREPARE a statement reconciling profits shown by financial and cost books.

ADDITIONAL QUESTIONS FOR PRATICE

QFP 1 (Concept Similar to Problem – 4)

A company operates on historic job cost accounting system, which is not integrated with the financial accounts. At the beginning of a month, the opening balances in cost ledger were:

	(₹ in lakhs)
Stores Ledger Control Account	80
Work-in-Process Control Account	20
Finished Goods Control Account	430
Building Construction Account	10
Cost Ledger Control Account	540

During the month, the following transactions took place:

			(₹ in lakh)
Materials	Purchased		40
	Issued to production		50
	Issued to factory maintenance		6
	Issued to building construction		4
Wages	Gross wages paid		150
	Indirect wages		40
	For building construction		10
Works Overheads	Actual amount incurred		160
	(Excluding items shown above)		
	Absorbed in building construction		20
	Under absorbed		8
Royalty paid	(Related to production)		5
Selling, Distribution and Administration overheads			25
Sales			450

At the end of the month, the stock of raw material and work-in-Process was ₹ 55 lakhs and ₹ 25 lakhs respectively. The loss arising in the raw material accounts is treated as factory overheads. The building under construction was completed during the month. Company's gross profit margin is 20% on sales.

PREPARE the relevant control accounts to record the above transactions in the cost ledger of the company.

QFP 2 (Concept Similar to Problem – 4)

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:

	₹	₹
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 from previous 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
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:

a. Stores Ledger Control Account.

b. Work-in-Process Control Account.

c. Finished Goods Control Account.

d. Production Overhead Control Account.

e. Costing Profit and Loss Account.

QFP 3 (Concept Similar to Problem – 5)

Acme Manufacturing Co. Ltd. opens the costing records, with the balances as on 1st July as follows:

	₹	₹
Material Control A/c	1,24,000	
Work-in-Process Control A/c	62,500	
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:

	₹
Materials purchased	4,80,100
Materials issued to jobs	4,77,400
Materials to works maintenance	41,200
Materials to administrative office	3,400
Materials to sales department	7,200
Wages Direct	1,49,300
Wages Indirect	65,000
Transportation for Indirect Materials	8,400
Production Overheads incurred	2,42,250
Absorbed Production Overheads	3,59,100
Administrative Overheads incurred	74,000
Administrative Overheads allocated to production	52,900
Administrative Overheads allocated to sales department	14,800
Selling & Distribution overheads incurred	64,200
Selling & Distribution overheads absorbed	82,000
Finished goods produced	9,58,400
Finished goods sold	9,77,300
Sales	14,43,000

Make up the various accounts as you envisage in the Cost Ledger and PREPARE a Trial Balance as at 30th September.

QFP 4 (Concept Similar to Problem – 6)

JOURNALISE the following transactions assuming that cost and financial transactions are integrated:

	₹
Raw materials purchased	2,00,000
Direct materials issued to production	1,50,000
Wages paid (30% indirect)	1,20,000
Wages charged to production	84,000
Manufacturing expenses incurred	84,000
Manufacturing overhead charged to production	92,000
Selling and Distribution costs	20,000
Finished products (at cost)	2,00,000
Sales	2,90,000
Closing stock	Nil
Receipts from debtors	69,000
Payments to creditors	1,10,000

QFP 5 (Concept Similar to Problem – 6)

Dutta Enterprises operates an Integral system of accounting. You are required to PASS the Journal Entries for the following transactions that took place for the year ended 31st March.

(Narrations are not required.)

	₹
Raw Materials purchased (50% on Credit)	6,00,000
Materials issued to production	4,00,000
Wages paid (50% Direct)	2,00,000
Wages charged to production	1,00,000
Factory Overheads incurred	80,000
Factory Overheads charged to production	1,00,000
Selling and Distribution Overheads incurred	40,000
Finished Goods at cost	5,00,000
Sales (50% Credit)	7,50,000
Closing stock	Nil
Receipts from debtors	2,00,000
Payments to creditors	2,00,000

CHAPTER 06: JOB COSTING

MEANING OF JOB COSTING

CIMA London defines Job Costing as "the category of basic costing methods which is applicable where the work consists of separate contracts, jobs or batches, each of which is authorised by specific order or contract." According to this method, costs are collected and accumulated according to jobs, contracts, products or work orders. Each job or unit of production is treated as a separate entity for the purpose of costing.

Principles of Job Costing

The job costing method may be regarded as the principal method of costing sincethe basic object and purpose of all costing is to:

- Analysis and ascertainment of cost of each unit of production
- Control and regulate cost
- Determine the profitability

Process of Job Costing

- Prepare a separate cost sheet for each job
- Disclose cost of materials issued for the job
- Employee costs incurred (on the basis of bill of material and time cardsrespectively)
- When job is completed, overhead charges are added for ascertaining totalexpenditure

Suitability of Job Costing

- When jobs are executed for different customers according to theirspecifications.
- when no two orders are alike and each order/job needs special treatment.
- Where the work-in-progress differs from period to period on the basis of thenumber of jobs in hand.

JOB COST CARD/ SHEET

Each job order is asymmetrical to other due to specific and customized requirements. To ascertain cost of a particular job, it is necessary to record all the expenditure related with a job separately. For this purpose, Job Cost card is used.

Each job order is asymmetrical to other due to specific and customized requirements. To ascertain cost of a particular job, it is necessary to record all the expenditure related with a job separately. For this purpose, Job Cost card is used.Job cost card is a cost sheet, where the quantity of materials issued, hours spent by different class of employees, amount of other expenses and share of overheads are recorded. This is helpful in knowing the total cost, profitability etc. of a job. The following is an illustrative format of Job Cost card/ sheet.

Format of Job Cost Sheet:

JOB COST SHEET					
Description: _____ Blue Print No.: _____ Material No.: _____ Reference No.: _____			Job No.: _____ Quantity: _____ Date of delivery: _____ Date commenced: _____ Date finished: _____		
Date	**Reference**	**Details**	**Material**	**Labour**	**Overhead**
		Total			

Summary of costs	**Estimated (Rs.)**	**Actual (Rs.)**	For the job _____ Units produced _____ Cost/unit _____ Remarks _____ Prepared by: _____ Checked by: _____
Direct material cost Direct wages Production overhead PRODUCTION COST			
Administration and Selling & Distribution Overheads			
TOTAL COST			
PROFIT/LOSS SELLING PRICE			

COLLECTION OF COSTS FOR A JOB

Collection of Materials Cost

An essential requirement of job cost accounting is that direct materials and their cost must be traced to and identified with specific job or work order. This segregation of materials cost by jobs or work order is brought by the use of separate stores requisitions for each job or work order.

Collection of Labour Cost

All direct labour cost must be analysed according to individual jobs or work orders. Similarly, different types of indirect labour cost also must be collected and accumulated under appropriate standing order or expenses code number. The analysis of labour according to jobs or work orders is, usually, made by means of job timecards or sheets. **All direct labour is booked against specific jobs in the job time cards or sheets.** All the idle time also is booked against appropriate standing order expense code number either in the job time card for each job or on a separate idle time card for each worker (where the job time card is issued job-wise).

Collection of Overheads

Manufacturing overheads are collected under suitable standing order numbers and selling and distribution overheads against cost accounts numbers. Total overhead expenses so collected are apportioned to service and production departments on some suitable basis. The expenses of service departments are finally transferred to production departments. The total overhead of production departments is thenapplied to products on some realistic basis, e.g. machine hour; labour hour; percentage of direct wages; percentage of direct materials; etc.

Treatment of spoiled and defective work

Spoiled work is the quantity of production that has been totally rejected and cannot be rectified. Defective work refers to production that is not as perfect as the saleable product but is capable of being rectified and brought to the required degree of perfection provided some additional expenditure is incurred. Normally, all the manufacturing operations are not fully successful; they result in turning out a certain amount of defective work. Nonetheless, over a period of time it is possible to work out a normal rate of defectives for each manufacturing process which would represent the number of defective articles which a process shall produce in spite of due care.

Defects arise in the following circumstances:

Circumstances	Treatment
1. 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 within the normal limit or is near thereto **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.

2. Where defect is due to bad workmanship.	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 workman concerned. It is possible, however that the management did provide for a certain proportion of defectives on account of bad workmanship as an unavoidable feature of production. If that be the case, the cost of rectifying to the extent provided for by the management will be treated as a normal cost and charged to the batch.
3. 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 an abnormal cost, it will be written off to theCosting Profit and Loss Account.

Advantages and Disadvantages of Job Costing

Some of the advantages and disadvantages of Job costing are summarized asbelow:

Advantages	Disadvantages
1. The details of Cost of material, Labour and overhead for all job is available to control.	**1.** Job Costing is laborious costly and method.
2. Profitability of each job can be derived.	**2.** As lot of clerical process is involved the chances of error is more.
3. It facilitates production planning.	**3.** This method is not suitable in inflationary condition.
4. Budgetary control and Standard Costing can be applied in job costing.	**4.** Previous records of costs will be meaningless if there is any change in market condition.
5. Spoilage and detective can be identified and responsibilities can be fixed accordingly.	

Difference between Job Costing and Process Costing

The main points which distinguish job costing and process costing are as below:

Job Costing	Process Costing
i. A Job is carried out or a product is **produced by specific orders**.	The process of producing the product hasa continuous flow and the **product produced is homogeneous.**
ii. Costs are determined **for eachjob.**	Costs are compiled on time basis i.e., for production of a given accounting period **for each process** or department.
iii. **Each job is separate andindependent** of other jobs.	**Products lose their individual identity** asthey are manufactured in a continuousflow.
iv. Each job or order has a numberand costs are collected against thesame job number.	The unit cost of process is an average costfor the period.
v. **Costs are computed when a job is completed**. The cost of a job may be determined by adding all costs against the job.	**Costs are calculated at the end of the costperiod.** The unit cost of a process may becomputed by dividing the total cost for theperiod by the output of the process duringthat period.
vi. As production is not continuousand each job may be different, so**more managerial attention is required for effective control.**	Process of production is usually standardized and is therefore, quite stable.Hence **control here is comparatively easier**.

QUESTIONS FOR CLASSROOM DISCUSSION

PROBLEM – 1

A shop floor supervisor of a small factory presented the following cost for Job No. 303, to determine the selling price.

PARTICULARS	PER UNIT
Materials	₹ 70
Direct wages 18 hours @ 2.50	₹ 45
(Dept. X - 8 Hrs; Dept. Y - 6 Hrs; Dept. Z - 4 Hrs)	
Chargeable expenses	₹ 5
	₹ 120
Add: 33-$^{1}/_{3}$ % for expenses cost	₹ 40
Total	**₹ 160**

Analysis of the Profit/Loss Account (for the year 20x1)

PARTICULARS	AMOUNT	PARTICULARS	AMOUNT
Materials used	₹ 1,50,000	Sales less returns	₹ 2,50,000
Direct wages:			
- Dept. X - 10,000			
- Dept. Y - 12,000			
- Dept. Z - 8,000	₹ 30,000		
Special stores items	₹ 4,000		
Overheads:			
Dept. X - 5,000			
Dept. Y - 9,000			
Dept. Z - 2,000	₹ 16,000		
Works cost	**₹ 2,00,000**		
Gross profit c/d	₹ 50,000		
	₹ 2,50,000		**₹ 2,50,000**
Selling expenses	₹ 20,000	Gross profit b/d	₹ 50,000
Net profit	₹ 30,000		
	₹ 50,000		**₹ 50,000**

It is also noted that average hourly rates for the three Departments X, Y and Z are similar.

You are required to:

a. Draw up a job cost sheet.

b. Calculate the entire revised cost using 20x1 actual figures as the basis.

c. Add 20% to the total cost to determine the selling price.

PROBLEM – 2

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	DIRECT HOURS	LABOUR	FACTORY OVERHEAD APPLIED
115	₹ 1,325	400 Hrs	₹ 800	₹ 640
118	₹ 810	250 Hrs	₹ 500	₹ 400
120	₹ 765	300 Hrs	₹ 475	₹ 380
	₹ 2,900		**₹ 1,775**	**₹ 1,420**

Materials used in October were as follows:

Materials Requisition No.	Job No.	Cost
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:

PARTICULARS	NUMBER OF HOURS	
	SHOP A	SHOP B
Direct Labour:		
Job no: 115	25	25
Job no: 118	90	30
Job no: 120	75	10
Job no: 121	65	-
Job no: 124	25	10
Indirect Labour:		
Waiting of material	20	10

Machine breakdown	10	5
Idle time	5	6
Overtime premium	6	5
Total	**321**	**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 3 per hour while at shop B, it is 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?

PROBLEM – 3

The manufacturing cost of a work order is ₹ 1,00,000; 8% of the production against that order spoiled and the rejection is estimated to have a realisable value of ₹ 2,000 only. The normal rate of spoilage is 2%. Record this in the costing journal.

PROBLEM – 4

Ares Plumbing and Fitting Ltd. (APFL) deals in plumbing materials and also provides plumbing services to its customers. On 12th August, 20x2, APFL received a job order for a students' hostel to supply and fitting of plumbing materials. The work is to be done on the basis of specification provided by the hostel owner. Hostel will be inaugurated on 5th September, 20x2 and the work is to be completed by 3rd September, 20x2. Following are the details related with the job work:

Direct Materials

APFL uses a weighted average method for the pricing of materials issues. Opening stock of materials as on 12th August 20x2:

- 15mm GI Pipe, 12 units of (15 feet size) @ Rs. 600 each
- 20mm GI Pipe, 10 units of (15 feet size) @ Rs. 660 each
- Other fitting materials, 60 units @ Rs. 26 each
- Stainless Steel Faucet, 6 units @ Rs. 204 each
- Valve, 8 units @ Rs. 404 each

Purchases:

On 16th August 20x2:

- 20mm GI Pipe, 30 units of (15 feet size) @ Rs. 610 each
- 10 units of Valve @ Rs. 402 each on 18th August 20x2:
- Other fitting materials, 150 units @ Rs. 28 each
- Stainless Steel Faucet, 15 units @ Rs. 209 each on 27th August 20x2:
- 15mm GI Pipe, 35 units of (15 feet size) @ Rs. 628 each
- 20mm GI Pipe, 20 units of (15 feet size) @ Rs. 660 each
- Valve, 14 units @ Rs. 424 each Issues for the hostel job:

On 12th August 20x2:

- 20mm GI Pipe, 2 units of (15 feet size)
- Other fitting materials, 18 units on 17th August 20x2:
- 15mm GI Pipe, 8 units of (15 feet size)
- Other fitting materials, 30 units on 28th August 20x2:
- 20mm GI Pipe, 2 units of (15 feet size)
- 15mm GI Pipe, 10 units of (15 feet size)
- Other fitting materials, 34 units
- Valve, 6 units on 30th August 20x2:
- Other fitting materials, 60 units
- Stainless Steel Faucet, 15 units

Direct Labour:

Plumber: 180 hours @ Rs. 50 per hour (includes 12 hours overtime)

Helper: 192 hours @ Rs.35 per hour (includes 24 hours overtime)

Overtimes are paid at 1.5 times of the normal wage rate.

Overheads:

Overheads are applied @ Rs. 13 per labour hour.

Pricing policy:

It is company's policy to price all orders based on achieving a profit margin of 25% on sales price.

You are required to

i. Calculate the total cost of the job.

ii. Calculate the price to be charged from the customer

PROBLEM – 5

From the following information of General Engineering Co. Ltd., for the month of September, 20x1 prepare job accounts and respective control accounts.

Balance as on 1st September, 20x1			
		Dr.	**Cr.**
Stores ledger control account		₹ 70,000	
Work–in–progress			
Job. 110	₹ 20,000		
Job. 115	₹ 30,000		
Job. 119	₹ 15,000	₹ 65,000	
General Ledger Adjustment account			₹ 1,35,000
Total		**₹ 1,35,000**	**₹ 1,35,000**

Transactions during September, 20x1 were – materials purchased ₹ 48,000. New jobs taken up during the month were 121, 122, and 123. The selling prices of jobs completed during the month were Job No. 110 ₹ 75,000; Job No. 115 ₹ 65,000 and Job No.122 ₹ 60,000.

Allocation of materials and labour utilized:

Job. No.	**Material**	**Labour**
110	₹ 2,000	₹ 10,000
115	-	₹ 15,000
119	₹ 8,000	₹ 30,000
121	₹ 10,000	₹ 25,000
122	₹ 9,000	₹ 20,000
123	₹ 7,000	₹ 6,000
Total direct	₹ 36,000	₹ 1,06,000
Total indirect	₹ 4,000	₹ 14,000
Total	₹ 40,000	₹ 1,20,000

Works overhead at 50% of labour cost of jobs. Sundry manufacturing expenses ₹ 22,000. Materials returned to stores from Job. No. 121 was ₹ 200.

CHAPTER 07: UNIT & BATCH COSTING

INTRODUCTION

So far, we have discussed in earlier chapters, the element wise cost collection, calculation and its accounting under integral and non- integral accounting systems. Now we will discuss how the cost accounting information can be presented and used according the needs of the management. To fulfil the need of the users of the cost accounting information, different methods of costing are followed. Costing methods enable the users to have customized information of any cost object according to the need and suitability. Different methods of costing have been developed according to the needs and nature of industries. For the sake of simplicity, 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 products.

For industry doing job work

An entity which is engaged in the execution of special orders, each order being distinguishable from each other, such a concern is thought of involved in performing job works. Jobs are worked strictly in accordance with the customer's specifications and requirements, thus, each job order is unique. Examples of job order types of production are: ship building, construction of road and bridges, manufacturing of heavy electrical machineries and tools, wood and furniture works etc. Here, each job or unit of production is treated as a separate identity for the purpose of costing. The methods of costing for ascertaining cost of each job are known as a job costing, contract costing and batch costing.

For continuous or process type of industries

The continuous or process type of industries are characterized by the continuous production of uniform products according to the 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.

UNIT COSTING

Unit costing is that method of costing where the output produced is identical and each unit of output requires identical cost. Unit costing is synonymously known as single or output costing, but these are sub-division of unit costing method. This method of costing is followed by industries which produce single output or few variants of a single output.

$$\text{Cost per unit} = \frac{\text{Total cost of production}}{\text{No. of units produced}}$$

This method of costing, therefore finds its application in industries like paper, cement, steel works, mining, breweries etc.

COST COLLECTION PROCEDURE IN UNIT COSTING

Collection of Materials Cost

Cost of materials issued for production are collected from Material Requisition notes and accumulated for a certain period or volume of activity. The cost of material so accumulated 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 and functions-wise.

Collection of Employees (Labour) Cost

All direct employee (labour) cost is collected from job time cards or sheets and accumulated for a certain period or volume of activity. The time booked or recorded in the job time and idle time cards is valued at appropriate rates and entered in the cost accounting system. Other items of indirect employee (labour) costs are collected from the payrolls books for the purpose of posting against standing order or expenses code numbers in the overhead expenses ledger.

Collection of Overheads

Overheads are collected under suitable standing orders numbers, and selling and distribution overheads against cost accounts numbers. Total overhead expenses so collected are apportioned to service and production departments on some suitable basis. The expenses of service departments are finally transferred to production departments. The total overhead of production departments is then applied to products on some realistic basis, e.g. machine hour; labour hour; percentage of direct wages; percentage of direct materials; etc.

Treatment of spoiled and defective work

Circumstances	Treatment
(1) 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 beyond normal limits are written off in Costing Profit and Loss Account.
(2) 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.**

BATCH COSTING

Batch Costing is a type of specific order costing where articles are manufactured in predetermined lots, known as batch. Under this costing method, the cost object for cost determination is a batch for production rather output as seen in unit costing method.

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. Soon after a batch size is reached, all inputs in a batch is processed for further operations. Reasons for batch manufacturing may be either technical or economical or both. For 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 has to incur expenditures on engaging workers for production and supervision, setting-up of machine to run for production etc. These are the minimum level of expenditures which have to be incurred each time a batch is run irrespective of number of units produced.

Costing Procedure in Batch Costing

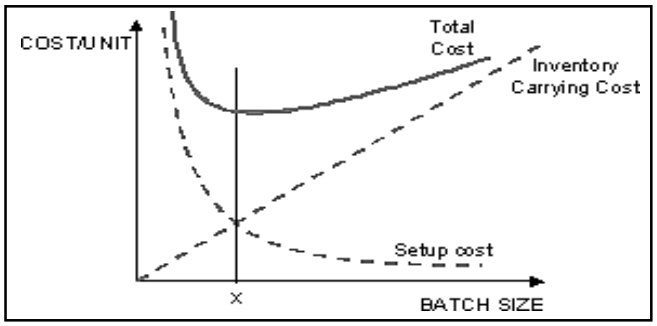
To facilitate convenient cost determination, one number is allotted for each batch. Material cost for the batch is arrived at on the basis of material requisitions for the batch and labour cost is arrived at by multiplying the time spent on the batch by direct workers as ascertained from time cards or job tickets. Overheads are absorbed on some suitable basis like machine hours, direct labour hours etc.

