CHAPTER 4

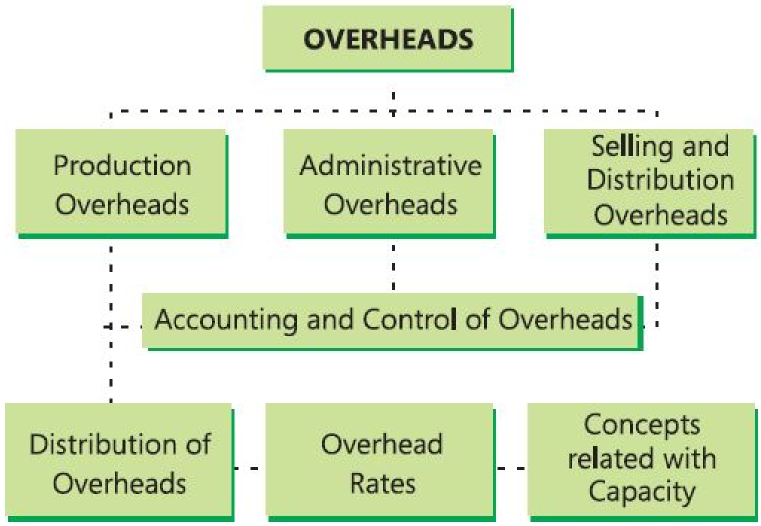
OVERHEADS – ABSORPTION COSTING METHOD

LEARNING OUTCOMES

After studying this chapter, you would be able to-

- Discuss the meaning of Overheads- Production, Administrative and Selling & Distribution.
- Discuss the meaning and methods of allocation, apportionment and absorption of overheads.
- Discuss the meaning and treatment of under-absorption and over-absorption of overheads and apply the same in cost computation.
- State the accounting and control of administrative, selling and distribution overheads.
- Discuss and apply the various methods to calculate overhead rate.

CHAPTER OVERVIEW



4.1 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. Overheads are also very important cost element along with direct materials and direct employees. Often in a manufacturing concern, overheads exceed direct wages or direct materials and at times even both put together. On this account, it would be a grave mistake to ignore overheads either for the purpose of arriving at the cost of a job or a product or for controlling total expenditure.

Overheads also represent expenses that have been incurred in providing certain ancillary facilities or services which facilitate or make possible the carrying out of the production process; by themselves these services are not of any use. For instance, a boiler house produces steam so that machines may run and, without the generation of steam, production would be seriously hampered. But if machines do not run or do not require steam, the boiler house would be useless and the expenses incurred would be a waste.

Overheads are incurred not only in the factory of production but also on administration, selling and distribution.

4.2 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.*	(i) Stock keeping expenses, (ii) Repairs and maintenance of plant, (iii) Depreciation of factory building, (iv) Indirect labour, (v) cost of primary packing (vi) Insurance of plant and machinery etc. Production overhead include 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 organisation. It includes formulating the policy, directing the organisation and controlling the operations of an undertaking which is not related directly to production, selling, distribution, research or development activity or function.	(i) Salary paid to office staffs, (ii) Repairs and maintenance of office building, (iii) Depreciation of office building (iv) postage and stationery, (v) Lease rental in case of operating lease (in case of finance lease, lease rental excluding finance cost) (vi) accounts and audit expenses etc.
Selling and Distribution Overheads	(i) Selling overhead: expenses related to sale of products and include all indirect	(i) Salesmen commission, (ii) Advertisement cost, (iii) Sales office expenses etc.

	expenses in *sales management* for the organisation. (ii) Distribution overhead: cost incurred on *making product available for sale in the market.*	(i) Delivery van expenses, (ii) Transit insurance, (iii) warehouse and cold storage expenses, (iv) 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.*	(i) Salary paid to permanent employees, (ii) Depreciation of building and plant and equipment, (iii) Interest on capital, (iv) 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.	(i) Indirect materials, (ii) Power and fuel, (iii) lubricants, (iv) 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.	(i) Electricity cost, (ii) water cost, (iii) 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.	(i) Stores used for maintaining machines and buildings (lubricants, cotton waste, bricks etc.) (ii) 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.	(i) Salary paid to foreman and supervisor (ii) 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.	(i) Rates & taxes, (ii) insurance, (iii) depreciation, (iv) 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.	(i) Materials cost, (ii) wages and salary, (iii) 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.	(i) Rates and taxes, (ii) Depreciation, (iii) Interest on borrowings

4.2.1 Advantages of Classification of Overheads into Fixed and Variable

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

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

(b) ***Preparation of Budget Estimates*****:** The segregation of overheads into fixed and variable part helps in the preparation of flexible budget. It enables a firm to estimate costs at different levels of activity and make comparison with the actual expenses incurred.

Suppose in October, 20X8 the output of a factory was 1,000 units and the expenses were:

	(₹)
Fixed	5,00,000
Variable	4,00,000
Semi-variable (40% fixed)	6,00,000
	15,00,000

In November, 20X8 the output was likely to increase to 1,200 units. In that case the budget or estimate of expenses will be:

		(₹)
Fixed		5,00,000
Variable $\left(\dfrac{₹\ 4,00,000 \times 1,200 \text{ units}}{1,000 \text{ units}}\right)$		4,80,000
Semi-variable		
Fixed, 40% of ₹ 6,00,000	2,40,000	
Variable : $\left[\dfrac{₹\ 3,60,000 \times 1,200 \text{ units}}{1,000 \text{ units}}\right]$		4,32,000
		16,52,000

It would be a mistake to think that with the output going up from 1,000 units to 1,200 units the expenses would increase proportionately to ₹18,00,000. This would be wrong budgeting.

(*c*) ***Decision Making*****:** The segregation of semi variable cost between fixed and variable overhead also helps the management to take many important decisions. For example, decisions regarding the price to be charged during depression or recession or for export market. Likewise, decisions on make or buy, shut down or continue, etc., are also taken after separating fixed costs from variable costs.

In fact, when any change is contemplated, say, increase or decrease in production, change in the process of manufacture or distribution, it is necessary to know the total effect on cost (or revenue) and that would be impossible without a correct segregation of fixed and variable costs. The technique of marginal costing, cost volume profit relationship and break-even analysis are all based on such segregation.

4.3 ACCOUNTING AND CONTROL OF MANUFACTURING OVERHEADS

We have already seen that overheads are by nature those costs which cannot be directly related to a product or to any other cost unit. Yet for working out the total cost of a product or a unit of service, the overheads must be included. Thus we have to find out a way by which the overheads can be distributed over the various units of production.

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 shows how actual are compared with the absorbed amount.

(Students should carefully note the distinction between the various terms used).

1. **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.*

2. **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.

(a) 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. For example- if a separate power meter has been installed for a department, the entire power cost ascertained from the meter is allocated to that department. The salary of the works manager cannot be directly allocated to any one department since he looks after the whole factory. It is, therefore, obvious that many overhead items will remain unallocated after this step.

(b) 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 unallocable expenses are to be spread over the various departments or cost centres on the basis of two principles. This is called apportionment. Thus apportionment implies "*the allotment of proportions of items of cost to cost centres or departments*". After this stage, all the overhead costs would have been either allocated to or apportioned over the various departments.

(c) Re-apportionment: Upto 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**. Such departments provide auxiliary services across the entity and renders services to other cost centres and in some cases to outside parties. Examples of such departments are engineering, quality control and assurance, laboratory, canteen, stores, time office, dispensary etc. The overheads of these departments are to be shared by the production departments since service departments operate primarily for the purpose of providing services to production departments. **The process of assigning service department overheads to production departments is called reassignment or re-apportionment**. At this stage, all the factory overheads are collected under production departments.

3. 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.

The overhead expenses can be absorbed by estimating the overhead (as assigned above) and then working out an absorption rate. When overheads are estimated, their absorption is carried out by adopting a pre-determined overhead absorption rate. This rate can be ca

lculated by using any one method as discussed in this chapter at the end.

As the actual accounting period begins, each unit of production automatically absorbs a certain amount of factory overheads through pre-determined rates. During the year a certain amount will be absorbed over the various products. This is known as the total amount of absorbed overheads.

4. **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.

Students will thus see that the whole discussion as above is meant to serve the following two purposes:

(a) to charge various products and services with an equitable portion of the total amount of factory overheads; and

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

4.4 STEPS FOR THE DISTRIBUTION OF OVERHEADS

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

4.4.1 Estimation and Collection of Manufacturing Overheads

The amount of factory 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.**

Standing Orders: In every manufacturing business, expenses are incurred on direct materials and direct labour in respect of several jobs or other units of production, manufacture of which is undertaken. The incurring of these expenses is authorised by production orders or work orders. The work order numbers are not ordinarily fixed or permanent. They are generally allotted in a serial order according to the number of manufacturing jobs undertaken by the business. In addition, indirect expenses are incurred in connection with the rendering of services to the production departments, or to the manufacturing process. The term *"Standing Order" denotes sanction for indirect expenses under various heads of expenditure*.

In large factories, usually the classification of indirect expenditures is combined with a system of Standing Orders (sometimes also referred as Service "Orders"). It is a **system under which a number is allotted to each item of expense for the purpose of identification**, and the same is continued from year to year. All the indirect expenditure in such a case, is charged to one or the other of the Standing Orders and periodical summaries, giving total of each Standing Order, are prepared for comparison with budgets, as well as for apportioning them among the various departments. The extent of such analysis and the nomenclature adopted are settled by the management according to the needs of the industry.

4.4.2 Allocation of Overheads over various Departments or Departmentalisation of Overheads

Most of the manufacturing processes functionally are different and are performed by different departments in the factory. Where such a division of functions had been made, some of the departments should be engaged in actual production of goods, and others in providing services ancillary thereto. At this stage, the factory overheads which can be directly related to the various production or service departments are allocated in this manner.

It may, sometime, become necessary to sub-divide a manufacturing organisation into several cost centres, so that a closer distribution of expenses and a more detailed control is practicable.

It is thus obvious that the principal object of setting up cost centres is to collect data, in respect of similar activities more conveniently. This avoids a great deal of cost analysis. When costs are collected by setting up cost centres, several items can be ascertained definitely and the element of estimation is reduced considerably. For instance, the allowance of the normal idle time or the amount to be spent on consumable stores, etc. **There are two main types of cost centres - machine or personal** - depending on whether the process of manufacture is carried on at a centre by man or machine. For the convenience of recording of expenditure, cost centres are sometimes allotted a code number.

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

(a) *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.

(b) *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.

(c) *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 that only 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.

(d) *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.

4.4.3 Apportioning overhead expenses over various departments

After the allocable overheads are related to the departments, expenses incurred for several departments have to be apportioned over each department, *e.g.* rent, power, lighting, insurance and depreciation. For distributing these overheads over different departments benefiting thereby, it is necessary at first to determine the proportion of benefit received by each department and then distribute the total expenditure proportionately on that basis. But the same basis of apportionment cannot be followed for different items of overheads since the benefit of service to a department in each case has to be measured differently. Some of the bases that may be adopted for the apportionment of expenses are stated below:

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	Number of workers

	(ii) Labour welfare expenses (iii) Time keeping (iv) Personnel office (v) Supervision	
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, or 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.

Some other basis of apportioning overhead costs: We have considered already that the benefit received by the department generally is the principal criterion on which the costs of service departments or common expenses are apportioned. But other bases of apportionments which may be used are mentioned below:

(a) Analysis or survey of existing conditions.

(b) Ability to pay.

(c) Efficiency or incentive.

A single concern may have only one criterion under consideration predominantly or may use all (including the service or benefit criterion) for different phases of its activity.

Analysis or Survey of existing conditions: At times it may not be possible to determine the advantage of an item of expenses without undertaking an analysis of expenditure. For example, lighting expenses can be distributed over departments only on the basis of the number of light points fixed in each department.

Ability to pay: It is a principle of taxation which has been applied in cost accounting as well for distributing the expenditure on the basis of income of the paying department, on a proportionate basis. For example, if a company is selling three different products in a territory, it may decide to distribute the expenses of the sales organisation to the amount of sales of different articles in these territories. This basis, though simple to apply, may be inequitable since the expenditure charged to an article may have no relation to the actual effort involved in selling it. Easy selling lines thus may have to bear the largest proportion of expenses while, on the other hand, these should bear the lowest charge.

Efficiency or Incentives: Under this method, the distribution of overheads is made on the basis of pre-determined levels of production or sales. When distribution of overhead cost is made on this basis and if the level of production exceeds the pre-determined level of production the incidence of overhead cost gets reduced and the total cost per unit of production or of sales, lowered. The opposite is the effect if the assumed levels are not reached.

Thus the department whose sales are increasing is able to show a greater profit and thereby is able to earn greater goodwill and appreciation of the management than it would have if the distribution of overheads was made otherwise.

Difference between Allocation and Apportionment

The difference between the allocation and apportionment is important to understand because the purpose of these two methods is the identification of the items of cost to cost units or centers. However, the main difference between the above methods is given below.

(1) *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.

On the other hand, *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.

(2) *Allocation* is a direct process of charging expenses to different cost centres whereas *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.

(3) The allocation or apportionment of an expense is not dependent on its nature, but the relationship between the expense and the cost centre decides that whether it is to be allocated or apportioned.

(4) Allocation is a much wider term than apportionment.

4.4.4 Re-apportioning service department overheads over production department

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

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. of electric Points, Wattage.
10. Power House (electric power cost)	Horse power, Kwh, Horse power × 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

Notes:

(1) Repairs included in repairs shop cost, building maintenance cost included in maintenance shop cost etc. should be apportioned on the basis of capital values.

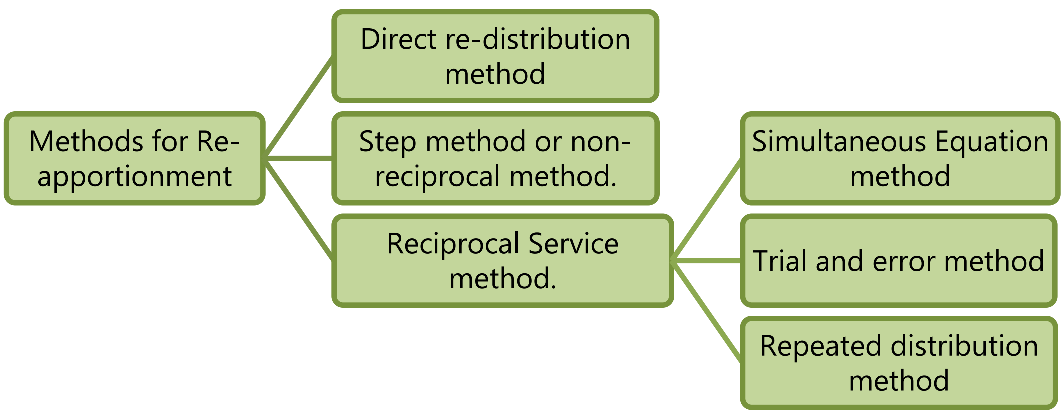
(2) Economy, practicability, equitability and reliability are the matters of consideration for selection of the base.

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.



(i) 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.** To understand the applications of this method, go through the illustration which follows.

ILLUSTRATION 1

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

Production Departments:	***(₹)***	***(₹)***
A	*30,00,000*	
B	*26,00,000*	
C	*24,00,000*	*80,00,000*
Service Departments:	***(₹)***	***(₹)***
Stores	*4,00,000*	
Time-keeping and Accounts	*3,00,000*	
Power	*1,60,000*	
Canteen	*1,00,000*	*9,60,000*

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

	Dept. A	***Dept. B***	***Dept. C***
Horse power of Machine	*300*	*300*	*200*
Number of workers	*20*	*15*	*15*
Value of stores requisition in (₹)	*2,50,000*	*1,50,000*	*1,00,000*

PREPARE a statement apportioning the costs of service departments over the production departments.

SOLUTION

Secondary Overhead Distribution Statement

Items of cost (as per primary distribution summary)	**Basis of apportionment**	**Total (₹)**	**Production Departments**		
			A (₹)	**B (₹)**	**C (₹)**
Cost as per primary distribution summary		80,00,000	30,00,000	26,00,000	24,00,000
Stores (5:3:2)	Value of Store requisition	4,00,000	2,00,000	1,20,000	80,000

Time-keeping and Accounts (4:3:3)	No. of workers	3,00,000	1,20,000	90,000	90,000
Power (3:3:2)	H.P. of Machine	1,60,000	60,000	60,000	40,000
Canteen (4:3:3)	No. of workers	1,00,000	40,000	30,000	30,000
		89,60,000	34,20,000	29,00,000	26,40,000

(ii) 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).** In other words, the cost of the service department that serves the largest number of services to the other service department(s) and production department(s) is distributed first. After this, the cost of service department serving the next largest number of departments is apportioned.

This process continues till the cost of last service department is apportioned. The cost of last service department is apportioned among production departments only.

Some authors are of the view that the cost of service department with largest amount of cost should be distributed first.

ILLUSTRATION 2

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

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

SOLUTION

Summary of Overhead Distribution

Departments	X (₹)	Y (₹)	A (₹)	B (₹)
Amount as given above	2,00,000	1,50,000	3,00,000	3,20,000
Expenses of X Dept. apportioned over Y, A	(2,00,000)	50,000	80,000	70,000

and B Dept. in the ratio (5:8:7)				
		2,00,000	3,80,000	3,90,000
Expenses of Y Dept. apportioned over A and B Dept. in the ratio (2:3)	-	(2,00,000)	80,000	1,20,000
Total	Nil	Nil	4,60,000	5,10,000

(iii) Reciprocal Service Method: This method recognises 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. (Refer to the following illustration to understand the method)

ILLUSTRATION 3

Service departments' expenses

	(₹)
Boiler House	*3,00,000*
Pump Room	*60,000*
	3,60,000

The allocation is :

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

SOLUTION

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

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

Then

$$B = 3{,}00{,}000 + 1/2\ P$$

$$P = 60{,}000 + 1/20\ B$$

Substituting the value of B,

$$P = 60{,}000 + 1/20\ (3{,}00{,}000 + 1/2\ P)$$

$$= 60{,}000 + 15{,}000 + 1/40\ P$$

$$= 75{,}000 + 1/40\ P$$

$$40\ P = 30{,}00{,}000 + P$$

$$39\ P = 30{,}00{,}000$$

$$P = ₹76{,}923$$

The total of expenses of the Pump Room are ₹76,923 and that of the Boiler House is ₹3,38,462 *i.e.*, ₹3,00,000 + 1/2 × ₹ 76,923.