ECONOMIC BATCH QUANTITY (EBQ)

As the product is produced in batches or lots, the lot size chosen will be critical in achieving least cost of operation. Primarily, the total production cost under batch production comprises of two main costs, namely,

1. Machine Set Up Costs and
2. Inventory holding costs.

If the size is higher, the set up cost may decline due to lesser number of set ups required; but units in inventory will go up leading to higher holding costs. If the lot size is lower, lower inventory holding costs are accomplished but only with higher set up costs. Economic batch quantity is the size of a batch where total cost of set-up and holding costs are at minimum. This relationship is explained with the help of following diagram



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 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. The mathematical formula usually used for its determination is as follows:

$$EBQ = \sqrt{\frac{2DS}{C}}$$

Were, D = Annual demand for the product

S = Setting up cost per batch

C = Carrying cost per unit of production

DIFFERENCE BETWEEN JOB AND BATCH COSTING

S. No	Job Costing	Batch Costing
1	Method of costing used for non- standard and non- repetitive products produced as per customer specifications and against specific orders.	Homogeneous products produced in a continuous production flow in lots.
2	Cost determined for each Job	Cost determined in aggregate for the entire Batch and then arrived at on per unit 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

QUESTIONS FOR CLASSROOM DISCUSSION

PROBLEM – 1

The following data relate to the manufacture of a standard product during the 4-week ended 28th February 20x1:

PARTICULARS	AMOUNT
Raw Materials Consumed	₹ 4,00,000
Direct Wages	₹ 2,40,000
Machine Hours Worked	3,200 hours
Machine Hour Rate	₹ 40
Office Overheads	10% of works cost
Selling Overheads	₹ 20 per unit
Units produced and sold	10,000 at ₹ 120 each

You are required to find out the cost per unit and profit for the 4- week ended 28th February 20x1.

PROBLEM – 2

Atharva Pharma care 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	Direct Wage	Factory Overheads
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.

PROBLEM – 3

Arnav Confectioners (AC) owns a bakery that 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
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.

PROBLEM – 4

Monthly demand for a product	500 units
Setting-up cost per batch	₹ 60
Cost of manufacturing per unit	₹ 20
Rate of interest	10% per annum

Determine economic batch quantity. Also, calculate the Total Cost.

PROBLEM – 5

M/s. KBC Bearings Ltd. is committed to supplying 48,000 bearings per annum to M/s. KMR Fans on a steady daily basis. It is estimated that it costs ₹ 1 as inventory holding cost per bearing per month and that the setup cost per run of bearing manufacture is ₹ 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?

PROBLEM – 6

XYZ Ltd. has obtained an order to supply 48000 bearings per year from a concern. On a steady basis, it is estimated that it costs Rs.0.20 as inventory holding cost per bearing per month and the set-up cost per run of bearing manufacture is Rs.384.

You are required to:

1. compute the optimum run size and number of runs for bearing manufacture.
2. compute the interval between two consecutive runs.
3. find out the extra costs to be incurred, if company adopts a policy to manufacture 8000 bearings per run as compared to optimum run Size.
4. give your opinion regarding run size of bearing manufacture. Assume 365 days in a year.

PROBLEM – 7

A Company has an annual demand from a single customer for 50,000 litres of a paint product. The total demand can be made up of a range of colours to be produced in a continuous production run after which a set-up of the machinery will be required to accommodate the colour change. The total

output of each colour will be stored and then delivered to the customer as s single load immediately before production of the next colour commences.

The Setup costs are ₹ 100 per set up. The Service is supplied by an outside company as required. The Holding costs are incurred on rented storage space which costs ₹ 50 per sq. meter per annum. Each square meter can hold 250 Litres suitably stacked.

You are required to calculate

1. Calculate the total cost per year where batches may range from 4,000 to 10,000 litres in multiples of 1,000 litres and hence choose the production batch size which will minimize the cost.
2. Use the economic batch size formula to calculate the batch size which will minimise total cost.

PROBLEM – 8

Wonder Ltd. has a capacity of 1,20,000 Units per annum as its optimum capacity. The production costs are as under:

Direct Material	₹ 90 per unit
Direct Labour	₹ 60 per unit
Overheads:	
Fixed	₹ 30,00,000 per annum
Variable	₹ 100 per unit

Semi Variable Overheads: ₹ 20,00,000 per annum up to 50% capacity and an extra amount of ₹ 4,00,000 for every 25% increase in capacity or part 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 ₹ 20,00,000 for the year work out the average selling price at which each unit should be quoted.

First 3 months: 50% capacity and remaining 9 months: 80% capacity.

Ignore Administration, Selling and Distribution overheads.

PROBLEM – 9

Rio Limited undertakes to supply 1000 units of a component per month for the Months of January, February and March 20x1. Every month a batch order is opened against which materials and labour costs are booked at actual. Overheads are levied at a rate per labour hour. The selling price is contracted at ₹ 15 per unit.

From the following data, present the profit per unit of each batch order and the overall position of the order for the 3,000 units.

MONTH	BATCH OUTPUT	MATERIAL COST	LABOUR COST
January 20x1	1250 nos	₹ 6,250	₹ 2,500

February 20x1	1500 nos	₹ 9,000	₹ 3,000
March 20x1	1000 nos	₹ 5,000	₹ 2,000

Labour is paid at the rate of ₹ 2 per hour. The other details are:

MONTH	OVERHEADS	TOTAL LABOUR HOURS
January 20x1	₹ 12,000	4,000
February 20x1	₹ 9,000	4,500
March 20x8	₹ 15,000	5,000

PROBLEM – 10

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 ₹ 8 per piece. From the following data present, CALCULATE the cost and profit per piece of each batch order and the overall position of the order for 1,200 pieces.

MONTH	BATCH OUTPUT	MATERIAL COST	DIRECT WAGES	DIRECT LABOUR
January	210	₹ 650	₹ 120	240 hrs
February	200	₹ 640	₹ 140	280 hrs
March	220	₹ 680	₹ 150	280 hrs
April	180	₹ 630	₹ 140	270 hrs
May	200	₹ 700	₹ 150	300 hrs
June	220	₹ 720	₹ 160	320 hrs

The other details are:

MONTHLY CHARGEABLE	EXPENSES	DIRECT LABOUR
January	₹ 12,000	4800 hrs
February	₹ 10,560	4400 hrs
March	₹ 12,000	5000 hrs
April	₹ 10,580	4600 hrs
May	₹ 13,000	5000 hrs
June	₹ 12,000	4800 hrs

PROBLEM – 11

X Ltd. is committed to supplying 24,000 bearings per annum to Y Ltd. on a steady basis. It is estimated that it costs 10 paise as inventory holding cost per bearing per month and that the set-up cost per run of bearing manufacture is ₹ 324.

a. What would be the optimum run size for bearing manufacture?

b. Assuming that the company has a policy of manufacturing 6,000 bearings per run, how much extra costs the company would be incurring as compared to the optimum run suggested in a. above?

c. What is the minimum inventory holding cost?

PROBLEM – 12

A customer has been ordering 90,000 special design metal columns at the rate of 18,000 columns per order during the past years. The production cost comprises ₹ 2,120 for material, ₹ 60 for labour and ₹ 20 for fixed overheads. It costs ₹ 1,500 to set up for one run of 18,000 columns and the inventory carrying cost is 5%.

a. Find the most economic production run.

b. Calculate the extra cost that company incur due to the processing of 18,000 columns in a batch.

CHAPTER 08. MATERIAL COST

INTRODUCTION

The general meaning of material is all commodities/ physical objects used to make the final product. It may be direct or indirect.

i. **Direct Materials:** Materials, cost of which can be directly attributable to the end product for which it is being used, in an economically feasible way.

ii. **Indirect Materials:** Those materials which are not directly attributable to a particular final product.

Direct Materials constitute a significant part for manufacturing and production of goods. Being an input and a significant cost element, it requires adequate management attention. Cost control starts from here, and for this purpose it is necessary that the principle of 3Es (Economy, Efficiency and Effectiveness) i.e., economy in procurement, efficiency in handling and processing the material and effectiveness in producing desired output as per the standard, is also applied for this cost element.

Importance of proper recording and control of material are as follows:

a. **Quality of final product:** The quality of output depends on the quality of inputs.

b. **Price of the final product:** Material constitutes a significant part of any product and the cost of final product is directly related with cost of materials used to produce the product.

c. **Production continuity:** The production firms need to ensure that production process runs smoothly and should not be paused for the want of materials. In order to avoid production interruptions, an adequate level of stock of materials should be maintained.

d. **Cost of Stock holding and stock-out:** An entity has to incur stock holding costs in the form of interest and/or opportunity cost for the fund used, stock handling losses like evaporation, obsolescence etc. Under-stocking causes in loss of revenue due to stock-out and breach of commitment.

e. **Wastage and other losses:** While handling and processing of materials, some wastage and loss arise. Based on the nature of material and process, these are classified as normal and abnormal for efficient utilisation and control.

f. **Regular information about resources:** Regular and updated information on availability and utilisation of materials are necessary for the entity for timely and informed decision making.

MATERIAL CONTROL

Material, being one of the total cost elements, are also required to be controlled so that the overall cost control objective can be fulfilled.

Objectives of System of Material Control

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

i. **Minimising interruption in production process:** Material Control system ensures that no activity, particularly production, suffers from interruption for want of materials and stores. It should be noted that this requires constant availability of every item that may be needed in production process, howsoever, small its cost may be.

ii. **Optimisation of Material Cost:** The overall material costs includes price, ordering costs and holding costs. Since all the materials and stores are acquired at the lowest possible price considering the required quality and other relevant factors like reliability in respect of delivery, etc., holding cost too needs to be minimized.

iii. **Reduction in Wastages:** Material Control System has an objective of avoidance of unnecessary losses and wastages that may arise from deterioration in quality due to defective or long storage or from obsolescence. It may be noted that losses and wastages in the process of manufacture are a concern of the production department.

iv. **Adequate Information:** The system of material control maintains proper records to ensure that reliable information is available for all items of materials and stores. This not only helps in detecting losses and pilferages but also facilitates proper production planning.

v. **Completion of order in time:** Proper material management is very necessary for fulfilling orders of the firm. This adds to the goodwill of the firm.

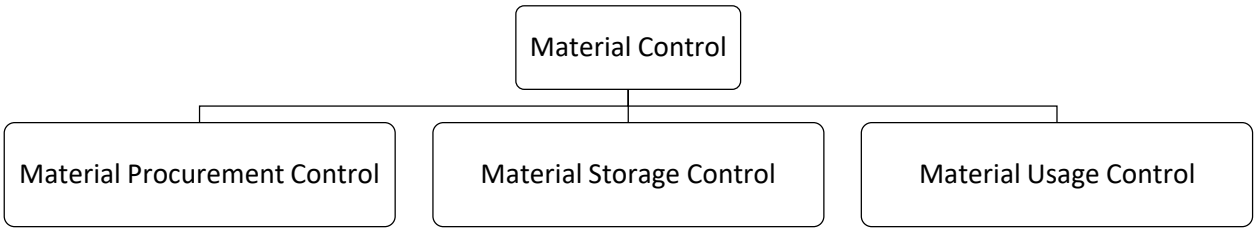
Requirements of Material Control

Material control requirements can be summarised as follows:

1. Proper co-ordination of all departments involved viz., finance, purchasing, receiving, inspection, storage, accounting and payment.
2. Determining purchase procedure to see that purchases are made, after making suitable enquiries, at the most favourable terms to the firm.
3. Use of standard forms for placing the order, noting receipt of goods, authorising issue of the materials etc.
4. Preparation of budgets concerning materials, supplies and equipment to ensure economy in purchasing and use of materials.
5. Operation of a system of internal check so that all transactions involving materials, supplies and equipment purchases are properly approved and automatically checked.
6. Storage of all materials and supplies in a well designated location with proper safeguards.
7. Operation of a system of perpetual inventory together with continuous stock checking so that it is possible to determine, at any time, the amount and the value of each kind of material in stock.
8. Operation of a system of stores control and issue so that there will be delivery of materials upon requisition to departments in the right amount at the time they are needed.

9. Development of system of controlling accounts and subsidiary records which exhibit summary and detailed material costs at the stage of material receipt and consumption.
10. Regular reports of materials purchased issue from stock, inventory balances, obsolete stock, goods returned to vendors, and spoiled or defective units are required.

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

Materials Procurement Procedure

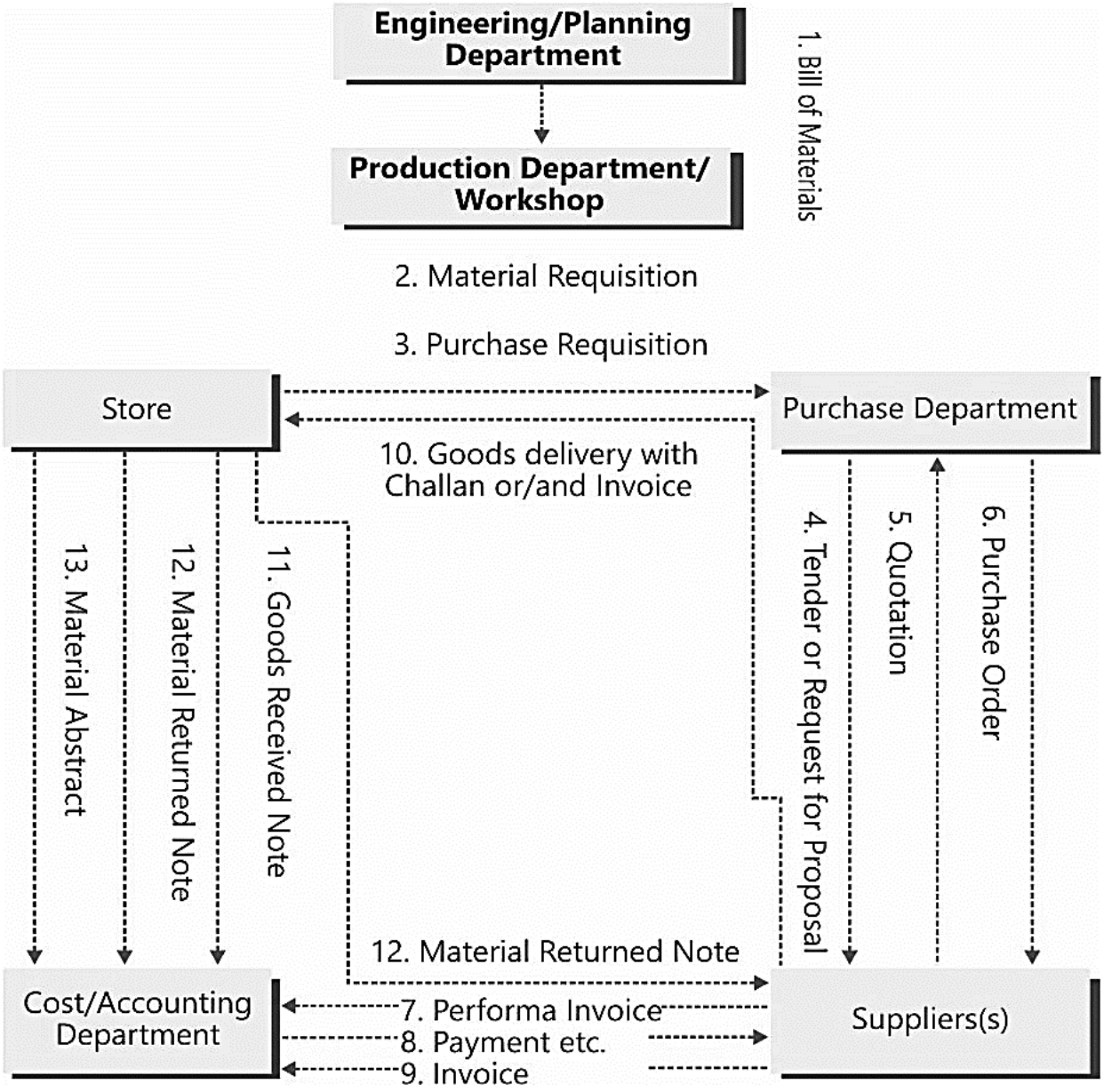


Diagram: Material Procurement Procedure

Bill of Materials

It is also known as Materials Specification List or Materials List. It is a detailed list specifying the standard quantities and qualities of materials and components required for producing a product or carrying out of any job. The materials specification list is prepared by the product development team commonly known as engineering or planning department in a standard form. Thisis shared with other concerned departments like Marketing, Production, Store, and Cost/ Accounting department.

Format and content of a Bill of Materials vary on the basis of industrial peculiarities, management information system (MIS) and accounting system in place.

Uses of Bill of Material

Marketing (Purchase) Dept.	Production Dept.	Stores Dept.	Cost/ Accounting Dept.
Materials are procured (purchased) on the basis of specifications mentioned in it.	Production is planned according to the nature, volume of the materials required to be used. Accordingly, material requisition lists are prepared.	It is used as a reference document while issuing materials to the requisitioning department.	It is used to estimate cost and profit. Any purchase, issue and usage are compared/verified against this document.

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 and materials are withdrawn on the basis of material requisition list or bill of materials. If no material list has been prepared, it is desirable that the task of the preparation of material requisition notes be left to the planning department or by the department requires the materials. The note is shared with Store and Cost/ Accounting department. Format of a Material requisition note may vary on the basis of Industrial Peculiarities, Management Information System (MIS) and Accounting System in place.

Difference between Bill of Materials and Material Requisition Note

Bill of Materials	Material Requisition Note
1. It is the document prepared by the engineering or planning dept.	**1.** It is prepared by the production or other consuming department.
2. It is a complete schedule of component parts and raw materials required for a particular job or work order.	**2.** It is a document asking Store-keeper to issue materials to the consuming department.
3. It often serves the purpose of a material requisition as it shows the complete schedule of materials required for a particular job i.e., it can replace material requisition.	**3.** It cannot replace a bill of materials.
4. It can be used for the purpose of quotations.	**4.** It is useful in arriving historical cost only.
5. It helps in keeping a quantitative control on materials drawn through material requisition.	**5.** It shows the material actually drawn from stores.

Purchase Requisition

This document authorises the purchase department to order for the materials specified in the note. Since the materials purchased will be used by the production departments, there should be constant co-ordination between the purchase and production departments. A purchase requisition is a form used for making a formal request to the purchasing department to purchase materials. This form is usually filled up by the store keeper for regular materials and by the departmental head for special materials (not stocked as regular items). At the beginning a complete list of materials and stores required should be drawn up, which should be reviewed periodically for any addition or deletion. On the basis of standing order, once an item is included in the standard list, it becomes the duty of the purchase department to arrange for fresh supplies before existing stocks are exhausted. Any change in the consumption pattern should be informed to the purchase department for necessary action from their end.

For control over buying of regular store materials, Inventory control system is to determine stock levels to be maintained and the number of quantities to be ordered. In respect of special materials, required for a special order or purpose, it is desirable that the concerned technical department should prepare materials specifications list specifying the quantity, size and order for the materials. Purchase requisition note may either be originated by the stores department in connection with regular materials or by the production planning or other technical departments in respect of special materials. Format of a purchase requisition note may vary on the basis of Industrial Peculiarities, Management Information System (MIS) and Accounting System in place.

Inviting Quotation/ Request for Proposal (RFP)/ Notification Inviting Tender (NIT)

Materials purchase department has to answer the following question before initiating purchasing of materials:

i. What to purchase?

ii. When to purchase?

iii. How much to purchase?

iv. From where to purchase?

v. At what price to purchase?

i. What to purchase?

Materials are purchased as per the requisition received from the stores oruser 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 requiredto get the order from supplier's place to production place, consumption pattern of materials are the important factors which affects the timing ofpurchase. Related to the question, later in this chapter Re-order Stock Levelwill 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 capitalrequirement 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 Organizations / 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, achieve the best value for their money. The purchases through GeM by Government usershave been authorized 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. 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

Having decided on the best quotation that should be accepted, 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

After execution of purchase order and advance payment (if terms of quotation so specify), necessary arrangement is made to receive the delivery of materials After receipt of materials along with relevant documents or/ and invoice, receiving department (store dept.) arrange to inspect the materials for its conformity with purchase order.

Goods Received Note

If everything is in order and the supply is considered suitable for acceptance, the Receiving department prepares a Receiving Report or Material Inward Note or Goods Received Note. Generally, it is prepared in quadruplicate, the copies being distributed to purchase department, store or order indenting department, receiving department and accounting department.

Material Returned Note

Sometimes materials have to be returned to suppliers after these have been received in the factory. Such returns may occur before or after the preparation of the receiving report. If the return takes place before the preparation of the receiving report, such material obviously would not be included in the report and hence not shown in the stores ledgers. In that case, no adjustment in the account books would be necessary. But if the material is returned after its entry in the receiving report, a suitable document must be drawn up in support of the issue so as to exclude from the Stores of Material Account the value of the materials returned back. This document usually takes the form of a Material Returned Note or Material outward return note3.8 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.

VALUATION OF MATERIAL RECEIPTS

Treatment of items associated with purchase of materials is tabulated as below

S No.	Items	Treatment
Discounts and Subsidy		
i.	Trade Discount	Trade discount is deducted from the purchase price if it is not shown as deduction in the invoice.
ii.	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.
iii.	Cash Discount	Cash discount is not deducted from the purchase price. It is treated as interest and finance charges. It is ignored.
iv.	Subsidy / Grant / Incentives	Any subsidy/ grant/ incentive received from the Government or from other sources deducted from the cost of purchase.
Duties and Taxes		
v.	Road Tax/ Toll Tax	Road tax/ Toll tax, if paid by the buyer, is included with the cost of purchase.
vi.	Goods and Service Tax (GST)	Goods and Service Tax (GST) is paid on supply of goods and provision of services and collected from the buyers. It 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.
vii.	Custom Duty	Custom duty is paid on import of goods from outside India. It is added with the purchase cost.
Penalty and Charges		
viii.	Demurrage	Demurrage is a penalty imposed by the transporter for delay in uploading or offloading of materials. It is an abnormal cost and not included with cost of purchase
ix.	Detention charges/ Fine	Detention charges/ fines imposed for non-compliance of rule or law by any statutory authority. It is an abnormal cost and not included with cost of purchase
x.	Penalty	Penalty of any type is not included with the cost of purchase

Other expenditures		
xi.	Insurance charges	Insurance charges are paid for protecting goods during transit. It is added with the cost of purchase.
xii.	Commission or brokerage paid.	Commission or brokerage paid is added with the cost of purchase.
xiii.	Freight inwards	It is added with the cost of purchase as it is directly attributable to procurement of material.
xiv.	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: If the containers are returned and their costs are refunded, then cost of containers should not be considered in the cost of purchase. • If the amount of refund on returning the container is less than the amount paid, then, only the short fall is added with the cost of purchase.
xv.	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, or due to any 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, or due to any avoidable reasons are not absorbed by the good units. Losses due to abnormal reasons are debited to costing profit and loss account.

MATERIAL STORAGE & RECORDS

Proper storing of materials is of primary importance. It is not enough only to purchase material of the required quality. 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 store-keeper also ensures safe custody of the material. It should be the function of store-keeper that the right quantity of materials always should be available in stock.

Duties of Store Keeper

These can be briefly set out as follows:

i. **General control over store:** Store keeper should keep control over all activities in Stores department. He should check the quantities as mentioned in Goods received note and with the purchased materials forwarded by the receiving department and to arrange for the storage in appropriate places.

ii. **Safe custody of materials:** Store keeper should ensure that all the materials are stored in a safe condition and environment required to preserve the quality of the materials.

iii. **Maintaining records:** Store keeper should maintain proper record of quantity received, issued, balance in hand and transferred to/ from other stores.

iv. **Initiate purchase requisition:** Store keeper should initiate purchase requisitions for the replacement of stock of all regular stores items whenever the stock level of any item of store approaches the re-order level fixed.

v. **Maintaining adequate level of stock:** Store keeper should maintain adequate level of stock at all time. He/ she should take all the necessary action so that production could not be interrupted due to lack of stock. Further he/ she should take immediate action for stoppage of further purchasing when the stock level approaches the maximum limit. He also needs to reserve a particular material for a specific job when so required

vi. **Issue of materials:** Store keeper should issue materials only against the material requisition slip approved by the appropriate authority. He/ she should also refer to bill of materials while issuing materials to requisitioning department.

vii. **Stock verification and reconciliation:** Store keeper should verify the book balances with the actual physical stock at frequent intervals by way of internal control and check the any irregular or abnormal issues, pilferage, etc.

Store Records

The record of stores may be maintained in three forms:

1. Bin Cards
2. Stock Control Cards
3. Store Ledger

Bin Cards

It is a quantitative record of inventory which shows the quantity of inventory available in a particular bin. Bin refers to a box/ container/ space where materials are kept. Card is placed with each of the bin (space) to record the details of material like receipt, issue and return. It is maintained by store department.

Advantages

1. There would be fewer chances of mistakes being made as entries are made at the same time as goods received or issued by the person actually handling the materials.
2. Control over stock can be more effective, as comparison of the actual quantity in hand at any time with the book balance is possible.
3. Identification of the different items of materials is facilitated by reference to the Bin Card, the bin or storage receptacle.

Disadvantages

1. Store records are dispersed over a wide area.
2. The cards are liable to be smeared with dirt and grease because of proximity to material and also because of handling materials.
3. People handling materials are not ordinarily suitable for the clerical work involved in writing Bin Cards.

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

1. Records are kept in a more compact manner so that reference to them is facilitated.
2. 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.
3. As the records are at one place, it is possible to get an overall idea of the stock position without the necessity of going round the stores.

Disadvantages

1. On the spot comparison of the physical stock of an item with its book balance is not facilitated.
2. 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.

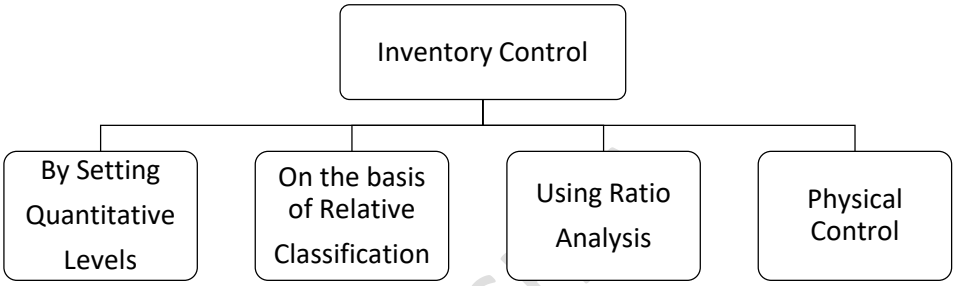
Stores Ledger

A Stores Ledger is maintained to record both quantity and cost of materials received, issued and those in stock. It is a subsidiary ledger to the main cost ledger; it is maintained by the Cost/ Accounts Department. The source documents for posting the ledger are Goods received notes, Materials requisition notes etc.

Difference between Bin Card & Stores Ledger

Bin Card	Stores Ledger
It is maintained by the storekeeper in the store.	It is maintained in cost accounting department.
It contains only quantitative details of material received, issued and returned to stores.	It contains information quantity both in and value.
Entries are made when transaction takes place.	It is always posted after the transaction.
Each transaction is individually posted.	Transactions may be summarized and then posted.
Inter-department transfers do not appear in Bin Card.	Material transfers from one job to another job are recorded for costing purposes.

INVENTORY CONTROL



Inventory Control- By Setting Quantitative Levels

Re-order Stock Level	•When to Order
Re-order Quantity/ EOQ	•How Much to Order
Maximum Stock Level	•Upto How much to stock
Minimum Stock Level	•Atleast How much to stock
Average Stock Level	•Stock normally kept
Danger Stock Level	•Kept for emergency requirement
Buffer Stock	•To meet sudden demand

Re-order Stock Level (ROL) This level lies between minimum and the maximum levels in such a way that before the material ordered is received into the stores, there is sufficient quantity in hand to cover both normal and abnormal consumption situations. In other words, it is the level at which fresh order should be placed for replenishment of stock.

It is calculated as:

ROL = Maximum Consumption × Maximum Re-order Period

Maximum Consumption = The maximum rate of material consumption in production activity

Maximum Re-order period = The maximum time to get order from supplier to the stores

This can also be calculated alternatively as below:

ROL = Minimum Stock Level + (Average Rate of Consumption × AverageRe-order period)

Minimum Stock Level	Minimum Stock level that must be maintained all the time.
Average Rate of Consumption	Average rate of material consumption in production activity. It is also known as normal consumption/ usage
Average Re-order period	Average time to get an order from supplier to the stores. It is also known as normal period.

(Re-order period is also known as Lead time)

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.

Economic Order Quantity (EOQ): The size of an order for which total of ordering and carrying cost are minimum.

Ordering Cost: Ordering costs are the costs which are associated with the purchase or order of materials such as cost to invite quotations, documentation works like preparation of purchase orders, employee cost directly attributable to the procurement of material, transportation and inspection cost etc.

Carrying Cost: Carrying costs are the costs for holding/ carrying of inventories in store such as the cost of fund invested in inventories, cost of storage, insurance cost, obsolescence etc.

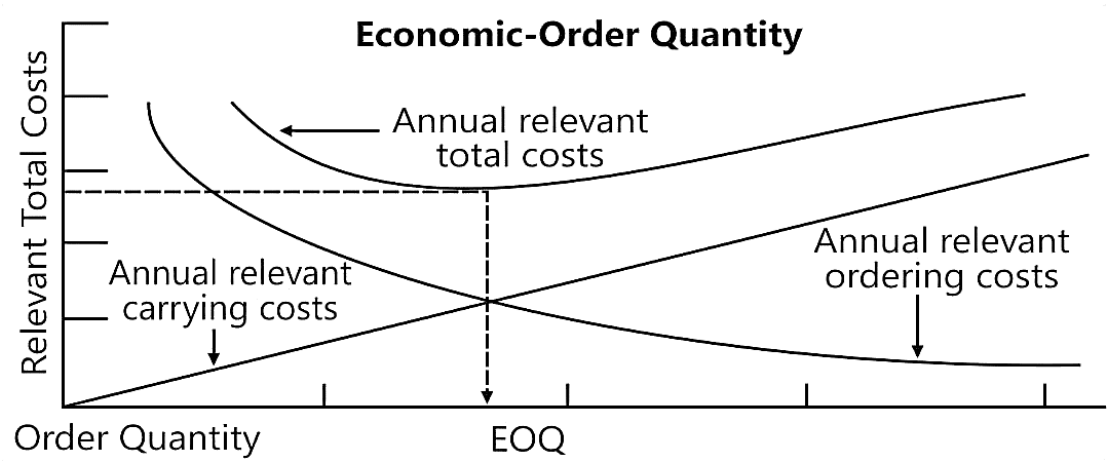
The Economic Order Quantity (EOQ) is calculated as below:

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

- **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: The calculation of economic order of material to be purchased is subject to the following assumptions:

1. Ordering cost per order and carrying cost per unit per annum are known and they are fixed.
2. Anticipated usage of material in units is known.
3. Cost per unit of the material is constant and is known as well.
4. The quantity of material ordered is received immediately



Minimum Stock Level: It is lowest level of material stock, which must be maintained in hand at all times, so that there is no stoppage of production due to non-availability of inventory.

It is calculated as below:

Minimum Stock Level = Re-order Stock Level - (Average Consumption Rate × Average Re-order Period)

Maximum Stock Level: It is the highest level of quantity for any material which can be held in stock at any time. Any quantity beyond this level cause extra amount of expenditure due to engagement of fund, cost of storage, obsolescence etc.

It can be calculated as below:

Maximum Stock Level = Re-order Level + Re-order Quantity - (Minimum Consumption Rate × Minimum Re-order Period)

Here, Re-order Quantity may be EOQ

Average Inventory Level: This is the quantity of material that is normally held in stock over a period. It is also known as normal stock level.

It can be calculated as below:

Average Stock Level = Minimum Stock Level + 1/2 Re-order Quantity

Alternatively, it can be calculated as below:

Average Stock Level = $\frac{\text{Maximum Stock Level} + \text{Minimum Stock Level}}{2}$

Danger level: It is the level at which normal issues of the raw material inventory are stopped and emergency issues are only made.

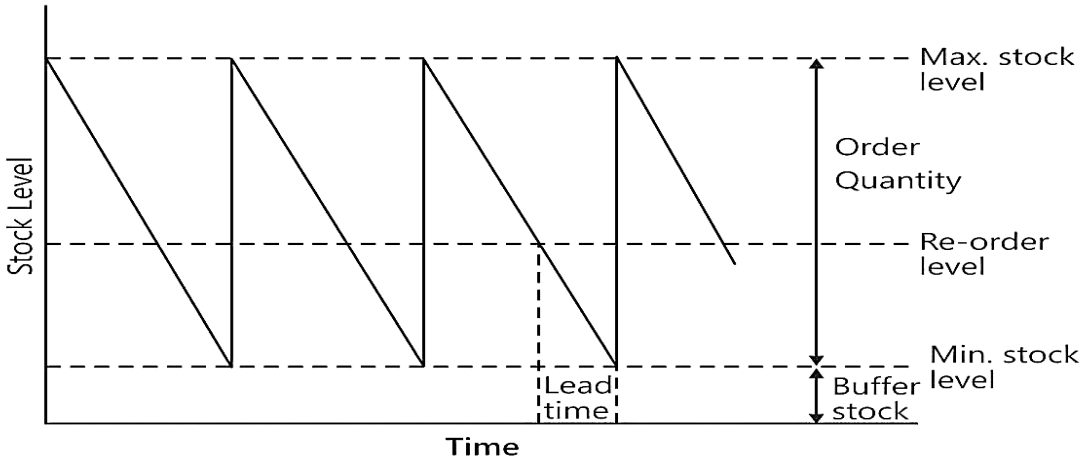
It can be calculated as below:

Danger Level = Average Consumption* × Lead time for emergency purchase

*Some time minimum consumption is also used.

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.

All the above stock levels can be understood with the help of the following diagram:



When the materials are purchased, the level keeps rising. It may reach maximum level if the rate of issuance is less. As the materials are consumed, the stock level starts declining. At re-order level, reorder quantity is ordered and fresh supplies are normally received when stocks reach minimum level. The time interval between re-order level, when the fresh order is placed, and the time of actual receipt of materials is known as lead time.

Inventory Stock-Out

Stock out is said to be occurred when an inventory item could not be supplied due to insufficient stock in the store. The stock- out situation costs to the entity not only in financial terms but in non-financial terms also. Due to stock out an entity not only loses overheads costs and profit but reputation (goodwill) also due to non-fulfilment of commitment. Though it may not be a monetary loss in short term but in long term it could be a reason for financial loss.

While deciding on the level of inventory, a trade-off between the stock out cost and carrying cost is made so that overall inventory cost can be minimized.

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 actually required for production. It is also known as 'Demand pull' or 'Pull through' system of production.

This can be understood with the help of the following diagram:

Inventory Control- On the basis of Relative Classification

ABC Analysis	• On the basis of value and frequency of inventory
Fast, Slow and Non Moving (FSN)	• On the basis of inventory turnover
Vital, Essential and Desirable (VED)	• On the basis of importance of inventory
High, Medium and Low (HML)	• On the basis of price of an item of inventory

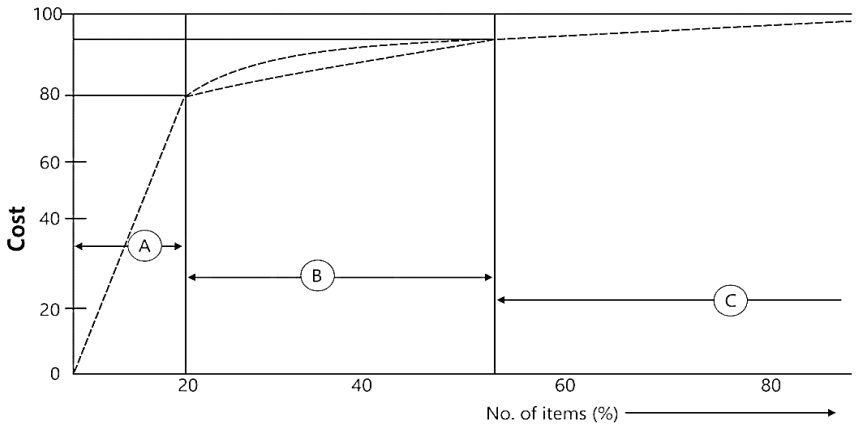
ABC Analysis

This system exercises discriminating control over different items of inventory on the basis of the investment involved. Usually the items are classified into three categories according to their relative importance, namely, their value and frequency of replenishment during a period.

i. **'A' Category:** This category of items consists of only a small percentage i.e., about 10% of the total items handled by the stores but require heavy investment about 70% of inventory value, because of their **high prices or heavy requirement** or both. Items under this category can be controlled effectively by using a regular system which ensures neither over-stocking nor shortage of materials for production. Such a system plans its total material requirements by making budgets. The stocks of materials are controlled by fixing certain levels like maximum level, minimum level and re-order level.

ii. **'B' Category:** This category of items is relatively less important; they may be 20% of the total items of material handled by stores. The percentage of investment required is about 20% of the total investment in inventories. In the case of these items, as the sum involved is **moderate**, the same degree of control as applied in 'A' category of items is not warranted. The orders for the items, belonging to this category may be placed after reviewing their situation periodically.

iii. **'C' Category:** This category of items does not require much investment; it may be about 10% of total inventory value but they are nearly 70% of the total items handled by store. For these categories of items, there is no need of exercising constant control. Orders for items in this group may be placed either after six months or once in a year, after ascertaining consumption requirements. In this case the objective is to economies on ordering and handling costs.



Advantages of ABC analysis: The advantages of ABC analysis are the following:

i. Continuity in production: It ensures that, without there being any danger of interruption of production for want of materials or stores, minimum investment will be made in inventories of stocks of materials or stocks to be carried.

ii. Lower cost: The cost of placing orders, receiving goods and maintaining stocks is minimized specially if the system is coupled with the determination of proper economic order quantities.

iii. Less attention required: Management time is saved since attention need to be paid only to some of the items rather than all the items, as would be the case if the ABC system was not in operation.

iv. Systematic working: With the introduction of the ABC system, much of the work connected with purchases can be systematized on a routine basis, to be handled by subordinate staff.

Fast Moving, Slow Moving and Non-Moving (FSN) Inventory: It is also known as FNS (Fast, Normal and Slow moving) classification of inventory analysis. Under this system, inventories are controlled by classifying them **on the basis of frequency of usage**. The classification of items into these three categories depends on the nature and managerial discretion. A threshold range on the basis of inventory turnover is decided and classified accordingly.

i. Fast Moving- This category of items is placed nearer to store issue point and the stock is reviewed frequently for making of fresh orders.

ii. Slow Moving- This category of items is stored little far and stock is reviewed periodically for any obsolescence, and may be shifted to Non-moving category.

iii. 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.

Some of the reasons for slow moving and non-moving inventories are stated below:

i. Failure of production management to communicate the updated requirement to the stores management

ii. Technological upgradation in terms of new machine requiring new kind of material or existing material becoming obsolete.

iii. Lack of periodic review of inventories.

By careful observation, timely identification and adoption of inventory management techniques such

as maintenance of minimum level or just in time approach, one can manage slow moving and non-moving inventories. We may calculate inventory turnover ratio and present the reports of comparison of actual and standards with variations, if any to the management.

Vital, Essential and Desirable (VED): Under this system of inventory analysis, inventories are classified **on the basis of its criticality for the production function and final product**. Generally, this classification is done for spare parts which are used for production.

i. **Vital-** Items are classified as vital when its unavailability can interrupt the production process and cause a production loss. Items under this category are strictly controlled by setting re-order level.
ii. **Essential-** Items under this category are essential but not vital. The unavailability may cause sub standardization and loss of efficiency in production process. Items under this category are reviewed periodically and get the second priority.
iii. **Desirable-** Items under this category are optional in nature, unavailability does not cause any production or efficiency loss.

For instance, in hospital administration, stock of medicines and essential chemicals are categorized as VED or FSN inventory. In case of life saving, rare and critical drugs, they are being categorized as vital inventory. They are the ones whose unavailability can interrupt smooth service. Those inventories which are optional or substitutes, not leading to loss in efficiency would be categorized as desirable inventories. FNS categorization helps the store keepers in hospitals to keep a check on medicines whose expiry date is close and needs to be disposed off at the earliest. The quantity of slow-moving drugs are maintained accordingly.

High Cost, Medium Cost, Low Cost (HML) Inventory: Under this system, inventory is classified on the basis of the cost of an individual item, unlike ABC analysis where inventories are classified on the basis of overall value of inventory. A range of cost is used to classify the inventory items into the three categories. High-Cost inventories are given more priority for control, whereas Medium-cost and Low-cost items are comparatively given lesser priority.

Using Ratio Analysis

Input-Output Ratio

Input-output ratio is the ratio of the quantity of input of material to production and the standard material content of the actual output.