The expenses will be allocated to the production departments as under:

Production departments:	A	B
	(₹)	(₹)
Boiler House (60% and 35% of ₹ 3,38,462)	2,03,077	1,18,462
Pump Room (10% and 40% of ₹ 76,923)	7,692	30,769
Total	2,10,769	1,49,231

The total of expenses apportioned to A and B is ₹ 3,60,000.

(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. All apportioned amounts for each service cost centre are added to get the total apportioned cost. These total service cost centre costs are redistributed to the production departments. Trial and error method and Simultaneous equation method gives the same result. (Refer to the following illustration to understand this method.)

ILLUSTRATION 4

Sanz Ltd., is a manufacturing company having three production departments, 'A', 'B' and 'C' and two service departments 'X' and 'Y'. The following is the budget for December 20X3:

	Total (₹)	A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Direct material		1,00,000	2,00,000	4,00,000	2,00,000	1,00,000
Direct wages		5,00,000	2,00,000	8,00,000	1,00,000	2,00,000
Factory rent	4,00,000					
Power	2,50,000					
Depreciation	1,00,000					
Other overheads	9,00,000					
Additional information:						
Area (Sq. ft.)		500	250	500	250	500
Capital value of assets (₹ lakhs)		20	40	20	10	10
Machine hours		1,000	2,000	4,000	1,000	1,000
Horse power of machines		50	40	20	15	25

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

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

Required:

(i) *PREPARE a statement showing distribution of overheads to various departments.*

(ii) *PREPARE a statement showing re-distribution of service departments expenses to production departments using Trial and error method.*

SOLUTION

(i) Overhead Distribution Summary

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

(ii) Redistribution of Service Department's expenses:

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

Distribution of Service departments' overheads to Production departments

	Production Departments		
	A (₹)	B (₹)	C (₹)
Overhead as per primary distribution	2,70,000	3,70,000	6,00,000
Dept- X (90% of ₹ 5,04,300)	2,26,900	75,600	1,51,300
Dept- Y (95% of ₹ 5,85,400)	3,51,300	2,04,900	---
	8,48,200	6,50,500	7,51,300

(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. (Refer to the following illustration to understand this method)

ILLUSTRATION 5

PH Ltd., is a manufacturing company having three production departments, 'A', 'B' and 'C' and two service departments 'X' and 'Y'. The following is the budget for December 20X8:

	Total (₹)	*A (₹)*	*B (₹)*	*C (₹)*	*X (₹)*	*Y (₹)*
Direct material		*1,00,000*	*2,00,000*	*4,00,000*	*2,00,000*	*1,00,000*
Direct wages		*5,00,000*	*2,00,000*	*8,00,000*	*1,00,000*	*2,00,000*
Factory rent	*4,00,000*					
Power	*2,50,000*					
Depreciation	*1,00,000*					
Other overheads	*9,00,000*					
Additional information:						
Area (Sq. ft.)		*500*	*250*	*500*	*250*	*500*
Capital value of assets (₹ lakhs)		*20*	*40*	*20*	*10*	*10*
Machine hours		*1,000*	*2,000*	*4,000*	*1,000*	*1,000*
Horse power of machines		*50*	*40*	*20*	*15*	*25*

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

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

Required:

(i) PREPARE a statement showing distribution of overheads to various departments.

(ii) PREPARE a statement showing re-distribution of service departments expenses to production departments.

(iii) CALCULATE machine hour rates of the production departments 'A', 'B' and 'C'.

SOLUTION

(i) Overhead Distribution Summary

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

(ii) Redistribution of Service Department's expenses

	A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Total overheads	2,70,000	3,70,000	6,00,000	4,75,000	5,35,000
Dept. X overhead apportioned in the ratio (45:15:30: —:10)	2,13,750	71,250	1,42,500	(4,75,000)	47,500
Dept. Y overhead apportioned in the ratio (60:35: —:5: —)	3,49,500	2,03,875	–	29,125	(5,82,500)

Dept. X overhead apportioned in the ratio (45:15:30: —:10)	13,106	4,369	8,738	(29,125)	2,912
Dept. Y overhead apportioned in the ratio (60:35: —:5: —)	1,747	1,019	–	146	(2,912)
Dept. X overhead apportioned in the ratio (45:15:30: —:10)	65	22	44	(146)	15
Dept. Y overhead apportioned in the ratio (60:35: —:5: —)	9	6	-	-	(15)
	8,48,177	6,50,541	7,51,282	–	–

(iii) Machine hour rate:

		A	B	C
A	Total overheads (₹)	8,48,177	6,50,541	7,51,282
B	Machine hours	1,000	2,000	4,000
C	**Machine hour rate (₹) [A ÷ B]**	**848.18**	**325.27**	**187.82**

4.4.5 Absorbing overheads over cost units, products, etc.

Collection of the figure of overheads for the factory as a whole or for various departments is not enough. It is clearly necessary to ascertain *how much of the overheads is to be debited to the cost of the various jobs, products etc. This process is called absorbing the overhead to cost units.* We take up below the various implications of this process. However, if only one uniform type of work is done, the task is easy and under such a situation the overhead expenses to be absorbed may be calculated by dividing actual overheads by the number of units of work done or estimated overheads by the estimated output.

4.5 METHODS OF ABSORBING OVERHEADS TO VARIOUS PRODUCTS OR JOBS

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

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

(ii) that the amount charged to individual jobs or products is equitable. In case of factory overhead, this means:

(a) that the time spent on completion of each job should be taken into consideration;

(b) that a distinction should be made between jobs done by skilled workers and those done by unskilled workers. and

(c) that jobs done by manual labour and those done by machines should be distinguished.

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 substitution of human labour by machines.

Several methods are commonly employed either individually or jointly for computing the appropriate overhead rate. The more common of these are:

(1) Percentage of direct materials,

(2) Percentage of prime cost,

(3) Percentage of direct labour cost,

(4) Labour hour rate,

(5) Machine hour rate and

(6) Rate per unit of Output

4.5.1 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:

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

4.5.2 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:

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

Example for the above two methods:

Suppose for a given period, actual figures are estimated as follows:

	₹
Direct materials	2,00,000
Direct labour	1,00,000
Factory overheads	90,000

The percentage of factory overheads to direct materials will be 45%, to prime cost 30%. If, on a job, material cost is ₹ 10,000 and direct labour is ₹7,000 the cost, after absorbing factory overhead, will be as follows :

(i) ₹ 17,000 + 45% ₹ 10,000 or ₹ 21,500,

(ii) ₹ 17,000 + 30% ₹ 17,000 or ₹ 22,100, and

One can see how, with a different method, the works cost comes out to be different. Of these methods, the first and second are generally considered to be unsuitable on account of the following reasons:

(i) Manufacturing overhead expenses are mostly a function of time i.e., time is the determining factor for the incurrence and application of manufacturing overhead expenses. That they are so would be clear if we recall that overhead expenses, specially manufacturing expenses, can in the ultimate analysis be regarded as expenditure incurred in providing the necessary facilities and service to workers employed in the productive process. The question of facilities and service made available to workers naturally is dependent on the length of time during which workers make use of the facilities. It may, therefore, be said that *the job or product on which more time has been spent would entail larger manufacturing expenses than the job requiring less time. The factor is ignored altogether by the first method and largely by the second method.*

(ii) Overheads are neither related to the prime cost nor to direct material cost except to a very small extent. Thus, if the percentage of material cost is used when there are two jobs requiring the same operational time but using material having varying prices, their manufacturing overhead cost would be different whereas this should not normally be so.

The method of absorbing overhead costs on the basis of prime cost also does not take into consideration the time factor. The fact that the amount includes labour cost in addition to material cost does not render the prime cost to be more suitable; infact, the results are liable to be more misleading because of the cumulative error of using both the labour and material cost as the basis of allocation of overhead expenses, on neither of which they are already dependent.

(iii) Since material prices are prone to frequent and wide fluctuations, the manufacturing overheads, if based on material cost or prime cost, also would fluctuate violently from period to period.

(iv) The skill of the workers involved and whether machines were used or not, are ignored when these methods are used.

Percentage of materials cost may, however, be used for the limited purpose of absorbing material handling and store overheads.

4.5.3 Percentage of direct labour cost

Formula to be used under this method is-

Direct Labour Cost Percentage Rate

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

Advantages	Disadvantages
(i) The method is simple and economical to apply. (ii) The time factor is given recognition even if indirectly. (iii) Total expenses recovered will not differ much from the estimated figure since total wages paid are not likely to fluctuate much.	(i) It gives rise to certain inaccuracies due to the time factor not being given full importance. (ii) Where machinery is used to some extent in the process of manufacture, an allowance for such a factor is not made. (iii) It does not provide for varying skills of workers

4.5.4 Labour hour rate

This method is an improvement on the percentage of direct wage basis, *as it fully recognises 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. Suppose factory overheads are estimated at ₹90,000 and labour hours at 1,50,000. The overhead absorption rate will be ₹0.60. If 795 direct labour hours are spent on a job, ₹477 will be absorbed as overhead. It can be calculated for each category of workers.

Formula to be used under this method is-

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

4.5.5 Machine hour rate

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

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

(ii) 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. In order to see that such expenses are not left out of production costs, one should include a portion of such expenses to compute the machine hour rate. Alternatively, the overheads not directly related to machines may be absorbed on the basis of Productive Labour Hour Rate Method or any other suitable method.

Note: Some people even prefer to add the wages paid to the machine operator in order to get a comprehensive rate of working a machine for one hour.

By the machine hour rate method, manufacturing overhead expenses are charged to production on the basis of number of hour machines are used on jobs or work orders. Here each machine or group of machines are treated as a cost centre. Overheads apportioned to a production department is further apportioned to machines or group of machines. These apportioned costs are divided by the estimated productive machine hour to get machine hour rate.

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

Step1: Calculate total of overheads apportioned to a production department (as discussed earlier in this chapter)

↓

Step 2: Apportion further these overheads to machines or group of machines in the department.

↓

Step 3: Allocate machine specific costs (directly identifiable with the machine)

↓

Step 4: Estimate total productive hours for the machine

↓

Step 5: Aggregate overheads as apportioned in step-2 and allocated in step-3 and divide it by Estimated total productive hours

↓

Step 6: The resultant figure is machine hour rate

The above costs are further divided into fixed cost or standing charges and variable cost. Costs which remain constant irrespective of operation machine are treated as fixed cost or standing charges. Examples of fixed cost include insurance premium for machine, rent for premises, supervisor's salary, depreciation (if relates to effluxion of time) etc.

Costs which vary with the operation of the machine are treated as variable cost. Examples of variable cost include cost for power, cost for consumables (lubricants, oils etc.), repairs and maintenance, depreciation (if it relates to activity) etc.

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 charging machine operating expenses to production. (2) The under-absorption of machine overheads would indicate the extent to which the machines have been idle. (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.	(1) Additional data concerning the operation time of machines, not otherwise necessary, must be recorded and maintained. (2) As general department rates for all the machines in a department may be suitable, the computation of a separate machine hour rate for each machine or group of machines would mean further additional work.

4.5.6 Rate per unit of output method

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

$$\text{Overheads Rate} = \frac{\text{Amount of overheads}}{\text{Number of units}}$$

4.6 TYPES OF OVERHEAD RATES

The overhead rates may be of the following types:

1. **Normal Rate:** This rate is calculated by dividing the actual overheads by actual base. It is also known as actual rate.

It is calculated by the following formula:

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

2. **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 basis.

(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 ₹10,000 and output at 4,000 units, the overhead rate will be ₹2.50 per unit.

(3) The **overhead rate for a year may be fixed** on the basis of the normal volume of the business.

3. **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 standardised.

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.

4. 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:

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

ILLUSTRATION 6

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 P_2 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:

Departments	P_1	25,50,000	S_1	6,00,000
	P_2	21,75,000	S_2	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, 20X8)

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*	S_1	*60,000*
	P_2	*2,04,000*	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, 20X8 that will reflect the budgeted costs and actual costs.

SOLUTION

(i) Computation of predetermined overhead rate for each production department from budgeted data

	Production Department		Service Department	
	P_1	P_2	S_1	S_2
Budgeted factory overheads for the year in (₹)	25,50,000	21,75,000	6,00,000	4,50,000
Allocation of service department S_1's costs to production departments P_1 and P_2 equally in (₹)	3,00,000	3,00,000	(6,00,000)	--
Allocation of service department S_2's costs to production departments P_1 and P_2 in the ratio of 2:1 in (₹)	3,00,000	1,50,000	–	(4,50,000)
Total	31,50,000	26,25,000	--	--

Budgeted machine hours in department P_1 (working note-1)	1,05,000	--		
Budgeted labour hours in department P_2 (working note-1)	--	1,75,000		
Budgeted machine/ labour hour rate (₹)	30.00	15.00		

(ii) Performance report for July, 20X8

(When 4,000 and 3,000 units of products A and B respectively were actually produced)

	Budgeted (₹)	Actual (₹)
Raw materials used in Dept. P_1:		
A : 4,000 units × ₹ 120	4,80,000	4,89,000
B : 3,000 units × ₹ 150	4,50,000	4,56,000
Direct labour cost (on the basis of labour hours worked in department P_2)		
A : 4,000 units × 2 hrs. × ₹ 72	5,76,000	5,91,900
B : 3,000 units × 2.5 hrs. × ₹ 75	5,62,500	5,52,000
Overhead absorbed on machine hour basis in Dept. P_1:		
A : 4,000 units × 1.5 hrs. × ₹ 30	1,80,000	1,74,400*
B : 3,000 units × 1 hr. × ₹ 30	90,000	1,18,649
Overhead absorbed on labour hour basis in Dept. P_2:		
A : 4,000 units × 2 hrs. × ₹ 15	1,20,000	1,31,364
B : 3,000 units × 2.5 hrs. × ₹ 15	1,12,500	1,18,548
	25,71,000	26,31,861

* (*Refer to working note 4*)** (*Refer to working note 5*)

Working notes:

1.

	Product A	Product B	Total
Budgeted output (in units)	50,000	30,000	
Budgeted machine hours in Dept. P_1	75,000 (50,000×1.5 hrs.)	30,000 (30,000×1 hr.)	1,05,000
Budgeted labour hours in Dept. P_2	1,00,000 (50,000×2 hrs.)	75,000 (30,000×2.5 hrs.)	1,75,000

2.

	Product A	Product B	Total
Actual output (in units)	4,000	3,000	
Actual machine hours utilized in Dept. P_1	6,100	4,150	10,250
Actual labour hours utilised in Dept. P_2	8,200	7,400	15,600

3. Computation of actual overhead rates for each production department from actual data

	Production Department		Service Department	
	P_1	P_2	S_1	S_2
Actual factory overheads for the month of July, 20X1 in (₹)	2,31,000	2,04,000	60,000	48,000
Allocation of service Dept. S_1's costs to production Dept. P_1 and P_2 equally in (₹)	30,000	30,000	(60,000)	–
Allocation of service Dept. S_2's costs to production Dept. P_1 and P_2 in the ratio of 2:1 in (₹)	32,000	16,000	–	(48,000)
Total	2,93,000	2,50,000	--	--
Actual machine hours in Dept. P_1 (working note-2)	10,250	--		

Actual labour hours in Dept. P_2 (working note-2)	--	15,600		
Actual machine/ labour hour rate (₹)	28.59	16.02		

4. Actual overheads absorbed (based on machine hours)

A : 6,100 hrs × ₹ 28.59 = ₹ 1,74,400

B : 4,150 hrs × ₹ 28.59 = ₹ 1,18,649

5. Actual overheads absorbed (based on labour hours)

A : 8,200 hrs × ₹ 16.02 = ₹ 1,31,364

B : 7,400 hrs × ₹ 16.02 = ₹ 1,18,548

ILLUSTRATION 7

A machine costing ₹ 1,00,00,000 is expected to run for 10 years. At the end of this period its scrap value is likely to be ₹ 9,00,000. Repairs during the whole life of the machine are expected to be ₹ 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 ₹ 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 ₹ 30,000 and the lighting charges amount to ₹ 8,000 per month. The foreman is paid a monthly salary of ₹ 19,200. FIND OUT the machine hour rate, assuming insurance is @ 1% p.a. and the expenses on oil, etc., are ₹ 900 per month.

SOLUTION

Total number of hours per annum- 4,380

Total number of hours per month- 365

Computation of Machine Hour Rate

	Per month (₹)	Per hour (₹)
Fixed costs (Standing Charges)		
Depreciation (Refer working note-1)	75,833	
Rent (₹30,000 × ¼)	7,500	
Lighting charges {(₹8,000 × 2 points) ÷ 10 points}	1,600	

Foreman's salary (₹19,200 × 1/6)	3,200	
Sundry expenses (oil etc.)	900	
Insurance {(1% of ₹9,10,000) ÷ 12 months}	758	
	89,791	246.00
Variable costs:		
Repairs (Refer working note -2)		41.10
Electricity (15 units × ₹5)		75.00
Machine Hour rate		**362.10**

Working Notes:

(1) Depreciation per month = $\frac{\text{Cost of Machine} - \text{Scrap value}}{\text{Life of the machine}}$

$$= \frac{₹\,1,00,00,000 - ₹\,9,00,000}{(10\text{ years} \times 12\text{ months})^*} = ₹\ 75,833$$

*In the question the life of the machine is given as 10 years and it is also mentioned the machine will run for 4,380 hours per annum. The depreciation can be calculated either on the basis of time i.e. 10 years or on the basis of activity of 43,800 hours (4,380 hours p.a.)