Inventory Turnover Ratio

$$\text{Inventory Turnover Ratio} = \frac{\text{Cost of Material Consumed during the period}}{\text{Cost of Average stock held during the period}}$$

Average stock = 1/2 (opening stock + closing stock)

Average no. of days of Inventory holding = $\frac{365\text{days}/12\text{months}}{\text{Inventory Turnover ratio}}$

Physical Control

Two Bin System: Under this system, each bin is divided into two parts –

- smaller part to stock the quantity equal to the minimum stock or even the re-ordering level, and
- The other part to keep the remaining quantity.

Issues are made out of the larger part; but as soon as it becomes necessary to use quantity out of the smaller part of the bin, fresh order is placed. "Two Bin System" is supplemental to the record of respective quantities on the bin card and the stores ledger card.

Establishment of system of budgets: To control investment in the inventories, it is necessary to know in advance about the inventories requirement during a specific period (usually a year). The exact quantity of various types of inventories and the time when they would be required can be known by studying carefully production plans and production schedules. Based on this, inventories requirement budget can be prepared. Such a budget will discourage the unnecessary investment in inventories.

Perpetual inventory records and continuous stock verification: Perpetual inventory represents a system of records maintained by the stores department. **It, in fact, comprises of Bin Cards and Stores Ledger.**

The success of perpetual inventory depends upon the following:

a. The Stores Ledger showing quantities and amount of each item.
b. Stock Control cards (or Bin Cards).
c. Reconciling the quantity balances shown by a. & b. above.
d. Checking the physical balances of a number of items every day systematically and by rotation.
e. Explaining promptly the causes of discrepancies, if any, between physical balances and the book figures.
f. Making corrective entries wherever required after step (e) and
g. Removing the causes of the discrepancies referred to in step (e)

Advantages of perpetual inventory: The main advantages of perpetual inventory are as follows:

1. Physical stocks can be counted and book balances adjusted as and when desired without waiting for the entire stock-taking to be done.
2. Quick compilation of Profit and Loss Account (for interim period) due to prompt availability of stock figures.
3. Discrepancies are easily located and thus corrective action can be promptly taken to avoid their recurrence.
4. 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.

5. Fixation of the various stock levels and checking of actual balances in hand with these levels assist the store keeper in maintaining stocks within limits and in initiating purchase requisitions for correct quantity at the appropriate time.

Continuous Stock Verification: The checking of physical inventory is an essential feature of every sound system of material control. The system of continuous stock-taking consists of **physical verification of items of inventory**. The stock verification may be done by internal audit department but are independent of the store and production staff. Stock verification is done at appropriate interval of time without prior notice. The element of surprise is essential for effective control of the system.

Disadvantages of Annual/ Periodic Stock Taking: Annual stock-taking, however, has certain inherent shortcomings which tend to detract from the usefulness of such physical verification. For instance, since all the items have to be covered in a given number of days, either the production department has to be shut down during those days to enable thorough checking of stock or else the verification must be of limited character.

On the contrary, continuous stock taking is holding more advantages. Some of them are discussed below:

Advantages of continuous stock-taking:

1. Closure of normal functioning is not necessary.
2. Stock discrepancies are likely to be brought to the notice and corrected much earlier than under the annual stock-taking system.
3. The system generally has a sobering influence on the stores staff because of the element of surprise present therein.
4. The movement of stores items can be watched more closely by the stores auditor so that chances of obsolescence buying are reduced.
5. Final Accounts can be ready quickly. Interim accounts are possible quite conveniently.

MATERIAL ISSUE PROCEDURE

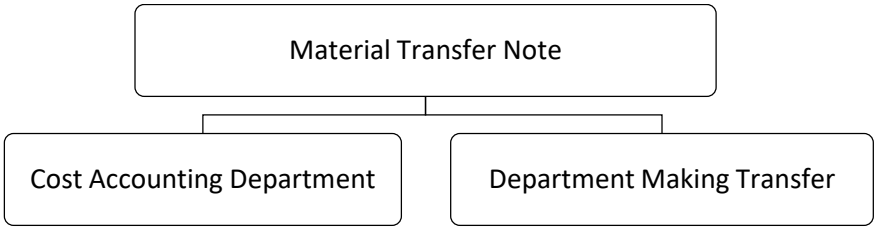
Issue of material must not be made except under properly authorized requisition slip. Usually, it is the foreman of a department who has the authority to draw materials from the store. Issue of material must be made on the basis of first in first out, that is, out of the earliest lot in hand. If care is not exercised in this regard, quality of earliest lot of material may deteriorate for having been kept for a long period.

Issue against Material Requisition Note

It is the voucher of the authority as regards to the issue of materials for use in the factory or in any of its departments. After receipt of material requisition slip, store keeper ensures that requisition is properly authorized and requisitioned quantity is within the quantity specified in bill of materials.

Transfer of Material

The surplus material arising on a job or other units of production may sometime be unsuitable for transfer to store because of its bulk, heavy weight, brittleness or some other reason. It may, however, be possible to find some alternative use for such materials by transferring them to some other job instead of returning them to the store. It must be stressed that generally transfer of material from one job to another is irregular, if not improper; in so far, it is not conducive to correct allocation and control of material, cost of jobs or other units of production. It is only in the circumstances envisaged above, that such direct transfer should be made. At the time of material transfer, a material transfer note should be made in duplicate. The disposition of the copies of this note being are as follows:



No copy is required for the store, as no entry in the stores records would be called for. The Cost Accounting Department would use its copy for the purpose of making the necessary entries in the cost ledger accounts for the jobs affected.

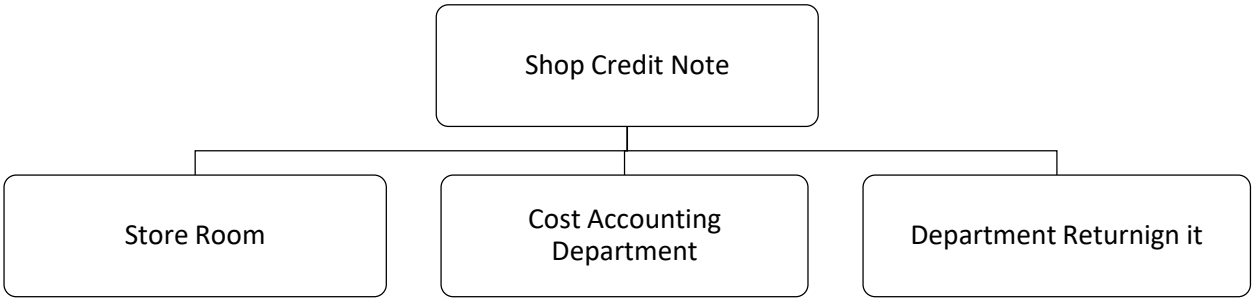
Format of a material requisition note may vary on the basis of industrial peculiarities, management information system (MIS) and accounting system in place.

Return of Material

Sometimes, it is not possible before hand to make any precise estimate of the material requirements or units of production. Besides, at times, due to some technical issues or other difficulties, it is not practicable to measure the exact quantity of material required by a department. In either case, material may have to be issued from stores in bulk, often in excess of the actual quantity required. Where such a condition exists, it is of the utmost importance from the point of view of materials control that any surplus material left over on the completion of a job should be promptly hand over to the storekeeper for safe and proper custody.

Unless this is done, the surplus material may be misappropriated or misap- plied to some purpose, other than that for which it was intended. The material cost of the job against which the excess material was originally drawn in that case, would be overstated, unless the job is given credit for the surplus arising thereon.

The surplus material, when it is returned to the storeroom, should be accompanied by a document known as a Shop Credit Note or alternatively as a Stores Debit Note. This document should be made out; by the department returning the surplus material and it should be in triplicate to be used as follows:



VALUATION OF MATERIAL ISSUES

Cost Price Methods

i. Specific Price Method

This method is useful, especially when materials are purchased for a specific job or work order, as such materials are issued subsequently to that specific job or work order at the price at which they were purchased.

Advantages and Disadvantages

Advantages	Disadvantages
• The cost of materials issued for production purposes to specific jobs represent actual and correct costs.	• This method is difficult to operate, specially when purchases and issues are numerous.
• This method is best suited for non-standard and specific products.	

ii. First-in First-out (FIFO) Method

It is a method of pricing the issues of materials, in the order in which they are purchased. In other words, the materials are issued in the order in which they arrive in the store or the items longest in stock are issued first. Thus, each issue of material only recovers the purchase price which does not reflect the current market price. This method is considered **suitable in times of falling price** because the material cost charged to production will be high while the replacement cost of materials will be low. But, in the case of rising prices, if this method is adopted, the charge to production will be low as compared to the replacement cost of materials. Consequently, it would be difficult to purchase the same volume of material (as in the current period) in future without having additional capital resources.

Advantages and disadvantages

Advantages	Disadvantages
• It is simple to understand and easy to operate.	• If the prices fluctuate frequently, this method may lead to clerical error.

• Material cost charged to production represents actual cost with which the cost of production should have been charged.	• Since each issue of material to production is related to a specific purchase price, the costs charged to the same job are likely to show a variation from period to period.
• In the case of falling prices, the use of this method gives better results.	• In the case of rising prices, the real profits of the concern being low, while the profits in the books will appear high. This may lead to inability of the firm to meet the materials purchase demand at the current market price.
• Closing stock of material will be represented very closely at current market price.	

iii. Last-in-First-out (LIFO) Method

It is a method of pricing the issues of materials on the basis of assumption that the items of the last batch (lot) purchased are the first to be issued. Therefore, under this method the prices of the last batch (lot) are used for pricing the issues, until it is exhausted, and so on. If however, the quantity of issue is more than the quantity of the latest lot, then earlier (lot) and its price will also be taken into consideration. **During inflationary period or period of rising prices, the use of LIFO would help** to ensure that the cost of production determined on the above basis is approximately the current one. This method is also useful specially when there is a feeling that due to the use of FIFO or average methods, the profits shown and tax paid are too high.

Advantages and Disadvantages

Advantages	Disadvantages
• The **cost of materials issued** will be either nearer to and or **will reflect the current market price.** Thus, the cost of goods produced will be related to the trend of the market price of materials. Such a trend in price of materials enables the matching of cost of production with current sales revenues.	• Calculation under LIFO system becomes complicated and cumbersome when frequent purchases are made at highly fluctuating rates.
• The use of the method during the period of rising prices does not reflect undue high profit in the income statement as it was under the first-in-first-out or average	• Costs of different similar batches of production carried on at the same time may differ a great deal.

method. In fact, the profit shown here is relatively lower because the cost of production takes into account the rising trend of material prices.	
• In the case of falling prices profit tends to rise due to lower material cost, yet the finished products appear to be more competitive and are at market price.	• In time of falling prices, there will be need for writing off stock value considerably to stick to the principle of stock valuation, i.e., the cost or the market price whichever is lower.
• Over a period, the use of LIFO helps to iron out the fluctuations in profits.	• This method of valuation of material is not acceptable to the income tax authorities.
• In the period of inflation LIFO will tend to show the correct profit and thus avoid paying undue taxes to some extent.	

iv. Base Stock Method

Minimum quantity of stock under this method is always held at a fixed price as reserve in the stock, to meet the state of emergency, if it arises. This minimum stock is known as base stock and is valued at a price at which the first lot of materials is received and remains unaffected by subsequent price fluctuations. This method of valuing inventory is different from other methods of valuing issues, as the base stock of materials are valued at the original cost, whereas, materials other than the base are valued using other methods like FIFO, LIFO etc. This method is not an independent method as it uses FIFO or LIFO. Advantages and disadvantages of this method depend upon the use of the other method viz., FIFO or LIFO.

Average Price Methods

Simple Average Price Method Under this method, materials issued are valued at average price, which is calculated by dividing the total of rates at which different lot of materials are purchased by total number of lots. In this method quantity purchased in each lot is ignored. However, the price of stock of that lot which is completely sold out is not considered for taking average price

Advantages and Disadvantages:

Advantages	Disadvantages
• This method is simple to use for an entity which orders materials in a lot of standard quantity, as only price per lot is taken to calculate average price	• This method does not provide right stock valuation when standard quantity for purchase in a lot is not specified.

• In a stable price environment, this method gives a price which approximates to the current market price.	• When price of materials fluctuates and the entity chooses to customize the order quantity, the price under this method may differ substantially from the current market price.

Weighted Average Price Method: Unlike Simple Average Price method, this method gives due weightage to quantities also. Under this method, issue price is calculated by dividing sum of products of price and quantity by total number quantities.

Advantages and Disadvantages:

Advantages	Disadvantages
• It smoothens the price fluctuations, if at all it is there, due to material purchases.	• Material cost does not represent actual cost price and therefore, a different profit or loss will arise out of such a pricing method.
• Issue prices need not be calculated for each issue unless new lot of materials is received.	• It may be difficult to compute, since every time lot is received, it would require re-computation of issue prices.

Market Price Methods

Replacement Price Method

Replacement price is defined as the price at which it is possible to purchase an item, identical to that which is being replaced or revalued. Under this method, materials issued are valued at the replacement cost of the items. This method is useful to determine true cost of production and to value material issues in periods of rising prices, because the cost of material considered in cost of production would be able to replace the materials at the increased price.

Realisable Price Method

Realisable price means a price at which the material to be issued can be sold in the market. This price may be more or may be less than the cost price at which it was originally purchased. Like replacement price method, the stores ledger would show profit or loss in this method too.

Notional Price Methods

Standard Price Method:

Under this method, **materials are priced at some predetermined rate or standard price** irrespective of the actual purchase cost of the materials. Standard cost is usually fixed after taking into consideration the following factors:

i. Current prices,

ii. Anticipated market trends, and

iii. Discount available and transport charges etc.

Standard prices are fixed for each material and the requisitions are priced at the standard price. This method is useful for controlling material cost and determining the efficiency of purchase department. In the case of highly fluctuating prices of materials, it is difficult to fix their standard cost on long-term basis.

Advantages	Disadvantages
• The use of the standard price method simplifies the task of valuing issues of materials.	• The use of standard price does not reflect the market price and thus results in a different or incorrect profit or loss.
• It facilitates the control of material cost and the task of judging the efficiency of purchase department.	• The fixation of standard price becomes difficult when prices fluctuate frequently
• It reduces the clerical work.	

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.

Re-use Price Method:

When materials are rejected and returned to the stores or a processed material is put to some other use, other than 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.

VALUATION OF RETURNS & SHORTAGES

Valuation of Materials Returned to the Vendor

Generally, materials are checked for quality, before dispatching to the store; and if any issues arise such as not meeting the quality requirements or any specification or are considered unfit for production due to any reason, due notice is made and materials are returned to the vendor. However, even if any substandard quality is noticed, before or after reaching the store, such materials can also be returned to the vendor.

The price of the materials to be returned to the vendor should include its invoice price plus freight, receiving and handling charges etc. Strictly speaking, the materials returned to the vendor should be returned at the stores ledger price and not at invoice price. But in practice, only invoice price is considered and the gap between the invoice price and stores ledger price is charged as overhead. In stores ledger, the defective or sub-standard materials are shown in the issue column at the rate shown in the ledger, and the difference between issue price and invoice cost is debited to an inventory adjustment account.

Valuation of Materials Returned to Stores

When materials requisitioned for a specific job or work-in progress are found to be in excess of the requirement or are unsuitable for the purpose, they are returned to the stores. There are two ways of treating such returns.

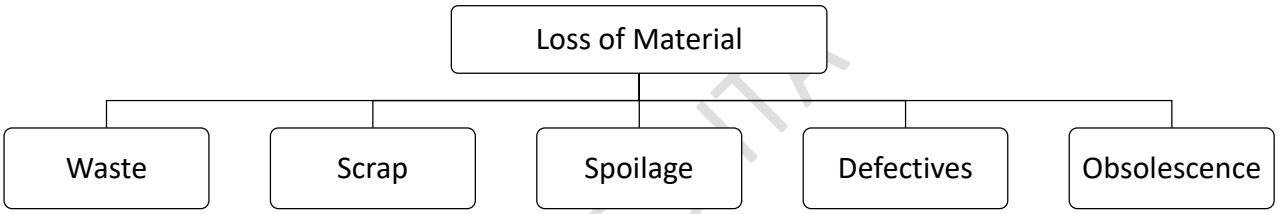
1. Such returns are entered in the receipt column at the price at which they were originally issued, and the materials are kept in suspense account, to be issued at the same price, against the next requisition.
2. Include the materials in stock, as if they were fresh purchases at the original issue price.

Valuation of Shortages during Physical Verification

Materials found short during physical verification should be entered in the issue column and valued at the rate as per the method adopted, i.e., FIFO or any other.

TREATMENT OF NORMAL AND ABNORMAL LOSS OF MATERIALS

Loss of materials during handling, storage, process may occur any of the following forms:



Waste

The portion of raw material which is lost during storage or production and discarded. The waste may or may not have any value.

Treatment of Waste:

Normal- Cost of normal waste is absorbed by good production units.

Abnormal- The cost of abnormal loss is transferred to Costing Profit and loss account.

Scrap

The materials which are discarded and disposed-off without further treatment. Generally, scrap has either no value or insignificant value. Sometimes, it may be reintroduced into the process as raw material.

Treatment of Scrap:

Normal- The cost of scrap is borne by good units and income arises on account of realisable value is deducted from the cost.

Abnormal- The scrap account should be charged with full cost. The credit is given to the job or process concerned. The profit or loss in the scrap account, on realisation, will be transferred to the Costing Profit and Loss Account.

Spoilage

It is the term used for materials which are badly damaged in manufacturing operations, and they cannot be rectified economically and hence taken out of the process to be disposed off in some manner without further processing.

Treatment of Spoilage:

Normal - Normal spoilage (i.e., which is inherent in the operation) costs are included in costs, either by charging the loss due to spoilage to the production order or by charging it to the production overhead so that it is spread over all the products. Any value realised from spoilage is credited to production order or production overhead account, as the case may be.

Abnormal-The cost of abnormal spoilage (i.e., arising out of causes not inherent in manufacturing process) is charged to the Costing Profit and Loss Account. When spoiled work is the result of rigid specification, the cost of spoiled work is absorbed by good production while the cost of disposal is charged to production overhead.

Defectives:

It signifies those units or portions of production which do not meet the quality standards. Defectives arise due to sub-standard materials, bad-supervision, bad-planning, poor workmanship, inadequate-equipment and careless inspection. The defectives which can be re-made as per the quality standard by using additional materials are known as reworks. Reworks include repairs, reconditioning and refurbishing. Defectives which cannot be brought up to the quality standards are known as rejects. The rejects may either be disposed-off or re-cycled for production process.

Treatment of Defectives:

Normal- An amount equal to the cost less realisable value on sale of defectives are charged to material cost of good production.

Abnormal- Material cost of abnormal defectives are not included in material cost but treated as loss after giving credit to the realisable value of such defectives. The material cost of abnormal loss is transferred to costing profit and loss account. Reclamation of loss from defective units. In the case of articles that have been spoiled, it is necessary to take steps to reclaim as much of the loss as possible.

For this purpose

i. All defective units should be sent to a place fixed for the purpose;

ii. These should be dismantled;

iii. Goods and serviceable parts should be separated and taken back into the stock;

iv. Parts which can be made serviceable by further work should be separated and sent to the workshop for the purpose and taken into stock after the defects have been removed; and

v. Parts which cannot be made serviceable should be collected in one place for being melted or sold off

Difference between Waste and Scrap

Waste	Scrap
1. It is connected with raw material or inputs to the production process.	**1.** It is the loss connected with the output
2. Waste of materials may be visible or invisible.	**2.** Scraps are generally identifiable and has physical substance.
3. Generally, waste has recoverable value. no	**3.** Scraps are termed as by-products and has small recoverable value.

Difference between Scrap and Defectives

Scrap	Defectives
1. It is the loss connected with the output	**1.** This type of loss is connected with the output as well as the input.
2. Scraps are not intended but cannot be eliminated due to the nature of material or process itself.	**2.** Defectives also are not intended but can be eliminated through a proper control system.
3. Generally, scraps are not used or rectified.	**3.** Defectives can be used after rectification.
4. Scraps have insignificant recoverable value.	**4.** Defectives are sold at a lower value from that of the good one.

Distinction between Spoilage and Defectives

The difference between spoilage and defectives is that while spoilage cannot be repaired or reconditioned, defectives can be rectified and transferred, either back to the standard production or to the seconds.

The problem of accounting for defective work is in relation to the costs of rectification or rework.

Obsolescence:

Obsolescence is defined as "the loss in the intrinsic value of an asset due to its supersession". In simple words, obsolescence refers to the loss in the value of an asset due to technological advancements.

Treatment - Materials may become obsolete under any of the following circumstances:

i. where it is a spare part or a component of a machinery that is used in manufacturing and is now obsolete;

ii. where it is used in the manufacturing of a product which has now become obsolete;

Where the material itself is replaced by another material due to either improved quality or fall in price. In all the three cases, 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 is an abnormal loss and it does not form part of the cost of manufacture.