(2) Repairs for the whole life is ₹18,00,000, which can be linked to activity level of 43,800 hours. Thus, Repairs cost per hour = $\frac{₹18,00,000}{43,800\text{ hours}}$ = ₹ 41.10

4.7 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 as follows 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 in the latter case, actual overhead rate will be more than the pre-determined overhead rate, hence over-absorption and under-absorption will occur respectively.

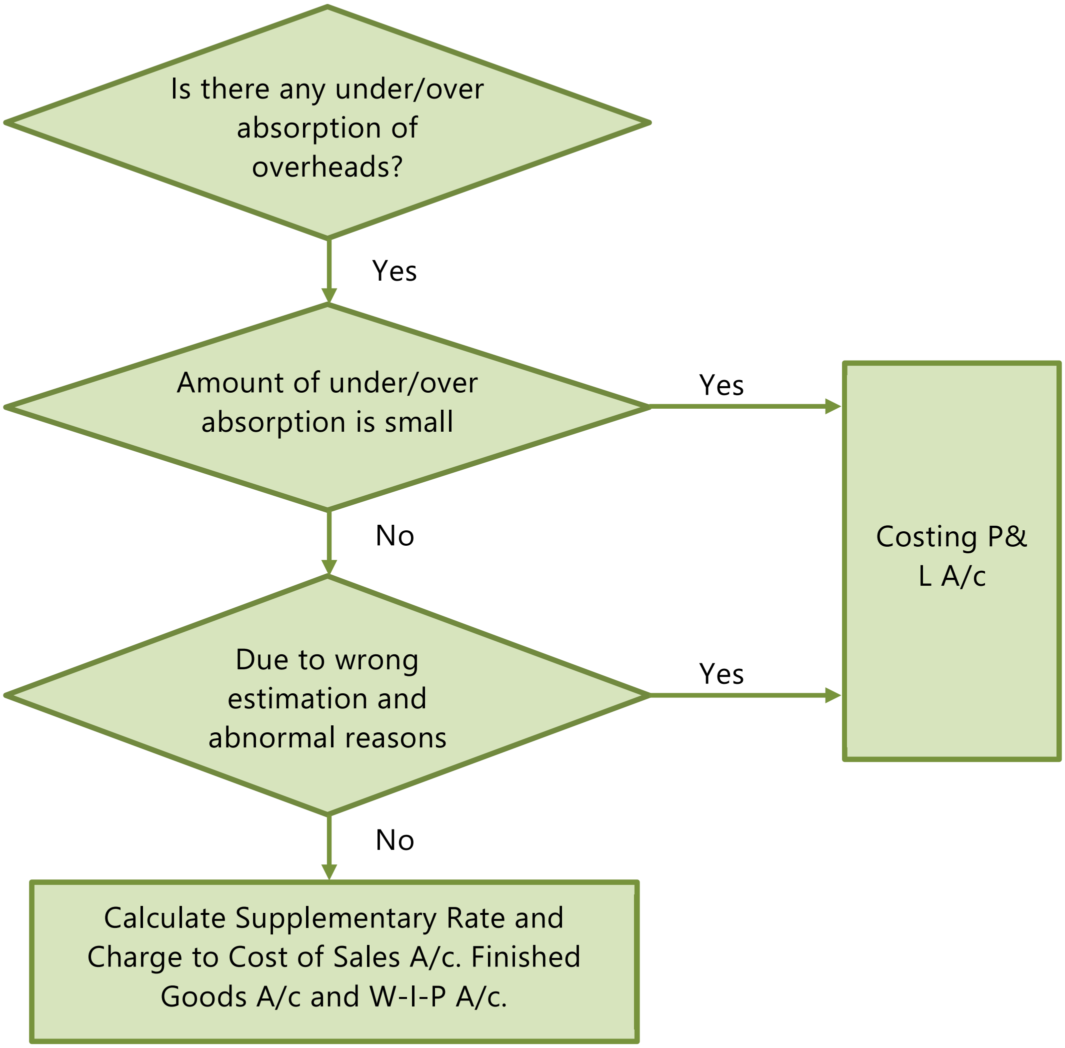
(ii) Similarly, if the number of units actually produced during the period remains the same as budgeted figure but the actual overheads incurred are more or less than the estimated overheads for the period, then a situation of under-absorption or over-absorption will arise respectively.

(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 also be termed as overhead variance. The amount of over-absorption being represented by a credit balance in the account and conversely, the amount of under-absorption being a debit balance.

Treatment of such under/ over absorption of overheads can be understood with the help of the following flow chart:



Treatment of Under-absorbed and Over-absorbed of overheads in Cost Accounting

As regards the treatment of such debit or credit balances, the **general view is that if the balances are small they should be transferred to the Costing Profit and Loss Account** and the cost of individual products should not be increased or reduced as these would be representing normal cost.

Where, however the *difference is large and due to wrong estimation, it would be desirable to adjust the cost of products manufactured*, as otherwise the cost figures would convey a misleading impression. Such adjustments usually take the form of supplementary rates where there is a debit balance in the overhead account and a credit in the other case.

Now, the production of any period can be identified in three forms, **goods finished and sold, goods finished but held in stock (not yet sold) and semi-finished goods (work in progress).** So far as the first category of goods is concerned, it is arguable that the post-mortem of the costs of individual products long after they have been sold may have some academic utility but it is frequently devoid of any practical significance. Therefore, it is suggested that the total variance concerning goods finished and sold should be adjusted by transferring the amount to the Cost of Sale Account, the costs of the individual items of such goods not being affected.

As regards the variance pertaining to goods finished and held in stock (*i.e.* not yet sold), it would be necessary to adjust the value of the stock; similarly, the value of work-in-progress should be adjusted.

However, over or under recovery of overheads due to abnormal reasons (such as abnormal over or under capacity utilisation) should be transferred to the Costing Profit and Loss Account.

ILLUSTRATION 8

A light engineering factory fabricates machine parts to customers. The factory commenced fabrication of 12 Nos. machine parts to customers' specifications and the expenditure incurred on the job for the week ending 21st August, 20X8 is given below:

	(₹)	(₹)
Direct materials (all items)		*780.00*
Direct labour (manual) 20 hours @ ₹ 15 per hour		*300.00*
Machine facilities :		
Machine No. I : 4 hours @ ₹ 45	*180.00*	
Machine No. II : 6 hours @ ₹ 65	*390.00*	*570.00*
Total		*1,650.00*
Overheads @ ₹ 8 per hour on 20 manual hours		*160.00*
Total cost		*1,810.00*

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, 20X8, the total labour hours worked was 2,400 and Machine Nos. I and II had worked for 30 hours and 32.5 hours respectively.

PREPARE a Cost Sheet for the job for the fabrication of 12 Nos. machine parts duly levying the supplementary rates.

SOLUTION

Fabrication of 12 Nos. machine parts (job No......) Date of commencement: 16 August, 20X8 Date of Completion. Cost sheet for the week ending, August 21, 20X8:

	(₹)	(₹)
Direct materials (all items)		780.00
Direct labour (manual) 20 hours @₹ 15 per hour		300.00
Machine facilities:		
Machine No. I : 4 hours @ ₹ 45	180.00	
Machine No. II : 6 hours @ ₹ 65	390.00	570.00
Total		1,650.00
Overheads @ ₹ 8 per hour on 20 manual hours		160.00
Total cost		1,810.00
Supplementary Rates		
Overheads 20 hours @ ₹ 2 per hour	40.00	
Machine facilities:		
Machine No. I - 4 hours @ ₹ 15	60.00	
Machine No. II - 6 hours @ ₹ 15	90.00	190.00
Cost		2,000.00

Working notes:

Overheads budgeted: 3,000 hours × ₹8 =₹24,000

Actual hours: 2,400

Actual rate per hour ₹24,000 ÷ 2,400 hours = ₹10

Supplementary charge ₹ 2 (₹10 – ₹ 8) per hour

Machine facilities:

	Machine No. I	Machine No. II
Budgeted	₹1,800 (40 × ₹45)	₹2,600 (40 × ₹65)
Actual number of hours	30	32.5
Actual rate per hour	₹60.00	₹80.00
Supplementary rate per hour	₹ 15.00 (₹60.00 – ₹45.00)	₹ 15.00 (₹80.00 – ₹65.00)

4.8 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 accounting and 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 organisation and controlling the operations of an undertaking. These overheads are also collected and classified in the same way as the factory overheads.

4.8.1 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, recognises 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 overhead apportionment 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 important department 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 not charged 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 formulating the policy, directing the organisation 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 basis 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.

4.8.2 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. But at 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 standing order numbers 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 department or 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.