CONSUMPTION OF MATERIALS

Any product that is manufactured in a firm entail's consumption of resources like material, Labour etc. The management for planning and control must know the cost of using these resources in manufacturing process. The consumption of materials takes place when it is used in the manufacturing of the product. It is important to note that the amount of materials consumed in a period by a cost object need not be equal to the amount of material available with the concern. For example, during any period, the total of raw material stock available for use in production may not be equal to the amount of materials actually consumed and assigned to the cost object of the production. The difference between the material available and material consumed represents the surplus stock or stock of material at the end of the period.

Identification of Materials

For the identification of consumption of materials with products of cost centres the followings points should be noted:

1. It is required that the concern should follow coding system for all materials, so that each material is identified by unique code number.
2. It is required that each product of a cost centre should be given a unique code number so that the direct material issued for production of particular product of a cost centre can be collected against the code number of that product.

   However, it may not be possible to allocate all materials directly to individual product of a cost centre e.g. maintenance materials, inspection and testing materials etc. The consumption of these materials are collected for cost centre and then charged to individual product by adopting suitable overhead absorption rate of cost centre.

   $$\text{Overhead absorption rate of cost centre} = \frac{\text{Cost for cost centre}}{\text{Base relating to cost centre}}$$
3. Each issue of materials should be recorded. One way of doing this is to use a material requisition note. This note shows the details of materials issued for the product of cost centre or the cost centre which is to be charged with cost of materials.
4. A material return note is required for recording the excess materials returned to the store. This note is required to ensure that original product of cost centre is credited with the cost of material which was not used and that the stock records are updated.
5. A material transfer note is required for recording the transfer of materials from one product of cost centre to other or from one cost centre to other cost centre.
6. The cost of materials issued would be determined according to stock valuation method used.

Monitoring Consumption of Materials

For monitoring consumption of materials, a storekeeper should periodically analyse the various material requisitions, material return notes and material transfer notes. Based on this analysis, a **material abstracts or material issue analysis sheet is prepared,** which shows at a glance the value of material consumed in manufacturing each product. This statement is also useful for ascertaining the cost of material issued for each product.

Format of Material Abstract

Week Ending.....

Material requisition or Transfer Note or Returned Note No.	Amount (Rs.)	Product Nos.						Total for Product	Overheads (Indirect Material charged)
		101	102	103	104	105	106		
		(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)		(Rs.)
	—	—	—	—	—	—	—	—	—
Total									

The material abstract statement serves a useful purpose. It, in fact, shows the amount of material to be debited to various products & overheads. The total amount of stores debited to various products & overheads should be the same as the total value of stores issued in any period.

Basis for Consumption Entries in Financial Accounts

Every manufacturing organization assigns material costs to the products for two purposes.

Firstly, for external financial accounting requirements, in order to allocate the material costs incurred during the period between cost of goods produced and inventories; **secondly to provide useful information for managerial decision-making** requirements. In order to meet external financial accounting requirements, it may not be necessary to accurately trace material costs to individual products. Some products costs may be overstated and others may be understated. But this may not matter for financial accounting purposes, as long as total of individual materials costs transactions are recorded i.e., transactions between cost centre within the firm are recorded in a manner that facilitates analysis of costs for assigning them to cost units. The consumption entries in financial accounts are made on the basis of total cost of purchases of materials after adjustment for opening and closing stock of materials.

Following equation is applicable here:

Consumption of Materials = Opening Stock of materials + Purchases – Closing Stock of materials

The stock of materials is taken at cost or net realizable value, whichever is less.

QUESTIONS FOR CLASSROOM DISCUSSION

PROBLEM – 1

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	₹
200 units Part No. A 32 @ Rs. 5	1,000.00
Less: 20% discount	(200.00)
	800.00
Add: GST @ 12%	96.00
	896.00
Add: Packing charges (5 non-returnable boxes)	50.00
	946.00

I. A 2 per cent cash discount will be given if payment is made in 30 days.

II. Documents substantiating payment of GST are enclosed for claiming Input credit.

PROBLEM – 2

From the following information calculate ordering cost and holding cost:

Estimated Annual material consumption	1,20,000 units	Ordering cost per order	100
Order quantity or order size	10,000 units	Holding cost per unit per annum	6

Also, state whether the above ordering quantity is the optimum ordering quantity. Also, calculate the relevant total cost at EOQ.

PROBLEM – 3

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 a new price of Rs. 12.80 is used.

PROBLEM – 4

The annual carrying cost of material 'X' is 3.6 per unit and its total carrying cost is ₹9,000 per annum. What would be the Economic order quantity for material 'X', if there is no safety stock of material X?

PROBLEM – 5

The 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:

PARTICULARS	FERTILIZERS	
	SUPER GROW	NATURE'S OWN
Annual Demand	2,000 bags	1,280 bags
Relevant ordering cost per purchase order	₹ 1,200	₹ 1,400
Annual relevant carrying cost per bag	₹ 480	₹ 560

Required:

a. Compute EOQ for super Grow and Nature's own.

b. 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?

c. For the EOQ, compute the number of deliveries per year for Super Grow and Nature's Own.

PROBLEM – 6

From the details given below, CALCULATE:

a. Re-ordering level

b. Maximum level

c. Minimum level

d. Danger level.

Re-ordering quantity is to be calculated on the basis of following information: Cost of placing a purchase order is Rs. 20. Number of units to be purchased during the year is 5,000 Purchase price per unit inclusive of transportation cost is Rs. 50 Annual cost of storage per units is Rs. 5.

Details of lead time: Average- 10 days, Maximum- 15 days, Minimum- 5 days.

For emergency purchases- 4 days.

Rate of consumption: Average: 15 units per day,

Maximum: 20 units per day.

PROBLEM – 7

Mohit Enterprises manufactures a special product "ZED". The following particulars were collected for the year

a. Monthly demand of ZED – 1,000 units.

b. Cost of placing an order 100.

c. Annual carrying cost per unit ₹15.

d. Normal usage 50 units per week.

e. Minimum usage 25 units per week.

f. Maximum usage 75 units per week.

g. Re-order period 4 to 6 weeks.

Compute from the above:

1	Re-order Quantity
2	Re-order Level
3	Minimum Level
4	Maximum Levels
5	Average Stock Level

PROBLEM – 8

A Company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 2022-23:

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:

i. COMPUTE the economic order quantity

ii. STATE whether the quantity discount offer can be accepted.

PROBLEM – 9

A firm is using an EOQ system of inventory replenishment for one of its purchased items, which has a known annual demand of 48,000 units with a near-uniform rate of consumption. The cost of placing an order is ₹ 250. The cost of the item is ₹ 5 per unit. The firm uses an inventory carrying rate of 30% p.a.

- Find the optimum order quantity and the number of orders per year.
- If the lead time is 10 days and a year is taken as 300 days find the re-order point.
- If for administrative reasons the firm wishes to place orders only once in three months how much extra cost will the firm incur on this policy?

PROBLEM – 10

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	5,000	30	3	4	5	4,750	?
C	6	10,000	15	2	3	4	?	2,000

Weekly production varies from 175 to 225 units, averaging 200 units of the said product.

COMPUTE 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.

PROBLEM – 11

M/s Tyro tubes trades in four-wheeler tyres and tubes. It stocks a sufficient quantity of tyres for almost every vehicle. In year-end 20x1-x2, the report of sales manager revealed that M/s Tyro tubes experienced stock-out of tyres.

The stock-out data is as follows:

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

M/s Tyro tubes loses ₹ 150 per unit due to stock-out and spends ₹ 50 per unit on carrying of inventory.

DETERMINE optimum safest stock level.

PROBLEM – 12

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

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

The annual demand for the material is 4,000 tonnes.

Stock holding costs are 20% of material cost p.a. The delivery cost per order is ₹ 6.00.

PROBLEM – 13

X Ltd. uses 50 containers of acid per annum at their plant. It has been calculated that a purchase order costs ₹ 10 to process and that the cost of stockholding is ₹ 1 per container per annum. Suppliers of acid offer quantity discounts as laid out below:

Number of Containers	01 - 09	10 - 49	50 - 99	100 & above
Discount per unit	Nil	₹ 0.50	₹ 1.00	₹ 1.60

Compute EOQ in the above situation.

PROBLEM – 14

The following is a summary of the receipts and issues of materials in a factory during a month:

Date	Particulars
1	Opening balance 500 units at ₹ 25 per unit
3	Issue 70 units
4	Issue 100 units
8	Issue 80 units
13	Received 200 units @ ₹ 24.50 per unit
14	Returned to store 15 units @ ₹ 24 per unit
16	Issue 180 units
20	Received 240 units @ ₹ 24.75 per unit.
24	Issue 304 units

25	Received 320 units @ ₹ 24.50 per unit.
26	Issue 112 units
27	Returned to store 12 units @ ₹ 24.50 per unit
28	Received 100 units at ₹ 25 per unit

Work out on the basis of '**FIFO**' and '**LIFO**' the value of closing stock. It was revealed that on 15th there was a shortage of 5 units and on 27th of 8 units.

PROBLEM – 15

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

a. Simple Average Method and

b. Weighted Average Method

from the following information pertaining to material 'X'.

Date	Particulars
1	Purchased 100 units @ ₹ 10.00 each.
2	Purchased 200 units @ ₹ 10.20 each
5	Issued 250 units to Job A vide MR No. 1
7	Purchased 300 units @ ₹ 10.50 each
10	Purchased 200 units @ ₹ 10.80 each
13	Issued 200 units to Job B vide MR No. 2
18	Issued 200 units to Job C vide MR No. 3
20	Purchased 100 units @ ₹ 11.00 each.
25	Issued 150 units to Job D vide MR No. 4

PROBLEM – 16

Imbrios India Ltd. is recently incorporated start-up company back in the year 2019. It is engaged in creating Embedded products and Internet of Things (IoT) solutions for the Industrial market. It is focused on innovation, design, research and development of products and services. One of its embedded products is LogMax, a system on module (SoM) Carrier board for industrial use. It is a small, flexible and embedded computer designed as per industry specifications.

In the beginning of the month of September 2022, company entered into a job agreement of providing 4800 LogMax to NIT, Mandi. Following details w.r.t. issues, receipts, returns of Store Department handling Micro-controller, a component used in the designated assembling process have been extracted for the month of September, 2022:

Sep. 1	Opening stock of 6,000 units @ Rs. 285 per unit
Sep. 8	Issued 4875 units to mechanical division vide material requisition no. Mech 009/22

Sep. 9	Received 17,500 units @ Rs. 276 per unit vide purchase order no. 159/22
Sep. 10	Issued 12,000 units to technical division vide material requisition no. Tech 012/22
Sep. 12	Returned to stores 2375 units by technical division against material requisition no. Tech 012/22.
Sep. 15	Received 9,000 units @ Rs. 288 per units vide purchase order no. 160/ 2222
Sep. 17	Returned to supplier 700 units out of quantity received vide purchase order no. 160/22.
Sep. 20	Issued 9,500 units to technical division vide material requisition no. Tech 165/22

On 25th September, 2022, the stock manager of the company expressed his need to leave for his hometown due to certain contingency and immediately left the job same day. Later, he also switched his phone off.

As the company has the tendency of stock-taking every end of the month to check and report for the loss due to rusting of the components, the new stock manager, on 30th September, 2022, found that 900 units of Micro-controllers were missing which was apparently misappropriated by the former stock manager. He, further, reported loss of 300 units due to rusting of the components.

From the above information you are required to prepare the Stock Ledger account using 'Weighted Average' method of valuing the issues.

PROBLEM – 17

The following transactions in respect of material Y occurred during the six months ended 30th September, 2022:

Month	Purchase (units)	Price per unit (Rs.)	Issued Units
April	200	25	Nil
May	300	24	250
June	425	26	300
July	475	23	550
August	500	25	800
September	600	20	400

Required:

a. The Chief Accountant argues that the value of closing stock remains the same no matter which method of pricing of material issues is used. Do you agree? Why or why not? EXPLAIN. Detailed stores ledgers are not required.

b. STATE when and why would you recommend the LIFO method of pricing material issues?

PROBLEM – 18

After inviting tenders, two quotations are received as follows:

Supplier A - ₹ 4.40 per unit

Supplier B - ₹ 4.20 per unit + ₹ 4,000

You are required to

i. Calculate the order quantity for which the purchase price per unit will be the same.

ii. Select the Supplier if the Purchase Department wishes to place an order for 15,000 units.

PROBLEM – 19

From the following details, DRAW a plan of ABC selective control:

Item	Units	Unit cost (Rs.)
1	7,000	5.00
2	24,000	3.00
3	1,500	10.00
4	600	22.00
5	38,000	1.50
6	40,000	0.50
7	60,000	0.20
8	3,000	3.50
9	300	8.00
10	29,000	0.40
11	11,500	7.10
12	4,100	6.20

PROBLEM – 20

From the following data for the year ended 31st March, 20x2, CALCULATE the inventory turnover ratio of the two items and put forward your comments on them.

Particulars	Material A	Material B
Opening stock 01.04.20x1	₹ 10,000	₹ 9,000
Purchase during the year	₹ 52,000	₹ 27,000
Closing stock 31.03.20x2	₹ 6,000	₹ 11,000

PROBLEM – 21

The particulars relating to the import of Sealing Ring made by AB & Co., during December, 20x1 are given below:

a. Sealing Ring – 1,000 pieces invoiced @ $ 2.00 C.I.F., Bombay Port.

b. Customs duty was paid @ 100% on Invoice Value (which was converted to Indian currency by adopting an exchange rate of ₹ 17.20 per).

c. Clearing charges - ₹ 1,800 for the entire consignment, and

d. Freight charges - ₹ 1,400 for transporting the consignment from Bombay Port to factory premises.

It was found on inspection that 100 pieces of the above material were broken and, therefore, rejected. There is no scrap value for the rejected part. No refund for the broken material would be admissible as per the terms of the contract. The Management decided to treat 60 pieces as normal loss and the rest 40 pieces as abnormal loss. Assume 700 pieces were consumed and 200 pieces were kept in closing stock.

Calculate:

a. Total cost of material, and

b. Unit cost of material issued to production.

Also, state briefly how the value of 100 pieces rejected in inspection will be treated in costs.

PROBLEM – 22

In a certain month, 6,000 kgs of raw material A costing ₹ 150 per kg were processed through Unit No. 3 for the manufacture of solvent X. The total operating cost of Unit No. 3 for the month was ₹12,00,000. Out of the output, 10% was unusable and was disposed of at ₹ 25 per kg. Prepare an account for the month's operation Unit No. 3 assuming that spoilage was:

i. Part of the normal production process;

ii. An abnormal loss due to poor quality material.

Additional information: Out of 5400 kgs, 5000 kgs were sold.

ADDITIONAL QUESTIONS FOR PRATICE

QFP 1 (Concept Similar to Problem – 1)

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

	₹
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

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

QFP 2 (Concept Similar to Problem – 2)

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

Consumption of materials per annum: 10,000 kg.

Order placing cost per order: Rs. 50

Cost per kg. of raw materials: Rs.2 Storage costs: 8% on average inventory

QFP 3 (Concept Similar to Problem – 6)

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.

QFP 4 (Concept Similar to Problem – 18)

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

No. 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.

QFP 5 (Concept Similar to Problem – 19)

The following data are available in respect of material X for the year ended 31st March, 2023.

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

CALCULATE:

i. Inventory turnover ratio, and

ii. The number of days for which the average inventory is held.

QFP 6 (Concept Similar to Problem – 13)

The following information is provided by Sunrise Industries for the fortnight of April, 2023:

Material Exe:

Stock on 1-4-2023 100 units at Rs. 5 per unit.

Purchases

5-4-2023, 300 units at Rs. 6

8-4-2023, 500 units at Rs. 7

12-4-2023, 600 units at Rs. 8

Issues

6-4-2023, 250 units

10-4-2023, 400 units

14-4-2023, 500 units

Required:

A. CALCULATE using FIFO and LIFO methods of pricing issues:

- **a.** the value of materials consumed during the period

b. the value of stock of materials on 15-4-2023.

B. EXPLAIN why the figures in a. and b. in part A of this question are different under the two methods of pricing of material issues used. You need not draw up the Stores Ledgers.

QFP 7 (Concept Similar to Problem – 8)

Anil & Company buys its annual requirement of 36,000 units in 6 instalments. Each unit costs Rs. 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. CALCULATE, how much money can be saved by Economic Order Quantity?

QFP 8 (Concept Similar to Problem – 12)

EXE Limited has received an offer of quantity discounts on its order of materials as under:

Price per ton (Rs.)	Ton (Nos.)
1,200	Less than 500
1,180	500 and less than 1,000
1,160	1,000 and less than 2,000
1,140	2,000 and less than 3,000
1,120	3,000 and above.

The annual requirement for the material is 5,000 tons. The ordering cost per order is Rs. 1,200 and the stock holding cost is estimated at 20% of material cost per annum.

You are required to

i. COMPUTE the most economical purchase level.

ii. WHAT will be your answer to the above question if there are no discounts offered and the price per ton is Rs. 1,500?

QFP 9 (Concept Similar to Problem – 9)

G. Ltd. produces a product which has a monthly demand of 4,000 units. The product requires a component X which is purchased at Rs. 20. For every finished product, one unit of component is required. The ordering cost is Rs. 120 per order and the holding cost is 10% p.a.

You are required to CALCULATE:

i. Economic order quantity.

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

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

QFP 10 (Concept Similar to Problem – 16)

The following information is extracted from the Stores Ledger:

Material X

Opening Stock Nil

Purchases:

Jan. 1 100 @ Rs. 1 per unit

Jan. 20 100 @ Rs. 2 per unit

Issues:

Jan. 22 60 for Job W 16

Jan. 23 60 for Job W 17

Complete the receipts and issues valuation by adopting the First-In-First-Out, Last-In-First-Out and the Weighted Average Method. TABULATE the values allocated to Job W 16, Job W 17 and the closing stock under the methods aforesaid and discuss from different points of view which method you would prefer.

CHAPTER 09: EMPLOYEE COST AND DIRECT EXPENSES

INTRODUCTION

To manufacture a product or to make provision for service, the role of human exertion inevitable. The term used for human resources may include workers, employees, labourers, staffs etc. employee cost is wider term which includes wages, salary, bonus, incentives etc. paid to an employee and charged to a cost object as labour cost. In a nutshell, **employee cost is wider term which includes wages, salary, bonus, incentives etc. paid to an employee and charged to a cost object as labour cost.**

Unlike other costs, employee costs are influenced by human behavior. Due to this peculiarity, divergence in employee compensation is observed across the different industries. Wages are determined on both quantitative and qualitative factors like volume of work, skills required etc. Hence, it is necessary that employees should be monitored, measured, and compensated appropriately to achieve economy in cost, efficiency in performance and effectiveness in desired output.

EMPLOYEE (LABOUR) COST

Employee (Labour) Cost: Benefits paid or payable to the employees of an entity, whether permanent, or temporary for the services rendered by them. Employee cost includes payments made in cash or kind. Employee cost includes the following:

i. Wages and salary;
ii. Allowances and incentives;
iii. Payment for overtimes;
iv. Employer's contribution to Provident fund and other welfare funds;
v. Other benefits (leave with pay, free or subsidised food, leave travel concession etc.) etc.

Classification of Employee (Labour) Cost: Employee cost are broadly classified as direct and indirect employee cost.

i. Direct Employee (Labour) Cost
Benefits paid or payable to the employees which can be attributed to a cost object in an economically feasible manner. This can be easily identified and allocated to an activity, contract, cost centre, customer, process, product etc.

ii. Indirect Employee (Labour) Cost
Benefits paid or payable to the employees, which cannot be directly attributable to a particular cost object in an economically feasible manner.

Distinction between Direct and Indirect Employee Cost

Direct employee cost	Indirect employee cost
1. It is the cost incurred in payment of employees who are directly engaged in the production process.	**1.** Cost incurred for payment of employees who are not directly engaged in the production process.
2. Direct employee cost can be easily identified and allocated to cost unit.	**2.** 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.	**3.** Indirect employee cost may not vary with the volume of production.

EMPLOYEE (LABOUR) COST CONTROL

Employee costs are associated with human beings. To control employee costs one has to understand human behaviour. Employee cost control means control over the cost incurred on employees. The aim should be to keep the wages per unit of output as low as possible.

The aim should be to keep the wages per unit of output as low as possible. This can only be achieved by giving employees appropriate compensation to encourage efficiency so that optimum output can be achieved in effective manner.

A well-motivated team of employees can bring about wonders. Each concern should, therefore, constantly strive to raise the productivity of employee. The efforts for the control of employee costs should begin from the very beginning. There has to be a concerted effort by all the concerned departments.