ILLUSTRATION 9 (Reverse Calculation of Factory Overhead and Administrative overheads)

In an engineering company, the factory overheads are recovered on a fixed percentage basis on direct wages and the administrative overheads are 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:

	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:

(i) COMPUTATION of percentage recovery rates of factory overheads and administrative overheads.

(ii) CALCULATION of the amount of factory overheads, administrative overheads and profit for each of the two jobs.

(iii) Using the above recovery rates FIX 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%*

SOLUTION

(i) Let factory overhead recovery rate, as percentage of direct wages be F and administrative overheads recovery rate, as percentage of factory cost be A.

Factory Cost of Jobs:

Job 101 = ₹96,000 + ₹42,000F

Job 102 = ₹67,500 + ₹30,000F

Total Cost of Jobs:

Job 101 = (₹ 96,000 + ₹42,000F) + (₹96,000+ ₹42,000F) A = ₹ 1,51,500

Job-102 = (₹ 67,500 + ₹ 30,000F) + (₹67,500+ ₹30,000F) A = ₹ 1,06,875

(Refer to working note)

On solving above relations: F = 0.60 and A = 0.25

Hence, percentage recovery rates of factory overheads and administrative overheads are 60% and 25% respectively.

Working note:

	Job 101	*Job 102*
Total cost (₹)	1,51,500	1,06,875
$\frac{\text{Selling price}}{(100\% + \text{Percentage of profit})}$	*(₹ 1,66,650/110%)*	*(₹ 1,28,250/120%)*

(ii) **Statement of jobs, showing amount of factory overheads, administrative overheads and profit**

	Job 101	*Job 102*
	(₹)	*(₹)*
Direct materials	54,000	37,500
Direct wages	42,000	30,000
Prime cost	96,000	67,500
Factory overheads		
60% of direct wages	25,200	18,000
Factory cost	1,21,200	85,500
Administrative overheads		
25% of factory cost	30,300	21,375
Total cost	1,51,500	1,06,875
Profit	15,150	21,375
Selling price	1,66,650	1,28,250

(iii) **Selling price of Job 103**

	(₹)
Direct materials	24,000

Direct wages	20,000
Prime cost	44,000
Factory overheads (60% of Direct Wages)	12,000
Factory cost	56,000
Administrative overheads	14,000
(25% of factory cost)	
Total cost	70,000
Profit margin (balancing figure)	10,000
Selling price $\left[\frac{\text{Total Cost}}{87.5\%}\right]$	80,000

4.9 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 type of expenses represent two distinct type of functions. Some concerns group together these two type of overhead expenses into one composite class, namely, selling and distribution overhead, for the purpose of Cost Accounting.

4.9.1 Accounting of selling and distribution overheads

The collection and accumulation of each expense is made by means of appropriate standing order numbers in the usual way. Where it is decided to apportion a part of the administrative overhead to the selling division the same should also be collected through appropriate standing order numbers.

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 on basis as it may not have any direct relationship with the selling and distribution cost.

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 derived by 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 godowns 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 apportioned in 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, commission payable 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.

4.9.2 Control of Selling & 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 liking and 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 to control.

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 flexible budget may be prepared indicating the expenses at different levels of sales. The actual expenses are compared with the budgeted figures and in the case of variances 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.

ILLUSTRATION 10

A company which sells four products, some of them unprofitable, proposes discontinuing the sale of one of them. The following information is available regarding income, costs and activity for the year ended 31st March, 20X9.

	Products			
	A	B	C	D
Sales (₹)	30,00,000	50,00,000	25,00,000	45,00,000
Cost of sales (₹)	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:

	(₹)	Basis of allocation to products
Fixed Costs		
Rent & Insurance	3,00,000	Square feet
Depreciation	1,00,000	Parcel
Salesmen's salaries & expenses	6,00,000	Sales Volume
Administrative wages and salaries	5,00,000	No. of invoices
Variable Costs:		
Packing wages & materials	₹ 2 per parcel	
Commission	4% of sales	
Stationery	₹ 1 per invoice	

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

SOLUTION

Statement of Profit or Loss on Various Products during the year ended March 31, 20X9.

	Total (₹)	Products			
		A (₹)	B (₹)	C (₹)	D (₹)
Sales	1,50,00,000	30,00,000	50,00,000	25,00,000	45,00,000
Variable costs:					
Cost of sales	1,08,50,000	20,00,000	45,00,000	21,00,000	22,50,000
Commissions 4% of sales	6,00,000	1,20,000	2,00,000	1,00,000	1,80,000
Packing wages & materials @ ₹ 2 per parcel	10,00,000	2,00,000	3,00,000	1,50,000	3,50,000
Stationery @ ₹1 per invoice	4,00,000	80,000	1,40,000	60,000	1,20,000
Total variable costs	1,28,50,000	24,00,000	51,40,000	24,10,000	29,00,000
Contribution (Sales – variable cost)	21,50,000	6,00,000	(1,40,000)	90,000	16,00,000
Fixed Costs:					
Rent & Insurance (5:4:8:3)	3,00,000	75,000	60,000	1,20,000	45,000
Depreciation (4:6:3:7)	1,00,000	20,000	30,000	15,000	35,000
Salesmen's salaries & expenses (6:10:5:9)	6,00,000	1,20,000	2,00,000	1,00,000	1,80,000
Administrative wages & salaries (4:7:3:6)	5,00,000	1,00,000	1,75,000	75,000	1,50,000
Total Fixed costs	15,00,000	3,15,000	4,65,000	3,10,000	4,10,000
Profit or Loss (Contribution–fixed Costs)	6,50,000	2,85,000	(6,05,000)	(2,20,000)	11,90,000
Percentage of profit or Loss on sales (%)	4.33	9.50	(12.10)	(8.80)	26.4

4.10 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 the basis 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 utilised capacity of a plant. It is also known as *operating capacity*.** This capacity takes into account loss of 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 or services 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 planned maintenance	*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. It is 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 utilised in production.

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

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

The idle capacity may arise due to lack of product demand, non-availability of raw material, shortage of skilled labour, absenteeism, shortage of power fuel or supplies, seasonal nature of product etc.

Installed Capacity	
	Normal Idle Capacity
Normal Capacity	
	Abnormal Idle Capacity
Actual Capacity	

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 utilised.

(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.

4.11 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** of the 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 given in 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 organisation. 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 the flow 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 particular job 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 workers should be treated as office; sales or distribution overhead as the case may be. These expenses can be spread over various departments of the concern on the basis of the number 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 the canteen is meant only for factory workers therefore this 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 recovered as 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 meet some specific customer order, such expenditure may be charged directly to the order concerned. If night shifts are run due to abnormal circumstances, the additional expenditure should be charged to the costing profit and loss account.

(xii) Research and Development Expenses: The Terminology defines *research expenses as "the expenses of searching for new or improved products, new application 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 should be 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.

SUMMARY

- **Overheads:** Overheads represent expenses that have been incurred in providing certain ancillary facilities or services which facilitate or make possible the carrying out of the production process; by themselves these services are not of any use.
- **Cost allocation:** The term 'allocation' refers to assignment or allotment of an entire item of cost to a particular cost center or cost unit.
- **Cost apportionment:** Apportionment implies the allotment of proportions of items of cost to cost centres or departments.
- **Re-apportionment:** The process of assigning service department overheads to production departments is called reassignment or re-apportionment.
- **Absorption-** The process of recovering overheads of a department or any other cost center from its output is called recovery or absorption.
- **Direct re-distribution method:** Under this method service department costs 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 service rendered by service department to another service department. The sequence here begins with the department that renders service to the maximum number of other service departments.
- **Reciprocal Service Method:** These methods are used when different service departments render services to each other, in addition to rendering services to production departments. In such cases various service departments have to share overheads of each other. The methods available for dealing with reciprocal services are

    (a) Simultaneous equation method;

    (b) Repeated distribution method;

    (c) Trial and error method.
- **Blanket overhead rates:** 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.

$$\text{Blanket Overhead rate} = \frac{\text{Overhead costs for the whole factory}}{\text{Total units of the selected base}} \times 100$$

TEST YOUR KNOWLEDGE

MCQs based Questions

1. "Fixed overhead costs are not affected in monetary terms during a given period by a change in output". But this statement holds good provided

   (a) Increase in output is not substantial

   (b) Increase in output is substantial

   (c) Both (a) and (b)

   (d) None of the above

2. The concept of 'idle capacity of plant' as used in cost accounting is its

   (a) Best capacity for normal production

   (b) Capacity used for standard setting

   (c) Theoretical maximum capacity

   (d) Capacity below which production should not fall

3. The allotment of whole items of cost to cost centres or cost units is called

   (a) Overhead absorption

   (b) Cost apportionment

   (c) Cost allocation

   (d) None of the above

4. Primary packing cost is a part of

   (a) Direct material cost

   (b) Production Cost

   (c) Selling overheads

   (d) Distribution overheads

5. Director's remuneration and expenses form part of

   (a) Production overhead

   (b) Administration overhead

   (c) Selling overhead

   (d) Distribution overhead

6. In case, the output of a factory is doubled, the depreciation should be treated as
   (a) Fixed cost
   (b) Variable cost
   (c) Semi- variable cost
   (d) None of the above
7. Bad debt is an example of
   (a) Distribution overhead
   (b) Production overhead
   (c) Selling overhead
   (d) Administration overhead
8. Normal capacity of a plant refers to the difference between
   (a) Maximum capacity and practical capacity
   (b) Practical capacity and normal capacity
   (c) Practical capacity and estimated idle capacity as revealed by long term sales trend.
   (d) Maximum capacity and actual capacity
9. The difference between actual factory overhead and absorbed factory overhead will be usually at the minimum level, provided pre- determined overhead rate is based on
   (a) Maximum capacity
   (b) Direct labour hours
   (c) Machine hours
   (d) Normal capacity
10. Identify among the following a scientific and accurate method of factory overhead absorption
   (a) Percentage of direct material cost method
   (b) Percentage of direct labour cost method
   (c) Percentage of prime cost method
   (d) Machine hour rate method

Theoretical Questions

1. STATE what is blanket overhead rate? In which situations, blanket rate is to be used and why?
2. DISCUSS the step method and reciprocal service method of secondary distribution of overheads.
3. DISCUSS the problems of controlling the selling and distribution overheads.
4. DISTINGUISH between cost allocation and cost absorption.
5. EXPLAIN Single and Multiple Overhead Rates.
6. EXPLAIN how would you treat the idle capacity costs in Cost Accounts?
7. DISCUSS the difference between allocation and apportionment of overhead.
8. EXPLAIN what are the methods of re-apportionment of service department expenses over the production departments? Discuss.

Practical Questions

1. The ABC Company has the following account balances and distribution of direct charges on 31st March, 20X1.

	Total	Production Depts.		Service Depts.	
		Machine shop	Packing	Gen. Plant	Store & Maintenance
	(₹)	(₹)	(₹)	(₹)	(₹)
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				

Taxes	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		Radiator Sections	No. of Employees	Investment ₹	H.P hours
Machine Shop	2,000	Sq. ft.	45	20	640,000	3,500
Packing	800	" "	90	10	200,000	500
General Plant	400	" "	30	3	10,000	–
Store & Maint.	1,600	" "	60	5	150,000	1,000
	4,800	" "	225	38	1,000,000	5,000

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

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

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

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

2. Modern Manufactures Ltd. has three Production Departments P_1, P_2, P_3 and two Service Departments S_1 and S_2 details pertaining to which are as under:

	P_1	P_2	P_3	S_1	S_2
Direct wages (₹)	3,000	2,000	3,000	1,500	195
Working hours	3,070	4,475	2,419	-	-
Value of machines (₹)	60,000	80,000	1,00,000	5,000	5,000
H.P. of machines	60	30	50	10	-
Light points	10	15	20	10	5
Floor space (sq. ft.)	2,000	2,500	3,000	2,000	500

The following figures extracted from the Accounting records are relevant:

	(₹)
Rent and Rates	5,000
General Lighting	600
Indirect Wages	1,939
Power	1,500
Depreciation on Machines	10,000
Sundries	9,695

The expenses of the Service Departments are allocated as under :

	P_1	P_2	P_3	S_1	S_2
S_1	20%	30%	40%	-	10%
S_2	40%	20%	30%	10%	-

FIND OUT the total cost of product X which is processed for manufacture in Departments P_1, P_2 and P_3 for 4, 5 and 3 hours respectively, given that its Direct Material Cost is ₹ 50 and Direct Labour Cost is ₹ 30.

3. 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 (₹)	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.

4. 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 the quarter	17,500
Depreciation per annum	2,00,000
Indirect charges per annum	1,50,000

During the first month of operation the following details were taken from the job register:

	Job		
	A	B	C
Number of hours the machine was used :			
(a) Without the use of the computer	600	900	—
(b) With the use of the computer	400	600	1,000

You are required to COMPUTE the machine hour rate:

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

(b) For the individual jobs A, B and C.

5. A machine shop has 8 identical Drilling machines manned by 6 operators. The machine cannot be worked without an operator wholly engaged on it. The

original cost of all these machines works out to ₹ 8 lakhs. These particulars are furnished for a 6 months 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 worker for 8 hours a day.	₹ 20
Production bonus estimated	15% on wages
Value of power consumed	₹ 8,050
Supervision and indirect labour	₹ 3,300
Lighting and electricity	₹ 1,200

These particulars are for a year

Repairs and maintenance including consumables 3% of value of machines.

Insurance ₹ 40,000

Depreciation 10% of 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.

6. Job No. 198 was commenced on October 10, 20X8 and completed on November 1, 20X8. Materials used were ₹ 600 and labour charged directly to the job was ₹ 400. Other information is as follows:

   Machine No. 215 used for 40 hours, the machine hour rate being ₹ 3.50.

   Machine No. 160 used for 30 hours, the machine hour rate being ₹ 4.00. 6 welders worked on the job for five days of 8 hours each : the Direct labour hour per welder is ₹ 0.20.

   Expenses not included for CALCULATING the machine hour or direct labour hour rate total led ₹ 2,000, total direct wages for the period being ₹ 20,000. Ascertain the works costs of job No. 198.

7. In a factory, overheads of a particular department are recovered on the basis of ₹ 5 per machine hour. The total expenses incurred and the actual machine

hours for the department for the month of August were ₹ 80,000 and 10,000 hours respectively. Of the amount of ₹ 80,000, ₹ 15,000 became payable due to an award of the Labour Court and ₹ 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. EXPLAIN how would you treat the under-absorbed overhead in the cost accounts?

8. In a manufacturing unit, factory overhead was recovered at a pre-determined rate of ₹ 25 per man-day. The total factory overhead expenses incurred and the man-days actually worked were ₹ 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?

9. 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 Materials	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:

Job No. CW 7083 :

Department	Direct Materials	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 :

(i) CALCULATE the overhead absorption rate as per the current policy of the company and determine the selling price of the Job No. CW 7083.

(ii) 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.

(iii) DETERMINE the selling price of Job CW 7083 based on the overhead application rates calculated in (ii) above.

(iv) 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.

10. The total overhead expenses of a factory are ₹ 4,46,380. Taking into account the normal working of the factory, overhead was recovered in production at ₹ 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. Also give the profit implication of the method suggested.

11. ABC Ltd. manufactures a single product and absorbs the production overheads at a pre-determined rate of ₹ 10 per machine hour.

At the end of financial year 20X8-X9, 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 20X8-X9 is as under :

Production :

Finished goods	20,000 units
Work-in-progress	8,000 units
(50% complete in all respects)	

Sales :

Finished goods	18,000 units

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

(i) CALCULATE the amount of under-absorption of production overheads during the year 20X8-X9; and

(ii) SHOW the accounting treatment of under-absorption of production overheads.

ANSWERS/ SOLUTIONS

MCQs

1.	(a)	**2.**	(c)	**3.**	(c)	**4.**	(b)	**5.**	(b)	**6.**	(c)
7.	(c)	**8.**	(c)	**9.**	(d)	**10**	(d)				

Theoretical Questions

1. Please refer paragraph 4.6

2. Please refer paragraph 4.4.4

3. Please refer paragraph 4.9

4. Please refer paragraph 4.3

5. Please refer paragraph 4.6

6. Please refer paragraph 4.10

7. Please refer paragraph 4.4.3

8. Please refer paragraph 4.4.4

Practical Problems

1. (a) Overhead Distribution Statement

	Production Departments		Service Departments	
Allocated Expenses:	Machine Shop	Packing	General Plant	Stores & Maintenance
Indirect labour	4,000	3,000	2,000	5,650
Maintenance material	1,800	700	1,020	1,500
Superintendent's salary	–	–	4,000	–
Misc. supplies	400	1,000	150	200
Cost & payroll salaries	–	–	10,000	–
Total	6,200	4,700	17,170	7,350
Apportioned expenses (See schedule below)	77,720	25,800	2,830	22,650
Total	83,920	30,500	20,000	30,000

Schedule of Apportioned Expenses

Item	Basis	Machine (₹)	Packing (₹)	General Plant (₹)	Stores & Maintenance (₹)
Power	Horse Power Hrs.	5,600	800	–	1,600
Rent	Floor Space	5,000	2,000	1,000	4,000
Fuel & Heat	Radiator Secs.	1,200	2,400	800	1,600
Insurance	Investment	640	200	10	150
Taxes	Investment	1,280	400	20	300
Depreciation	Investment	64,000	20,000	1,000	15,000
Total		77,720	25,800	2,830	22,650

(b) Distribution of Service Department Expenses

	Production Departments		Service Departments	
	Machine	Packing	General Plant	Stores & Maintenance
	(₹)	(₹)	(₹)	(₹)
Total Expense [as per (a)]	83,920	30,500	20,000	30,000
Transfer from Stores & Maintenance	15,000	6,000	9,000	–30,000
Transfer from General Plant	16,571	8,286	–29,000	4,143
Transfer from Stores & Maintenance	2,072	829	1,242	–4,143
Transfer from General Plant	710	355	–1,242	177
Transfer from Stores & Maintenance	88	36	53	–177
Transfer from General Plant	35	18	–53	—
Total	1,18,396	46,024	—	—