Department	Functions
1. Personnel Department	**i.** On receipt of employee requisition from the various departments it searches for therequired skills and qualification. **ii.** It ensures that the persons recruited possess the requisite qualification and skills required for the job. **iii.** Arranges proper training for the newlyrecruited employees and workshops forexisting employees. **iv.** Maintains all personal and job related records of the employees. **v.** Evaluation of performance from time to time
2. Engineering and Work Study Department	**i.** Prepares plans and specifications for each job. **ii.** Providing training and guidance to the employees. **iii.** Supervises production activities. **iv.** Conducts time and motion studies.

	v. Undertakes job analysis. **vi.** Conducts job evaluation.
3. Time-keeping Department	**i.** Concerned with the maintenance of attendance records i.e. time keeping and **ii.** Time spent by an employee on various jobs i.e. time booking etc.
4. Payroll Department	**i.** The preparation of payroll of the employees. **ii.** It disburses salary and wage payments.
5. Cost Accounting Department	**i.** Accumulation and classification of employee costs. **ii.** Analysis and allocation of costs to various cost centres or cost objects

Important Factors for the Control of Employee Cost

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

i. Assessment of manpower requirements.

ii. Control over time-keeping and time-booking.

iii. Time & Motion Study.

iv. Control over idle time and overtime.

v. Control over employee turnover.

vi. Wage and Incentive systems.

vii. Job Evaluation and Merit Rating.

viii. 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 paid per hour in each department and to analyse the total payment of wages of each departmentinto:

i. The amount included in the direct cost of goods produced or jobscompleted;

ii. The amount treated as indirect employee cost and thus included inoverheads; and

iii. The amount treated as the cost of idle time and hence loss.

iv. The amount treated as abnormal loss/ gain and to be transferred to profitand loss account. Through this process costs of various jobs are ascertained. Naturally, in this theproper recording of time spent by the employees is essential.

ATTENDANCE & PAYROLL PROCEDURES

Attendance Procedure / Time-keeping

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

Objectives of Time-keeping: Correct recording of employees' attendance time is of utmost importance where payment is made on the basis of time worked.

Where payment is made by results viz; straight piece work, it would still be necessary to correctly record attendance for the purpose of ensuring that proper discipline and adequate rate of production are maintained. The objectives of time-keeping are as follows:

i. For the preparation of payrolls.
ii. For calculating overtime.
iii. For ascertaining and controlling employee cost.
iv. For ascertaining idle time.
v. For disciplinary purposes.
vi. For overhead distribution.

Methods of Time-keeping

There are various methods of time-keeping, which may be categorized into manual and mechanical methods. The choice of a particular method depends upon the requirements and policy of an entity; butwhichever method is followed, it should make a correct record of the time byincurring minimum possible expenditure and it should minimise the risk of fraudulent payments of wages. The examples of time keeping methods are follows:

Manual Methods

a. **Attendance Register Method-** Under this method, an attendance register is kept to **record the arrival and departure time of an employee**. This method is simple and expensive and is suitable for small organisations. However, this method may lead to dishonest practice of time manipulation by way of recording wrong time and back date entry in collusion with time keeper.
b. **Metal Disc / Token Method-** This method of time recording is veryold and is almost obsolete in practice. Under this method, each employee is allotted a metal disc or a token with a hole bearing his identification number. The token is kept or handed to the time keeper who record the token number in his register. Like attendance register method, this method also has some disadvantages like error in recording, proxy attendance etc.

Mechanical / Automated Methods

a. **Punch Card Attendance-** Under this method, each employee is provided a card for marking attendance. **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 inand/or out. This system does not require to employ any time keeper and minimises the risk of recording error and time manipulation.

b. **Bio-Metric Attendance system-** Under bio-metric attendance system **attendance is marked by recognizing an employee on the basis of physical and behavioural traits**. An employee's unique identity likefinger print, face and retina image etc. are kept in a database which is matched at the time of marking of attendance before the attendance device for this purpose. Bio-metric attendance system includes fingerprint recognition system, face recognition system, Time and attendance tracking technology etc. This system reduces the risk of time manipulation and proxy attendance. However, it may not be suitable for small organisations due to cost associated with set-up and maintenance.

Requisites of a Good Time-Keeping System: A good time-keeping system should have following requisites:

1. System of time-keeping should be such which should not allow proxyfor another employee under any circumstances.
2. There should also be a provision of recording of time of piece employees so that regular attendance and discipline may be maintained. This is necessary to maintain uniformity of flow ofproduction.
3. Time of arrival as well as time of departure of employees should be recorded so that total time of employees may be recorded and wages may be calculated accordingly.
4. As far as possible, method of recording of time should be mechanical so that chances of disputes regarding time may not arise between employees and the time-keeper.
5. Late-comers should record late arrivals. Any relaxation by the time-keeper in this regard will encourage indiscipline.
6. The system should be simple, smooth and quick. Unnecessary queuingfor marking attendance should be avoided.
7. The system should be reviewed and maintained periodically to preventany error.

Time-Booking

Time keeping just records the time spent by an employee in the premises for production but it does not show how much time a person spent on a particularjob. **Time booking refers to a method wherein each activity of an employee is recorded.** This data recorded is further used for measure the time spent on a particular job for costing, measurement of efficiency, fixation of responsibility etc.

Time booking for costing: The time spent on a particular job or activity is used to compute the cost of the job or activity.

Time booking to measure efficiency: The efficiency of the employees is measures by comparing the actual time taken by an employee with the standard time that should have been taken.

Time booking for fixation of responsibility: The time booked data is used to analyse the variance in time taken by an employee on a particular job or processwith respect to standard time to see the reasons for the variance. The reasons for variance is further classified as controllable and

uncontrollable. The controllable reasons are those which can be avoided by due care and efficiency. On the other hand, uncontrollable reasons cannot be avoided under the normal circumstances. Employees or any other concerned person or departments are made accountablefor variance under controllable reasons.

For the collection of all such data, a separate record, generally known as Time (or Job) card, is kept. The time (or job) card can be of two types:

- **One containing analysis of time with reference to each job:** A separate job card is employed in respect of a job undertaken; where a job involvesseveral operations, a separate entry is made in respect of each operation.

  Thus, the job card would record the total time spent on a particular job or operation. If a number of people are engaged on the same job or operation, the time of all those employees would be booked on the same card.

  One advantage of this method is that it provides complete data on the employee content of job or operation collectively so that the computationof employee cost is greatly facilitated.

  But this method has drawbacks as well. Since an employee's job timing is scattered over a number of job cards the time spent on all these jobs and idle time must be abstracted periodically for finding each employee's totaltime spent on different jobs and the time for which he remained idle during the period. The total of these two times (job and idle) must obviously equalhis total attendance time, as shown by his attendance record.
- **The other with reference to each employee**: In this case, it would greatly facilitate reconciliation of the employee's job time with his attendance time recorded.

  Under this system, a separate card would be used for each employee for each day or for each week and the time which he spends on different jobs (and also any idle time) would be recorded in the same card so that the card wouldhave a complete history on it as to how his time had been spent during the period.

  The format of job or time may vary industry to industry and according to the accounting system into used.

PAYROLL PROCEDURE

Steps included in this process are as under:

1. **Time and Attendance details:** A detailed sheet of number of days or hours worked by each employee (in case of time-based payment) and 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 calculateany further incentives such as overtime payment, bonus to be paid to the employees.
2. **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. Payroll department should ensure that no unauthorised or bogus employeeis paid.

3. **Computation of wages and other incentives:** Payroll department based on the details provided by the time keeping department and personnel department calculate wages/ salary 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.
4. **Payment to the employees:** 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 deductions wages/ salary is paid to the employees.
5. **Deposit of all statutory liabilities:** 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.

The followings are generally deducted from the payroll

Type of deductions	Description
Statutory Deductions	
1. Provident fund	Employee's contribution to the Provident fund is deducted from the salary/ wages of the concerned employee.
2. Employee State Insurance Scheme (ESI)	Employee's contribution to the ESI is deducted from the salary/ wages.
3. Tax Deduction at Source (TDS)	Employer is obliged to deduct tax at source if it will be paying to the employee net salary exceeding maximum exemption limit, in equal monthly instalments to the income tax department.
4. Professional Tax	Professional tax is a state level tax imposed for carrying on business, profession or service.
Other Deductions	
1. Voluntary contribution to Provident fund	If any employee so desires may contribute over and above the contribution payable by the employer.
2. Contribution to any benevolent fund.	An employee may contribute to any benevolent fund voluntarily by putting a request to the payroll department.
3. Loan deductions	Instalments of any loan taken by the employee.
4. Other advances and dues	Other advances like festival advance and unadjusted advances taken.

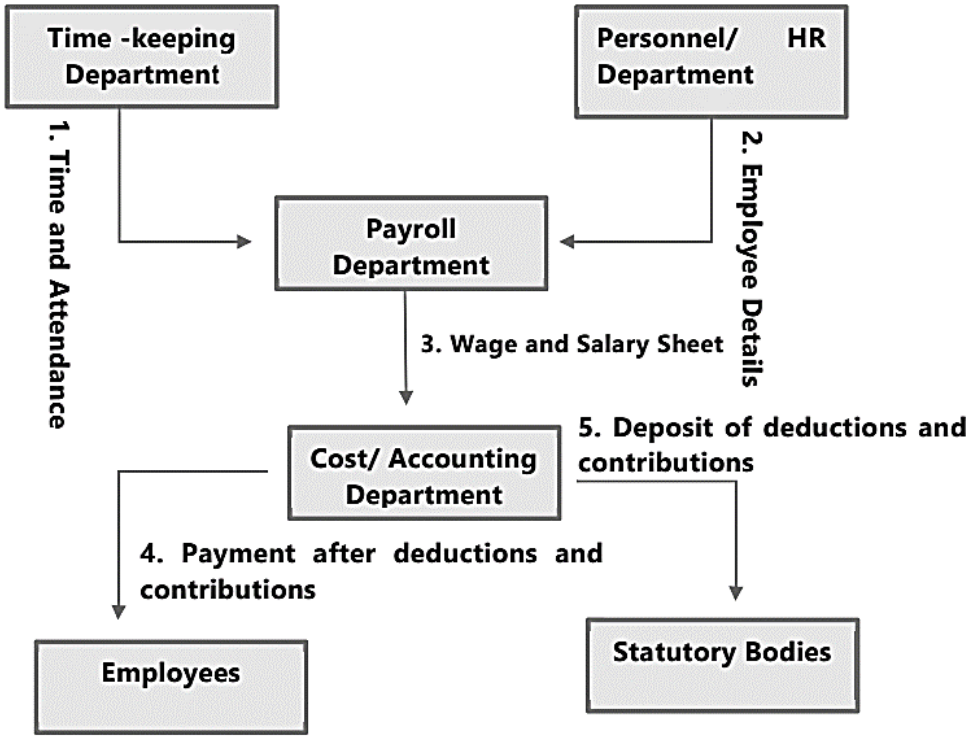


Diagram: Payroll Procedures

IDLE TIME

The time during which no production is carried-out because the worker remains idle but are paid.

Normal idle time: It is the time which cannot be avoided or reduced in the normal course of business.

Normal idle time:

It is the time which cannot be avoided or reduced in the normal course of business.

Causes	Treatment
1. The time lost between factory gate and the place of work,	It is treated as a part of cost of production. Thus, in the case of direct workers an allowance for normal idle time is considered setting of standard hours or standard rate.
2. The interval between one job and another, **3.** The setting up time for the machine, **4.** Normal rest time, break for lunch etc.	In case of indirect workers, normal idle time is considered for the computation of overhead rate.

Abnormal idle time

Apart from normal idle time, there may be factors which give rise to abnormal idle time.

Causes	Treatment
1. Idle time may also arise due to abnormal factors like lack of coordination **2.** Power failure, Breakdown of machines	Abnormal idle time cost is not included as a part of production cost and is shown as a separate item in the Costing Profit and Loss Account.

3. Non-availability of raw materials, strikes, lockouts, poor supervision, fire, flood etc. **4.** The causes for abnormal idle time should be further analysed into controllable and uncontrollable. **i.** Controllable abnormal idle time refers to that time which could have been put to productive use had the management been more alert and efficient. All such time which could have been avoided is controllable idle time. **ii.** Uncontrollable abnormal idle time refers to time lost due to abnormal causes, over which management does not have any control e.g., breakdown of machines, flood etc. may be characterised as uncontrollable idle time.	The cost of abnormal idle time should be further categorised into controllable and uncontrollable. For each category, the break-up of cost due to various factors should be separately shown. This would help the management in fixing responsibility for controlling idle time. Management should aim at eliminating controllable idle time and on a long- term basis reducing even the normal idle time. This would require a detailed analysis of the causes leading to such idle time.

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. Overtime payment consist of two elements- (i) Normal wages for overtime workand (ii) Premium payment for overtime work.

Overtime Payment = Wages paid for overtime at normal rate + Premium (extra) payment for overtime work

Overtime premium

The rate for overtime work is higher than the normal time rate; usually it is at double the normal rates. The extra amount so paid over the normal rate is called overtime premium. Rate and conditions for overtime premium may either be fixed by an entity itself or it may be required by any statute in force. Occasional overtime is a healthy sign as it indicates that the firm has the optimum capacity and that the capacity is being fully utilised. But persistent overtime is rather abad sign because it may indicate either a. that the firm needs larger capacity in men and machines, or b. that men have got into the habit of postponing their ordinary Work towards the evening so that they can earn extra money in the form of overtimewages.

Causes of Overtime and Treatment of Overtime premium in cost accounting

Causes	Treatment
1. The customer may agree to bear the entire charge of overtime because urgency of work.	**1.** 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.	**2.** 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 particular 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.	**3.** If overtime is worked in a department due to the fault of another department, the overtime premium should be charged to the latter department.
4. Overtime work may be resorted to, to secure an out-turn in excess of the normal output to take advantage of an expanding market or of rising demand	**4.** 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.

LABOUR UTILISATION

For identifying utilization of labour a statement is prepared (generally weekly) 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.

Identification of Utilisation of labours with Cost Centres

For the identification of utilisation of labour with the cost centre, a wage analysis sheet 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, time card, piece work cards and job cards.

The preparation of such sheet serves the following purposes:

i. It analyse the labour time into direct and indirect labour by cost centres, jobs, work orders.

ii. It provides details of direct labour cost comprises of wages, overtime to be charged as production cost of cost centre, jobs or work orders.

iii. It provides information for treatment of indirect labour cost as overhead expenses.

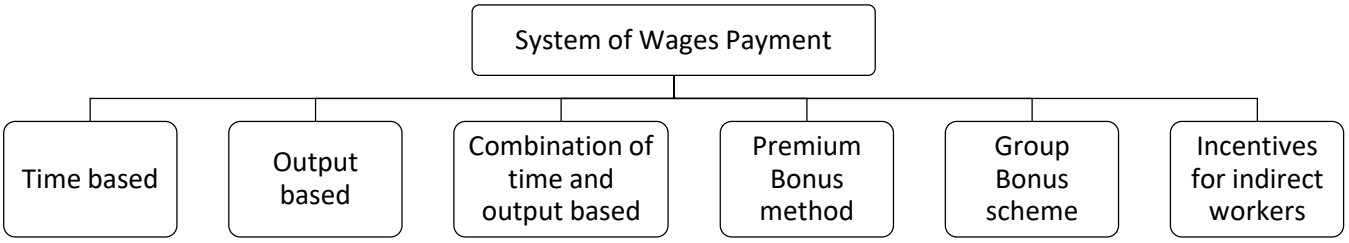
Identification of labour hours with work order or batches or capital job

For identification of labour hours with work order or batches or capital jobs or overhead work orders the following points are to be noted:

i. The direct labour hours can be identified with the particular work order or batches or capital job or overhead work orders on the basis of details recorded on source document such as time sheet or job cards.

ii. The indirect labour hours cannot be directly identified with the particular 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.

SYSTEMS OF WAGE PAYMENT AND INCENTIVES



Time Based (Time Rate System)

Straight Time Rate System: Under this system, the workers are paid on time basis i.e., hour, day, week, or month. The amount of wages due to a worker are arrived at by multiplying the time worked (including normal idle period) by rate for the time. Wages under time rate system is calculated as under:

Wages = Time Worked (Hours/ Days/ Months) × Rate for the time

Output Based (Piece Rate System)

Straight Piece Rate System Under this system, each operation, job or unit of production is termed a piece. A rate of payment, known as the piece rate or piece work rate is fixed for each piece. The wages of the worker depend upon his output and rate of each unit of output; it is in fact independent of the time taken by him. The wages paid to a worker are calculated as:

Wages = Number of units produced × Rate per unit

Premium Bonus Method

i. Halsey Premium Plan Under Halsey premium plan a standard time is fixed for each job or process. If there is no saving on this standard time allowance, the worker is paid only his day rate. He gets his time rate even if he exceeds the standard time limit, since his day rate is guaranteed.

Wages = Time taken × Time rate + 50% of time saved × Time rate

ii. Rowan Premium Plan According to this system a standard time allowance is fixed for the performance of a job and bonus is paid if time is saved.

Under Rowan System the bonus is that proportion of the time wages as time saved bears to the standard time.

$$\textbf{Time taken} \times \textbf{Rate per hour} + \frac{\text{Time saved}}{\text{Time allowed}} \times \textbf{Time taken} \times \textbf{Rate per hour}$$

Advantages and Disadvantages of Halsey Premium Plan

Advantages	Disadvantages
1. Time rate is guaranteed while there is opportunity for increasing earnings by increasing production.	**1.** Incentive is not so strong as with piece rate system. In fact the harder the worker works, the lesser he gets per piece.
2. The system is equitable in as much as the employer gets a direct return for his efforts in improving production methods and providing better equipment.	**2.** The sharing principle may not be liked by employees.

Advantages and Disadvantages of Rowan Premium Plan

Advantages	Disadvantages
1. 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.	**1.** The system is a bit complicated
2. It is admirably suitable for encouraging moderately efficient workers as it provides a better return for moderate efficiency than under the Halsey Plan.	**2.** The incentive is weak at a high production level where the time saved is more than 50% of the time allowed.
3. The sharing principle appeals to the employer as being equitable.	**3.** The sharing principle is not generally welcomed by employees.

ABSORPTION OF WAGES

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:

i. Medical facilities;

ii. Educational and training facilities;

iii. Recreational and sports facilities;

iv. Housing and social welfare; and

v. Cost of subsidised canteen and co-operative societies.

Such benefits are generally given in an industrial establishment. In some cases, the provision of benefits is compulsory. Therefore, while computing the wage cost per worker, the monetary value of such non-monetary benefits should also be taken into account.

The monetary part of a worker's remuneration includes the basic wages, dearness allowance, overtime wages, other special allowance, if any, production bonus, employer's contribution to the provident fund, Employees State Insurance scheme premium, contribution to pension fund, leave pay, etc.

The **basic wage** is the payment for work done, measured in terms of hours attended or the units produced, as the case may be. The basic wage rate is not normally altered unless there is a fundamental change in the working conditions or methods of manufacture.

Dearness allowance is an allowance provided to cover the increase in cost of living from one period to another. This allowance is calculated either as percentage of the basic wage or as a fixed amount for the days worked. In either case, the percentage or the fixed amount is subject to revision whenever the cost of living index or consumer price Index rises or falls by a certain figure as agreed to by the employer with the Employee union. When permanent rise in the cost of living index occurs, a part of the dearness allowance is often absorbed in the basic wage.

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 upto 20% of wages depending upon the quantum of profits calculated as per the Act.

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. The question is to what extent such additional payment or cost in respect of Employee can be charged directly to unit of cost as part of direct Employee cost? Of course, in the case of indirect Employee, all such payments as also the wages paid to them, must be treated as part of overheads.

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.

Night Shift Allowance

In some cases, workers get extra payment if they work at night. Since the extra payment is not for any particular job, therefore such a payment should be treated as part of overheads.

Absorption Rates of Employee Cost

Employee cost as stated above include monetary compensation and non-monetary benefits to workers.

Monetary benefits include, basic wages, D.A., overtime pay, incentive or production bonus contribution to employee provident fund, House Rent Allowance, Holiday and vacation pay etc.

The non-monetary benefits include medical facilities, subsidized canteen services, subsidized housing, education and training facilities.

Accounting of monetary and non-monetary benefits to indirect workers does not pose any problems because the total of monetary and non-monetary benefits are treated as overhead and absorbed on the basis of 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:

$$\text{Rate per hour} = \frac{\text{Total estimated monetary benefits and cost of non monetary benefits}}{\text{Budgeted direct employee hour - Normal idle time}}$$

Another alternative method is to treat the monetary benefits other than basic wages and dearness allowance as well as cost of non-monetary benefits as overheads.

EFFICIENCY RATING PROCEDURES

Efficiency is usually related with performance and may be computed by comparing the time taken with the standard time allotted to perform the given job/task.

If the time taken by a worker on a job equals or less than the standard time, then he is rated efficient.

In case he takes more time than the standard time he is rated as inefficient.

$$\text{Efficiency in \%} = \frac{\text{Time allowed as per standard}}{\text{Time Taken}} \times 100$$

For efficiency rating of employees the following procedures may be followed:

1. 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.
2. Measuring Actual Performance of workers: For computing efficiency rating it is necessary to develop a procedure for recording the actual performance of workers. The system developed should record the output of each worker along with the time taken by him.
3. Computation of efficiency rating: The efficiency rating of each worker can be computed by using the above mentioned Formula.

Need for Efficiency Rating

1. As discussed earlier when a firm follows a system of payment by results, the payment has a direct relationship with the output given by a worker. The firm for making payment to worker is required to ascertain his efficiency level.
2. The efficiency rating also helps the management in preparing employee requirement budget or for preparing manpower requirements.

Employee Productivity

Productivity is generally determined by the input/output ratio. In case of employees, it is calculated as below: $\frac{\text{Standard time for doing actual work}}{\text{Actual time taken}}$

Employee productivity is used for measuring the efficiency of individual workers. It is an index of efficiency in the utilization of human resources, materials, capital, power and all kinds of services and facilities.

It is measured by the output in relation to input. Productivity can be improved by reducing the input for a certain quantity or value of output or by increasing the output from the same given quantity or value of input.

Factors for increasing Employee Productivity: The important factors which must be taken into consideration for increasing employee productivity are as follows:

1. Employing only those workers who possess the right type of skill.
2. Placing a right type of person to a right job.
3. Training young and old workers by providing them the right types of opportunities.
4. Taking appropriate measures to avoid the situation of excess or shortage of employees.

5. Carrying out work study for fixation of wages and for the simplification and standardisation of work.

EMPLOYEE (LABOUR) TURNOVER

Employee turnover or labour turnover in an organisation is the rate of change in the composition of employee force during a specified period measured against a suitable index. The standard of usual employee turnover in the industry or locality or the employee turnover rate for a past period may be taken as the index or norm against which actual turnover rate is compared.

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

i. **Replacement Method** This method takes into consideration actual replacement of employees irrespective of number of persons leaving the organisation. Employee Turnover under this method is calculated as under:

$$\frac{\text{Number of employees replaced during the period}}{\text{Average number of employees during the period on roll}} \times 100$$

New employees appointed on account of expansion plan of the organisation are not included in number of replacements.

ii. **Separation Method** In this method employee turnover is measured by dividing the total number of employees separated during the period by the average total number of employees on payroll during the same period. Employee Turnover under this method is calculated as under:

$$\frac{\text{Number of employees separated during the period}}{\text{Average number of employees during the period on roll}} \times 100$$

iii. **Flux Method** This method takes both the number of replacements as well as the number of separations during the period into account for calculation of employee turnover. Employee Turnover under this method is calculated as under:

$$\frac{\left[\begin{array}{cc}\text{Number of employees} & \text{Number of employees} \\ \text{seperated} + & \text{replaced during the period}\end{array}\right]}{\text{Average number of employees during the period on roll}} \times 100$$

Employee turnover due to new recruitment: Generally, employees recruited on account of expansion of an organisation, are not considered for calculation of employee turnover. But it is considered that the newly recruited employees are also responsible for changes in the composition or work force.

$$\frac{\text{No. of Seperations} + \text{No. of Replacements} + \text{No. of New joinings}}{\text{Average No of employees during the Period on roll}}$$

Or

$$\frac{\text{No. of Seperations} + \text{No. of Acessions}}{\text{Average No of employees during the Period on roll}}$$

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

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

Equivalent Employee (Labour) Turnover rate:

$$\frac{\text{Employee Turnover Rate for the Period}}{\text{Number of days in the period}} \times 365$$

Causes of Employee (Labour) Turnover

The reasons for employee turnover in an organization can be classified under the following three heads:

a. Personal Causes;

b. Unavoidable Causes; and

c. Avoidable Causes.

a. Personal causes: All the personal reasons which induce or compel an employee to leave his job; such causes include the following:

i. Change of jobs for betterment.

ii. Premature retirement due to ill health or old age.

iii. Domestic problems and family responsibilities.

iv. Discontent over the jobs and working environment.

In all the above cases the employee leaves the organisation at his will and, therefore, it is difficult to suggest any possible remedy in the first three cases.

But the last one can be overcome by creating conditions leading to a healthy working environment. For this, officers should play a positive role and make sure that their subordinates work under healthy working conditions.

b. Unavoidable Causes: Unavoidable causes are those under which it becomes obligatory on the part of management to ask one or more of their employees to leave the organisation; such causes are summed up as listed below:

i. Seasonal nature of the business;

ii. Shortage of raw material, power, slack market for the product etc.;

iii. Change in the plant location;

iv. Disability, making a worker unfit for work;

v. Disciplinary measures;

c. Avoidable Causes: Avoidable causes are those which require the attention of management on a continuous basis so as to keep employee turnover ratio as low as possible. The main causes under this case are indicated below:

i. Dissatisfaction with job, remuneration, hours of work, working conditions, etc.,
ii. Strained relationship with management, supervisors or fellow workers;
iii. Lack of training facilities and promotional avenues;
iv. Lack of recreational and medical facilities;
v. Low wages and allowances.

Proper and timely management action can reduce the employee turnover appreciably so far as avoidable causes are concerned.

Effects of Employee (Labour) Turnover

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

i. Even flow of production is disturbed;
ii. Efficiency of new workers is low; productivity of new but experienced workers is low in the beginning;
iii. There is increased cost of training and induction;
iv. New workers cause increased breakage of tools, wastage of materials, etc.
v. Cost of recruitment and training increases.

Cost of Employees (Labour) Turnover: Two types of costs which are associated with employee turnover are:

a. 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:
   i. Cost of medical benefit provided to the employees;
   ii. Cost incurred on employees' welfare like pension etc.
   iii. Cost on other benefits with an objective to retain employees.
b. Replacement Costs: These are the costs which arise due to employee turnover. If employees leave soon after they acquire the necessary training and experience of good work, additional costs will have to be incurred on new workers, i.e., cost of recruitment, training and induction, abnormal breakage and scrap and extra wages and overheads due to the inefficiency of new workers. It is obvious that a company will incur very high replacement costs if the rate of employee turnover is high. Similarly, only adequate preventive costs can keep Employee turnover at a low level. Each company must, therefore, work out the optimum level of Employee turnover keeping in view its personnel policies and the behaviour of replacement cost and preventive costs at various levels of Employee turnover rates.

DIRECT EXPENSES

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.

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.

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.

QUESTIONS FOR CLASSROOM DISCUSSION

PROBLEM – 1

A worker is paid ₹ 10,000 per month and a dearness allowance of ₹ 2,000 p.m. Worker contribution to provident fund is @ 10% and the employer also contributes the same amount as the employee. The Employees State Insurance Corporation premium is 6.5% of wages of which 1.75% is paid by the employees. It is the firm's practice to pay 2 months' wages as a bonus each year.

The numbers of working days in a year are 300 of 8 hours each. Out of these, the worker is entitled to 15 days leave on full pay. CALCULATE the wage rate per hour for costing purposes.

PROBLEM – 2

During one week the workman X manufactured 200 articles. He receives a wage for a guaranteed 44-hour week at the rate of ₹ 15 per hour. The estimated time to produce one article is 15 minutes and under the incentive scheme, the time allowed is increased by 20%. Calculate his gross wages under each of the following methods of remuneration:

1. Time rate.
2. Piecework with a guaranteed weekly wage.
3. Rowan premium bonus.
4. Halsey premium bonus, 50% to the workman.

PROBLEM – 3

Two workmen, 'A' and 'B', produce the same product using the same material. Their normal wage rate is also the same. 'A' is paid bonus according to the Rowan system, while 'B' is paid a bonus according to the Halsey system. The time allowed to make the product is 50 hours. 'A' takes 30 hours while 'B' takes 40 hours to complete the product. The factory overhead rate is ₹ 5 per man-hour actually worked. The factory cost for the product for 'A' is ₹ 3,490 and for 'B' it is ₹ 3,600.

Required:

a. COMPUTE the normal rate of wages

b. COMPUTE the cost of materials cost,

c. PREPARE a statement comparing the factory cost of the products as made by the two workmen.

PROBLEM – 4

Wage negotiations are going on with the recognised employees' union, and the management wants you as an executive of the company to formulate an incentive scheme with a view to increasing productivity.

The case of three typical workers A, B and C who produce respectively 180, 120 and 100 units of the company's product in a normal day of 8 hours is taken up for study.

Assuming that day wages would be guaranteed at ₹ 75 per hour and the piece rate would be based on a standard hourly output of 10 units, CALCULATE the earnings of each of the three workers and the employee cost per 100 pieces under

(i) Day wages, (ii) Piece rate, (iii) Halsey scheme, and (iv) The Rowan scheme

Also, CALCULATE under the above schemes the average cost of labour for the company to produce 100 pieces.

PROBLEM – 5

a. Bonus paid under the Halsey Plan with a bonus at 50% for the time saved equals the bonus paid under the Rowan System. When will this statement hold good? (Your answer should contain the proof).

b. The time allowed for a job is 8 hours. The hourly rate is ₹ 8.

PREPARE a statement showing:

i. The bonus earned

ii. The total earnings of employee and

iii. Hourly earnings.

Under the Halsey System with 50% bonus for time saved and Rowan System for each hour saved progressively.

PROBLEM – 6

A skilled worker in XYZ Ltd. is paid a guaranteed wage rate of ₹ 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 ₹ 37.50 on the manufacture of that particular product.

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

PROBLEM – 7

Mr A. is working by employing 10 skilled workers. He is considering the introduction of some incentive scheme - either Halsey Scheme (with 50% bonus) or Rowan Scheme - of wage payment for increasing the Employee productivity to cope with the increased demand for the product by 25%. He feels that if the proposed incentive scheme could bring about an average 20% increase over the present earnings of the workers, it could act as a sufficient incentive for them to produce more and he has accordingly given this assurance to the workers.

As a result of the assurance, the increase in productivity has been observed as revealed by the following figures for the current month:

Hourly rate of wages (guaranteed)	₹ 40
Average time for producing 1 piece by one worker at the previous performance (This may be taken as time allowed)	2 hours
No. of working days in the month	25 days
No. of working hours per day for each worker	8 working hours
Actual production during the month	1,250 units

Required:

1. CALCULATE effective rate of earnings per hour under Halsey Scheme and Rowan Scheme.
2. CALCULATE the savings to Mr A in terms of direct labour cost per piece under the schemes.

PROBLEM – 8

A worker, whose day-work wages is ₹ 2.50 an hour, received a production bonus under the Rowan Scheme. He carried out the following work in a 48-hour week:

Job 1 - 1,500 items at 4 hours per 1,000

Job 2 - 1,800 items at 3 hours per 1,000

Job 3 - 9,000 items at 6 hours per 1,000

Job 4 - 1,500 items for which no "standard time" was fixed and it was arranged that the worker would be paid a bonus of 25 per cent. The actual time on the job was 4 hours.

Job 5 - 2,000 items at 8 hours per 1,000, each item was estimated to be half-finished.

Job No. 2 was carried out on a machine running at 90 per cent efficiency and an extra allowance of 1/9th of standard time was given to compensate the worker.

4 hours were lost due to a power cut. Calculate the earnings of the workers, clearly stating your assumptions for the treatment given by you for the hours lost due to power cuts.

PROBLEM – 9

The standard hours of job X is 100 hours. The job can be completed by A in 60 hours, B in 70 hours or C in 95 hours.

The bonus system applicable to the job is as follows:

	Percentage of Time saved to Time allowed			Bonus
Saving	Up to		10%	10% of time saved
From	11%	To	20%	15% of time saved
From	21%	To	40%	20% of time saved
From	41%	To	100%	25% of time saved

The rate of pay is ₹ 10/hour. Calculate the total earnings of each worker and also the rate of earnings per hr.

PROBLEM – 10

Twenty-five men work in a group. If the weekly production of the group exceeds 200 pieces per hour (which is the standard) each man gets a bonus in addition to his time wages.

Bonus regulation - Each man's share should be one-half of the percentage in excess of the standard production. Each man is paid this percentage of a wage rate of ₹ 12 per hour. There is no relationship between the individual workman's hourly rate and the bonus rate.

The following is one week's record:

	Hours worked	Production
Monday	190	44,200
Tuesday	210	47,300
Wednesday	195	45,200
Thursday	215	47,600
Friday	200	46,900
Saturday	190	44,800
Total	**1,200**	**2,76,000**

Compute:

1. The rate and amount of bonus for the week.
2. Total earning of X, who worked 45 hours during the week and was paid ₹ 10 per hour basic, and that of Y, who worked 48 hours and was paid ₹ 11 per basic.

PROBLEM – 11

A company uses an old method of machining. The estimates of operating details for a year are as under:

Number of parts to be manufactured and sold	30,000
Raw materials required per part	10 kg @ ₹ 2 per kg.
Average Wage Rate per worker	₹ 40 per day of 8 hours
Average Labour Efficiency	60%
Standard Time required to manufacture one part	2 hrs.
Overhead Rate	₹ 10 per clock hour
Material Handling Expenses	2% of Value of Materials

The company has a suggestion box scheme and an award equivalent to three months savings in labour cost is passed on to the employee whose suggestion is accepted. In response to this scheme, a suggestion has been received from an employee to use a special Jig in the manufacture of the aforesaid part. The cost of the Jig which has a life of one year is ₹ 3,000 and the use of the Jig will reduce the standard time by 12 minutes.

You are required to:

- Determine the amount of award payable to the employee.
- Prepare a comparative statement of costs before and after implementation of the suggested scheme.

PROBLEM – 12

A factory having the latest sophisticated machines wants to introduce an incentive scheme for its workers, keeping in view the following:

i. The entire gains of improved production should not go to the workers.

ii. In the name of speed, quality should not suffer.

iii. The rate setting department being newly established are liable to commit mistakes.

You are required to PREPARE a suitable incentive scheme and DEMONSTRATE by an illustrative numerical example how your scheme answers to all the requirements of the management.

PROBLEM – 13

A company's basic wages rate is ₹ 12 per hour and its overtime rates are –

Evenings: Time and one-third.

Weekends: Double time.

During the previous year the following hours were worked:

Normal time	22,000 clock hours
Time plus one-third	2,000 clock hours
Double time	1,000 clock hours

The following times have been worked on these jobs:

	Job A Clock hrs.	Job B Clock hrs.	Job C Clock hrs.
Normal time	300	500	400
Evening time	30	60	105
Weekend overtime	10	5	30

You are required to calculate the labour cost chargeable to each job in each of the following circumstances:

a. Where overtime is worked regularly throughout the year as company policy due to labour shortage.

b. Where overtime is worked irregularly to meet the spasmodic production requirements.

c. Where overtime is worked specifically at the customer's request to expedite delivery.

d. Where overtime is due to abnormal reasons.

PROBLEM – 14

CALCULATE the earnings of A and B from the following particulars for a month and allocate the employee cost to each job X Y and Z.

PARTICULARS	A	B
Basic Wages	₹ 10,000	₹ 16,000
Dearness Allowance	50%	50%
Contribution to provident Fund (on basic wages)	8%	8%
Contribution to Employee's State insurance (on basic wages)	2%	2%
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 employees' 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.

PROBLEM – 15

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' paid at 200 per day of 8 hours	Worker 'B" paid at 100 per day of 8 hours	Worker 'C' paid at 300 per day of 8 hours
Monday (hours)	10.5	8.0	10.5
Tuesday (hours)	8.0	8.0	8.0
Wednesday (hours)	10.5	8.0	10.5
Thursday (hours)	9.5	8.0	9.5
Friday (hours)	10.5	8.0	10.5
Saturday (hours)	-	8.0	8.0
Total (hours)	49.0	48.0	57.0

In terms of an award in 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 @ ₹ 968 for the relevant month. The dearness allowances 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 week days and 4 hours on Saturdays, the workers are however paid full wages for Saturday (8 hours for 4 hours worked).

Overtime is paid twice of ordinary wage rate if a worker works for more than nine hours in a day or forty-eight hours in a week. 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.

CALCULATE the wages payable to each worker.

PROBLEM – 16

The management of BR Ltd is worried about their increasing employee turnover in the factory and before analysing the causes and taking remedial steps; it wants to have an idea of the profit foregone as a result of employee turnover in the last year.

Last year sales amounted to ₹ 83,03,300 and P/V ratio was 20 per cent. The total number of actual hours worked by the direct employee force was 4.45 lakhs. The actual direct employee hours included 30,000 hours attributable to training new recruits, out of which half of the hours were unproductive. As a result of the delays by the Personnel Department in filling vacancies due to employee turnover, 1,00,000 potentially productive hours (excluding unproductive training hours) were lost.

The costs incurred consequent on employee turnover revealed, on analysis, the following:

Settlement cost due to leaving	₹ 43,820
Recruitment costs	₹ 26,740
Selection costs	₹ 12,750
Training costs	₹ 30,490

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

PROBLEM – 17

From the following data of Big-One Ltd, calculate labour turnover.

- Number of workers on the payroll at the beginning of the month: 1800.
- Number of workers on the payroll at the end of the month: 2200
- During the month, 20 workers left, 80 workers were discharged and 500 workers were recruited. Of these, 60 workers were recruited in the vacancies of those separated, while the rest were engaged due to expansion.

PROBLEM – 18

The Accountant of Y Ltd. has computed employee turnover rates for the quarter ended 31st March, 20x1 as 10%, 5% and 3% respectively under Flux method, Replacement method and Separation method.

If the number of workers replaced during that quarter is 30, FIND OUT the number of workers for the quarter.

- Recruited and joined and
- Left and discharged and
- Equivalent employee turnover rates for the year.

PROBLEM – 19

The normal working hours in a factory are 8 hours per day. An idle time of 1 hour is considered normal due to rest, lunch etc. compute the cost of idle time its treatment in the following circumstance.

a. Ram, a production worker worked for 7 hours and was paid ₹ 120/- for the full day. Ram spent 3 hrs in job A and 4 hrs job B. Also calculate the Labour cost chargeable to both the jobs.

b. Raju, an indirect worker, was paid ₹ 20/- as his daily wage.

c. Dev, a production worker clocked 6 hours but was paid his full day's wages ₹ 120/-. Due to breakdown of machinery, he could not work for 1 hour during the day. Dev spent 3 hrs in job A and 3 hrs in job B. Also calculate the Labour cost chargeable to both the jobs.

PROBLEM - 20

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 take 30 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 3 hrs.

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

PROBLEM – 21

Aditya Ltd. is an engineering manufacturing company producing job order on the basis of specification given by the customers. During the last the month it has completed three job works namely A, B and C. The following are the items of expenditures which are incurred apart from direct materials and direct employee cost:

i. Office and administration cost- Rs. 3,00,000.

ii. Product blueprint cost for job A – Rs. 1,40,000

iii. Hire charges paid for machinery used for job work B- Rs. 40,000

iv. Salary to office attendants- Rs. 50,000

v. One time license fee paid for software used to make computerized graphics for job C- Rs.50,000.

vi. Salary paid to marketing manager- Rs. 1,20,000. Required:

CALCULATE direct expenses attributable to each job.

PROBLEM – 22

The following expenditures were incurred in Aditya Ltd. For the month of March 20x3:

		₹
i.	Paid for power & fuel	4,80,200
ii.	Wages paid to factory workers	8,44,000
iii.	Bill paid to job workers	9,66,000
iv.	Royalty paid for production	8,400
v.	Fee paid to technician hired for the job	96,000
vi.	Administrative overheads	76,000
vii.	Commission paid to sales staffs	1,26,000

You are required to CALCULATE direct expenses for the month.

ADDITIONAL QUESTIONS FOR PRATICE

QFP 1 (Concept Similar to Problem – 1)

'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-productiveand treated as normal idle time. You are required to COMPUTE the effective hourly cost of employee 'X'.

QFP 2 (Concept Similar to Problem – 1)

CALCULATE the Employee hour rate of a worker X from the following data:

Basic pay Rs. 10,000 p.m.

D.A. Rs. 3,000 p.m.

Fringe benefits Rs. 1,000 p.m.

Number of working days in a year 300. 20 days are availed off as holidays on full pay in a year. Assume a day of 8 hours.

QFP 3 (Concept Similar to Problem – 12)

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	1,00,000 hours
- Overtime before and after working hours	20,000 hours
Overtime on Sundays and holidays	5,000 hours
Total	**1,25,000 hours**

The following hours have been worked on job 'Z'

Normal	1,000 hours
Overtime before and after working hrs.	100 hours.
Sundays and holidays	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:

a. Where overtime is worked regularly throughout the year as a policy due to the workers' shortage.

b. Where overtime is worked irregularly to meet the requirements of production.

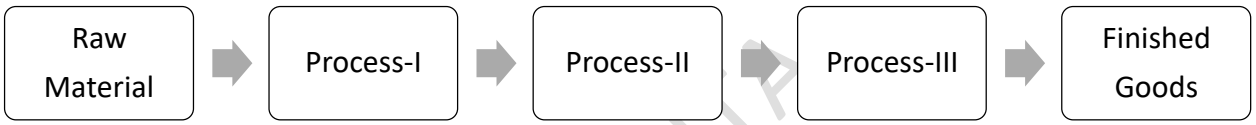
c. Where overtime is worked at the request of the customer to expedite the job.

CHAPTER 10: PROCESS & OPERATION COSTING

MEANING OF PROCESS COSTING

Process Costing is a method of costing used in industries where the material has to pass through two or more processes for being converted into a final product. It is defined as "a method of Cost Accounting whereby costs are charged to processes or operations and averaged over units produced". A separate account for each process is opened and all expenditure pertaining to a process is charged to that process account. Such type of costing method is useful in the manufacturing of products like steel, paper, medicines, soaps, chemicals, rubber, vegetable oil, paints, varnish etc. where the production process is continuous and the output of one process becomes the input of the following process till completion.

This can be understood with the help of the following diagram:



Basic Features

Industries, where process costing can be applied, have normally one or more of thefollowing features:

1. Each plant or factory is divided into a number of processes, cost centres ordepartments, and each such division is a stage of production or a process.
2. Manufacturing activity is carried on continuously by means of one or more process run sequentially, selectively or simultaneously.
3. The output of one process becomes the input of another process.
4. The end product usually is of like units not distinguishable from one another.
5. It is not possible to trace the identity of any particular lot of output to any lot of input materials. For example, in the sugar industry, it is impossible to trace any lot of sugar bags to a particular lot of sugarcane fed or vice versa.
6. Production of a product may give rise to Joint and/or By-Products.

COSTING PROCEDURE IN PROCESS COSTING

The Cost of each process comprises the cost of:

i. Materials
ii. Employee Cost (Labour)
iii. Direct expenses, and
iv. Overheads of production.

Materials - Materials and supplies which are required for each process are drawn against Material Requisitions Notes from the stores. Each process for which the materials are used, are debited with the cost of materials consumed on the basis of the information received from the Cost Accounting department.

Employee Cost (Labour) - Each process account should be debited with the Labour cost or wages paid to Labour for carrying out the processing activities. Sometimes the wages paid are apportioned over the different processes after selecting appropriate basis.

Direct expenses - Each process account should be debited with direct expenses like depreciation, repairs, maintenance, insurance etc. associated with it.

Production Overheads- Expenses like rent, power expenses, lighting bills, gas and water bills etc. are known as production overheads. These expenses cannot be allocated to a process. The suitable way out to recover them is to apportion them over different processes by using suitable basis. Usually, these expenses are estimated in advance and the processes debited with these expenses on a pre-determined basis.

TREATMENT OF NORMAL, ABNORMAL LOSS AND ABNORMAL GAIN

Normal Process Loss

It is also known as normal wastage. It is defined as the loss of material which is inherent in the nature of work. Such a loss can be reasonably anticipated from the nature of the material, nature of operation, the experience and technical data. It is unavoidable because of nature of the material or the process. It also includes units withdrawn from the process for test or sampling.

Treatment in Cost Accounts

The cost of normal process loss in practice is absorbed by good units produced under the process. The amount realized by the sale of normal process loss units should be credited to the process account.

Abnormal Process Loss

It is also known as abnormal wastage. It is defined as the loss in excess of the pre-determined loss (Normal process loss). This type of loss may occur due to the carelessness of workers, a bad plant design or operation, sabotage etc. Such a loss cannot obviously be estimated in advance. But it can be kept under control by taking suitable measures.

Treatment in Cost Accounts

The cost of an abnormal process loss unit is equal to the cost of a good unit. The total cost of abnormal process loss is credited to the process account from which it arises. Cost of abnormal process loss is not treated as a part of the cost of the product. In fact, the total cost of abnormal process loss is debited to costing profit and loss account.

Abnormal Process Gain/ Yield

Sometimes, loss under a process is less than the anticipated normal figure. In other words, the actual production exceeds the expected figures. Under such a situation the difference between actual and expected loss or actual and expected production is known as abnormal gain or yield. So, abnormal gain may be defined as an unexpected gain in production under the normal conditions. This arises due to over- estimation of process loss, improvements in work efficiency of workers, use on better technology in production etc.

Treatment in Cost Accounts

The process account under which abnormal gain arises is debited with the abnormal gain and 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 on the basis of normal production.

VALUATION OF WORK-IN-PROCESS

In the case of process type of industries, it is possible to determine the averagecost per unit by dividing the total cost incurred during a given period of time bythe total number of units produced during the same period. But this is hardly the case in most of the process type industries where manufacturing is a continuous activity. The reason is that the cost incurred in such industries represents the cost of work carried on opening work-in-process, closing work-in-process and completed units. Thus, to ascertain the cost of each completed unit, it is necessaryto ascertain the cost of work-in-process in the beginning and at the end of the process.

The valuation of work-in-process presents a good deal of difficulty because it has units under different stages of completion from those in which work has just begunto those which are only a step short of completion. Work-in-process can be valuedon actual basis, i.e., materials used on the unfinished units and the actual amount of Labour expenses involved. However, the degree of accuracy in such a case cannot be satisfactory. An alternative method is based on converting partly finished units into equivalent finished units.

Equivalent Units

Equivalent units or equivalent production units, means converting the incomplete production units into their equivalent completed units. Under each process, an estimate is made of the percentage completion of work-in-process with regard to different elements of costs, viz., material, Labour and overheads. It is important that the estimate of percentage of completion should be as accurate as possible. The formula for computing equivalent completed units is:

$$\text{Equivalent completed units} = \begin{pmatrix}\text{Actual number of units in}\\ \text{the process of manufacture}\end{pmatrix} \times \begin{pmatrix}\text{Percentage of}\\ \text{Work completed}\end{pmatrix}$$

STEPS IN PROCESS COSTING

For each production process, a Production Cost Report is prepared at the end ofeach accounting period. The objective of preparing the report is to know physical units and equivalent units in process, element wise cost of goods produced and transferred, goods in process (work-in-process), units lost due to abnormal reasons i.e. abnormal loss etc. To prepare the report, the following steps are generally followed:

Step-1: Analysis of physical flow of production units

The first step is to determine and analyze the number of physical units in the form of inputs (introduced fresh or transferred from previous process, beginning work- in-process) and outputs (completed and work-in-process).

Step-2: Calculation of equivalent units for each cost elements

The second step is to calculate equivalent units of production for each cost element i.e. for material, Labour and overheads. It is calculated by taking the extent of work done in respect of each element

Step-3: Determination of total cost for each cost element

Total cost for 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

In this step, the cost per equivalent unit for each cost element is calculated. The total cost as calculated in Step-3 is divided by the equivalent units as determined in Step-2.

Step-5: Assignment of total costs to units completed and ending WIP

In this step, the total cost for units completed, units transferred to next process, ending work in process, abnormal loss etc. are calculated and posted in the process account and production cost report.

PROCESS COSTING METHODS

Mainly two methods 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 are taken from both opening work-in-process (WIP) and freshly introduced materials/inputs. The cost to complete the opening WIP and other completed units are calculated separately. The cost of opening WIP is added to cost incurred on completing the incomplete (WIP) units into complete one. The total cost of units completed and

transferred is calculated by adding opening WIP cost to cost on freshly introduced inputs. In this method the closing stock of work in process is valued at current 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 aggregate cost is divided by output in terms of completed units. The equivalent production in this case consists of work-load already contained in opening work-in-process and work-load of current period.

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.

INTER-PROCESS PROFITS

To control cost and to measure performance, different processes within an organization are designated as separate profit centers. In this type of organizational structure, the output of one process is transferred to the next process not at cost but at market value or cost plus a percentage of profit. The difference between cost and the transfer price is known as inter-process profits.

The advantages and disadvantages of using inter-process profit, in the case of process type industries are as follows:

Advantages:

1. Comparison between the cost of output and its market price at the stage of completion is facilitated.
2. Each process is made to stand by itself as to the profitability.

Disadvantages:

1. The use of inter-process profits involves complication.
2. The system shows profits which are not realized because of stock not sold out.

OPERATION COSTING

This product costing system is used when an entity produces more than one variant of final product using different materials but with similar conversion activities. Which means conversion activities are similar for all the product variants but materials differ significantly. Operation Costing method is also known as Hybrid product costing system as materials costs are accumulated by job order or batchwise but conversion costs i.e. labour and overheads costs are accumulated by department, and process costing methods are used to assign these costs to products. Moreover, under operation costing, conversion costs are applied to products using a predetermined application rate. This predetermined rate is basedon budgeted conversion costs.

For example, a company is manufacturing two grades of products, Product- Deluxe and Product-Regular. Both the products pass through a similar production process but require different quality and quantities of raw materials. The cost of raw material is accumulated on the basis of job or batches or units of two variants of products. But the costs for the conversion activities need not to be identified withthe product variants as both the Products requires similar activities for conversion. Hence, conversion activity costs are accumulated on the basis of departments or processes only. Example of industries are ready made garments, Shoe making, jewelry etc.

QUESTIONS FOR CLASSROOMDISCUSSION

PROBLEM – 1

Product A is produced after three distinct processes. The following information is obtained from the accounts of a period: -

ITEMS	PROCESS			Total
	I	II	III	
Direct material	₹ 1,800	₹ 300	₹ 100	₹ 2,200
Direct wages	₹ 100	₹ 200	₹ 100	₹ 400
Direct expenses	₹ 300	-	₹ 200	₹ 500

Production overhead incurred is 800 and is covered @ 200% of direct wages. Production during the period was 100 kg.; there were no opening or closing stocks. Prepare process cost accounts assuming there is no process loss.

PROBLEM – 2

Product B is obtained after it passes through three distinct processes. The following information is obtained from the accounts for the week ending May 12, 20x1:

ITEMS	PROCESS			TOTAL
	I	II	III	
Direct material	₹ 2,600	₹ 1,980	₹ 2,962	₹ 7,542
Direct wages	₹ 2,000	₹ 3,000	₹ 4,000	₹ 9,000
Production overhead				₹ 9,000

1,000 units @ ₹ 3 each were introduced to process I.

There was no stock of materials or work-in-process at the beginning or end of the period. The output of each process passes direct to the next process and finally to finished stores. Production overhead is recovered on 100% of direct wages.

The following additional data are obtained:

UNIT	Output during the week	Percentage of normal loss to input	Value of scrap per unit
Process I	950 units	5%	2
Process II	840 units	10%	4
Process III	750 units	15%	5

Prepare process cost accounts and abnormal gain or loss accounts.

PROBLEM – 3

In Process I, 1,000 units were introduced during January and 200 units, 40% complete in all respects remained as closing work-in-progress at the end of the month. Compute the equivalent production and obtain the cost of closing work-in-progress if the total process cost during the period were ₹1,760.

PROBLEM – 4

In Process I Opening work-in-progress in February 20x1 was 200 units 40% complete. 1,050 units were introduced during the period, 1,100 completed units were transferred in Process II and 150 units remained as closing work-in-progress 70% complete.

Compute equivalent production and apportion the total process costs of ₹ 2,250 to production and work-in-progress inventories under the FIFO method.

NOTE: The cost of Opening work-in-progress b/f is ₹ 500/-

PROBLEM – 5

In process A, there was an opening work-in-progress of 100 units 40% complete and closing work-in-progress was 1,100 units 70% complete. Units introduced during the month of January were 11,000 units and completed units transferred to process B were 8,600 units. The normal loss was 10% of production. Compute equivalent production & apportion the total process costs of ₹ 29,190 to production, abnormal loss and work-in-progress.

Note: Cost of Opening WIP b/f is ₹ 1,000/-

PROBLEM – 6

The following data are available in respect to Process I for February 20x1: -

Opening work-in-progress	900 units at ₹ 4,500
Degree of Completion	Materials 100%, Labour 60%, Overhead 60%
Input of materials	9,100 units ₹ 27,300
Direct wages	₹ 8,200
Production overhead	16,400
Units scrapped	1,200 units
Degree of Completion	Material 100%, Labour & Overhead 70%
Closing work-in- progress	1,000 units
Degree of Completion	Materials 100%, Labour 80%, Overhead 80%
Units transferred to next process	7,800 units

Normal process loss is 10% of total input (opening stock plus units put in). The scrap value is ₹ 3 per unit.

You are required to

a. Compute equivalent production;

b. Cost per equivalent unit for each element and cost of abnormal losses, closing work-in-progress and units transferred to next process; and

c. Prepare process accounts.

PROBLEM – 7

From the following information for May 20x1, prepare the process cost accounts for Process III:-

Opening stock in process	500 units at	₹ 7,200
Transfer from Process II	21,300 units	₹ 1,65,400
Direct materials added in Process III		₹ 80,360
Direct wages		₹ 39,620
Production overhead		₹ 19,810
Units scrapped during the period		1,100 units
Transferred to Process IV		18900 units
Closing stock		1,800 units

Degree of completion: -

PARTICULARS	OPENING STOCK	CLOSING STOCK	SCRAP
Material	70%	80%	100%
Labour	50%	60%	80%
Overhead	50%	60%	80%

There was a normal loss of 5% of production and units scrapped were sold at ₹ 3 each.

PROBLEM – 8

From the following information during a period prepare process cost accounts for Process III.

Opening WIP in Process III	800 units at	₹ 10,300
Transfer from process II	21200 units at	₹ 1,64,600
Transferred to Process IV	19200 units	
Closing WIP of process III	2000 units	
Units scrapped	800 units	
Direct material added in Process III	79,040	
Direct wages	₹ 39,040	
Production overhead	19,520	

Degree of completion:

PARTICULARS	OPENING STOCK	CLOSING STOCK	SCRAP
Material	80%	70%	100%
Labour	60%	50%	70%
Overhead	60%	50%	70%

The normal loss in the process was 5% of the production and scrap was sold @ ₹ 3 per unit.

PROBLEM – 9

From the following information during a period prepare process cost account for Process I by Average method:

Opening WIP:	20,000 units	
	Material	₹ 4,500
	Wages	₹ 1,300
	Overhead	₹ 800
Units introduced:	80,000 units	
	Material	₹ 18,500
	Wages	₹ 9,200
	Overhead	₹ 6,200

During the period 60,000 units were completed and transferred to Process II.

Closing WIP:	40,000 units	Degree completion
	Materials	100%
	Wages and overhead	25%

PROBLEM – 10

In a manufacturing unit, raw material passes through four processes I, II, III and IV and the output of each process is the input of the subsequent process. The loss in the four processes I, II, III, and IV are respectively 25%, 20%, 20% and 16 2/3% of the input. If the end product at the end of process IV is 40,000 kg., what is the quantity of raw material required to be fed at the beginning of Process I and the cost of same at ₹ 5 per kg.?

Find out also the effect of increase or decrease in the material cost of the end product for variation of every rupee in the cost of the raw material.

PROBLEM – 11

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 20x1:

Particulars	Process- I	Process - II	Finished Stock
Opening stock	₹ 7,500	₹ 9,000	₹ 22,500
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 processes 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 ₹ 1,40,000.

PREPARE Process cost accounts and finished goods account showing the profit element at each stage.

ADDITIONAL QUESTIONS FOR PRATICE

QFP 1 (Concept Similar to Problem – 2)

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 thecurrent year, PREPARE Process- I, Process- II and Finished Stock A/c:

Particulars	Process- I	Process- II
Raw materials used	7,500 units	--
Raw materials cost per unit	Rs. 60	--
Transfer to next process/finishedstock	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
Realizable value of scrap per unit	Rs. 12.50	Rs. 37.50

6,000 units of finished goods were sold at a profit of 15% on cost. Assume that therewas no opening or closing stock of work-in-process.

QFP 2 (Concept Similar to Problem – 3)

An English willow company who manufactures cricket bat buys wood as its directmaterial. The Forming department processes the cricket bats and the cricket bats are then transferred to the Finishing department where stickers are applied. The Forming department began manufacturing 10,000 initial bats during the month of December for the first time and their cost is as follows:

Direct material: Rs. 33,000

Conversion costs: Rs. 17,000

Total Rs. 50,000

A total of 8,000 cricket bats were completed and transferred to the Finishing department, the rest 2,000 were still in the Forming process at the end of the month. All of the forming departments direct material were placed, but, on average, only 25% of the conversion costs was applied to the ending work in progress inventory.

CALCULATE:

i. Equivalent units of production for each cost.

ii. The Conversion cost per Equivalent units.

iii. Cost of closing work in process (WIP) and finished products.

QFP 3 (Concept Similar to Problem – 6)

Hill manufacturing Ltd uses process costing to manufacture Water density sensors for hydro sector. The following information pertains to operations forthe month of May.

Particulars	Units
Beginning WIP, May 1	16,000
Started in production during May	1,00,000
Completed production during May	92,000
Ending work in progress, May 31	24,000

The beginning work in progress was 60% complete for materials and 20% complete for conversion costs. The ending inventory was 90% complete for material and 40% complete for conversion costs.

Costs pertaining to the month of May are as follows:

Beginning inventory costs are material Rs.27,670, direct Labour Rs.30,120 and factoryoverhead Rs. 12,720.

Cost incurred during May are material used, Rs. 4,79,000, direct Labour Rs.1,82,880, factory overheads Rs. 3,91,160.

CALCULATE:

i. Using the FIFO method, the equivalent units of production for material.

ii. Cost per equivalent unit for conversion cost.

QFP 4 (Concept Similar to Problem – 6)

A company produces a component, which passes through two processes. During the month of April, 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 100% complete as to materials cost and 50% complete as to Labour and overheads cost. The Process I costs 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 tofinished goods stores. There was a normal loss with no salvage value of 200 units inProcess II. There were 1,800 units, remained unfinished in the process with 100% complete as to materials and 25% complete as regard to wages and overheads.

No further process material costs occur after introduction at the first processuntil the end of the second process, when protective packing is applied to the completed components. The process and packing costs incurred at the end ofthe Process II were:

Packing materials Rs.4,000

Direct wages Rs.3,500

Factory overheads Rs.4,500

Required:

i. PREPARE Statement of Equivalent Production, Cost per unit and ProcessI A/c.

ii. PREPARE Statement of Equivalent Production, Cost per unit and ProcessII A/c.

QFP 5 (Concept Similar to Problem – 8)

Following information is available regarding Process-I for the month of February:

Production Record:	
Units in process as on 1st February (All materials used, 25% complete for Labour and overhead)	4,000
New units introduced	16,000
Units completed	14,000
Units in process as on 28th February (All materials used, 33-1/3% complete for Labour and overhead)	6,000
Cost Records:	
Work-in-process as on 1st February	(Rs.)
Materials	6,000
Labour	1,000
Overhead	1,000
	8,000
Cost during the month:	
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.

QFP 6 (Concept Similar to Problem – 8)

Following details are related to the work done in Process-I by XYZ Companyduring the month of March:

	(Rs.)
Opening work-in process (2,000 units)	
Materials	80,000
Labour	15,000
Overheads	45,000
Materials introduced in Process-I (38,000 units)	14,80,000
Direct Labour	3,59,000
Overheads	10,77,000
Units scrapped: 3,000 units	
Degree of completion:	
Materials	100%
Labour and overheads Closing work-in process: 2,000 units	80%
Degree of completion:	
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 units fetch Rs. 20 per piece.

You are required to PREPARE using average method:

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.

QFP 7 (Concept Similar to Problem – 9)

'Healthy Sweets' is engaged in the manufacturing of jaggery. Its process involve sugarcane crushing for juice extraction, then filtration and boiling of juice along with some chemicals and then letting it cool to cut solidified jaggery blocks.

The main process of juice extraction (Process – I) is done in conventional crusher, which is then filtered and boiled (Process – II) in iron pots. The solidified jaggery blocks are then cut, packed and

dispatched. For manufacturing 10 kg of jaggery, 100 kg of sugarcane is required, which extracts only 45 litre of juice.

Following information regarding Process – I has been obtained from the manufacturing department of Healthy Sweets for the month of January:

		(Rs.)
Opening work-in process (4,500litre)		
Sugarcane		50,000
Labour		15,000
Overheads		45,000
Sugarcane introduced for juice extraction (1,00,000 kg)		5,00,000
Direct Labour		2,00,000
Overheads		6,00,000
Abnormal Loss: 1,000 kg		
Degree of completion:		
	Sugarcane	100%
	Labour and overheads	80%
Closing work-in process: 9,000litre		
Degree of completion:		
	Sugarcane	100%
	Labour and overheads	80%

Extracted juice transferred for filtering and boiling: 39,500litre(Consider mass of 1litre of juice equivalent to 1 kg)

You are required to PREPARE using average method:

i. Statement of equivalent production,

ii. Statement of cost,

iii. Statement of distribution cost, and

iv. Process-I Account.