2. Statement Showing Distribution of Overheads of Modern Manufactures Ltd.

			Production Departments			Service Departments	
Particulars	Basis	Total	P_1	P_2	P_3	S_1	S_2
		(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
Direct wages	Actual	1,695	-	-	-	1,500	195
Rent & rates	Area	5,000	1,000	1,250	1,500	1,000	250
General lighting	Light points	600	100	150	200	100	50
Indirect wages	Direct wages	1,939	600	400	600	300	39
Power	H.P.	1,500	600	300	500	100	–
Depreciation of machines	Value of machines	10,000	2,400	3,200	4,000	200	200
Sundries	Direct wages	9,695	3,000	2,000	3,000	1,500	195
		30,429	7,700	7,300	9,800	4,700	929

Redistribution of Service Department's Expenses over Production Departments

	Total (₹)	P_1 (₹)	P_2 (₹)	P_3 (₹)	S_1 (₹)	S_2 (₹)
Total Overheads	30,429.00	7,700	7,300	9,800	4,700	929
Dept. S_1 Overheads apportioned in the ratio: (20:30:40:—:10)	4,700.00	940	1,410	1,880	-4,700	470
Dept. S_2 overheads apportioned in the ration :(40:20:30:10:—)	1,399.00	559.60	279.80	419.70	139.90	-1,399.00
Dept. S_1 overheads apportioned in the ratio (20:30:40:—:10)	139.90	27.98	41.97	55.96	-139.90	13.99
Dept. S_2 overheads apportioned in the ratio (40:20:30:10:—)	13.99	5.60	2.80	4.20	1.39	-13.99
Dept. S_1 overheads apportioned in the ratio (20:30:40:—:10)	1.39	0.28	0.42	0.56	-1.39	0.13
Dept. S_2 overheads apportioned in the ratio (40:20:30:10:—)	0.13	0.06	0.03	0.04		-0.13
Total	9,233.52	9,035.02	12,160.46			
Working hours	3,070.00	4,475.00	2,419.00			
Working rate per hour	3.00	2.02	5.03			

Cost of the Product 'X'

	(₹)
Direct material cost	50.00
Direct labour cost	30.00
Overhead cost (See working note)	37.19
	117.19

Working Note :

Overhead cost :

(₹ 3 × 4 hrs.) + (₹ 2.02 × 5 hrs.) + (₹ 5.03 × 3 hrs.)

= ₹ 12 + ₹ 10.10 + ₹ 15.09 = ₹ 37.19

3. (a) Deccan Manufacturing Limited

Schedule Showing the Distribution of Overhead Costs among Departments

	Service				Production		
	P	Q	R	S	X	Y	Z
	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
Overhead costs	45,000	75,000	1,05,000	30,000	1,93,000	64,000	83,000
Distribution of overhead cost of Dept. 'P'	(45,000)	5,000	4,000	5,000	10,000	12,500	8,500
Distribution of overhead costs of Dept. 'Q'		(80,000)	24,000	12,000	16,000	12,000	16,000
Distribution of overhead cost of Dept. 'R'	-		(1,33,000)	19,000	57,000	28,500	28,500
Distribution of overhead costs of Dept. 'S'	-	-		(66,000)	24,000	18,000	24,000
Total (A)					3,00,000	1,35,000	1,60,000
(b) Direct labour hours (B)					4,000	3,000	4,000
Overhead recovery rate per hour $\frac{(A)}{(B)}$					₹ 75	₹ 45	₹ 40

4. Working notes:

		(₹)
(i)	Total machine hours used (600 + 900 + 400 + 600 + 1,000)	3,500
(ii)	Total machine hours without the use of computers (600 + 900)	1,500
(iii)	Total machine hours with the use of computer (400 + 600 + 1,000)	2,000
(iv)	Total overheads of the machine per month	
	Rent (₹ 17,500 ÷ 3 months)	5,833.33
	Depreciation (₹ 2,00,000 ÷ 12 months)	16,666.67
	Indirect Charges (₹ 1,50,000 ÷ 12 months)	12,500.00
	Total	35,000.00

(v) Computer hire charges for a month = ₹ 35,000

(₹ 4,20,000 ÷ 12 months)

(vi) Overheads for using machines without computer

$$= \frac{₹\,35{,}000}{3{,}500 \text{ hrs.}} \times 1{,}500 \text{ hrs.} = ₹\,15{,}000$$

(vii) Overheads for using machines with computer

$$= \frac{₹\,35{,}000}{3{,}500 \text{ hrs.}} 2{,}000 \text{ hrs.} + ₹\,35{,}000 = ₹\,55{,}000$$

(a) Machine hour rate of Gemini Enterprises for the firm as a whole for a month.

(1) When the Computer was used: $\frac{₹\,55{,}000}{2{,}000 \text{ hours}}$ = ₹ 27.50 per hour

(2) When the computer was not used: $\frac{₹\,15{,}000}{1{,}500 \text{ hrs.}}$ = ₹ 10 per hour

(b) Machine hour rate for individual job

	Rate per hr.	Job A		Job B		Job C	
	(₹)	Hrs.	(₹)	Hrs.	(₹)	Hrs.	(₹)
Overheads							
Without Computer	10.00	600	6,000	900	9,000	–	–
With computer	27.50	400	11,000	600	16,500	1,000	27,500
		1,000	17,000	1,500	25,500	1,000	27,500
Machine hour rate			₹ 17		₹ 17		₹ 27.50

5. Computation of comprehensive machine hour rate of machine shop

	(₹)
Operator's wages	17,100
(*Refer to working note 2*)	
Production bonus	2,565
(15% on wages)	
Power consumed	8,050
Supervision and indirect labour	3,300

Lighting and electricity	1,200
Repairs and maintenance	12,000
Insurance	20,000
Depreciation	40,000
Sundry works expenses	6,000
General management expenses	27,265
	1,37,480

Machine hour rate $= \dfrac{\text{Total overheads of machine shop}}{\text{Hours of machines operation}}$

$= \dfrac{₹ 1,37,480}{5,760 \text{ hours}}$ *(Refer to working note 1)* = ₹ 23.87

Working notes

1. Computation of hours, for which 6 operators are available for 6 months.

Normal available hours p.m. per operator.		208
Less: Absenteeism hours	18	
Less: Leave hours	20	
Less: Idle time hours	10	
		48
Utilisable hours p.m. per operator		160

Total utilisable hours for 6 operators and for 6 months are = 160 × 6 × 6
= 5,760 hours

As machines cannot be worked without an operator wholly engaged on them therefore, hours for which 6 operators are available for 6 months are the hours for which machines can be used. Hence 5,760 hours represent total machine hours.

2. Computation of operator's wages

Average rate of wages : $\dfrac{₹ 20}{8}$ = ₹ 2.50 per hour

Hours per month for which wages are paid to a worker (208 hours – 18 hours) = 190 hours.

Total wages paid to 6 operators for 6 months = 190 hours × 6 × 6 × ₹ 2.50 = ₹ 17,100

6.

		(₹)
Materials		600.00
Direct labour		400.00
		1,000.00
Factory overheads :	(₹)	
Machine No. 215 : 40 hours @ ₹ 3.50	140.00	
Machine No. 160 : 30 hours @ ₹ 4.00	120.00	
240 hours of welders @ ₹ 0.20 per hr.	48.00	
General[2] 10% of wages	40.00	348.00
Works cost		1,348.00

1. 6 welders × 5 days × 8 hours = 240 hours
2. Un apportioned expenses ₹ 2,000 which works out at 10% of direct wages.

7. Under-absorbed overhead expenses during the month of August

	(₹)	(₹)
Total expenses incurred in the month of August:		80,000
Less: The amount paid according to labour		
court award (Assumed to be non-recurring)	15,000	
Expenses of previous year	5,000	20,000
Net overhead expenses incurred for the month		60,000
Overhead recovered for 10,000 hours @ ₹ 5 per hour		50,000
Under-absorbed overheads		10,000

₹ 4,000 may be distributed over Finished Goods and Cost of Sales as follows:

Finished Goods	* ₹1,000
Cost of Sales	* ₹3,000

***Working notes**

Under-absorbed overhead :	₹4,000
Units produced :	40,000
Rate of under-absorbed overhead recover	₹ 0.10 per unit
Amount of under-absorbed overheads charged to finished goods (10,000 × ₹ 0.10)	₹ 1,000
Amount of under-absorbed overheads charged to cost of sales : (30,000 × ₹ 0.10)	₹ 3,000

8. Computation of unabsorbed overheads

Man-days worked	1,50,000
	(₹)
Overhead actually incurred	41,50,000
Less: Overhead absorbed @ ₹ 25 per man-day (₹ 25 × 1,50,000)	37,50,000
Unabsorbed overheads	4,00,000
Unabsorbed overheads due to defective planning (i.e. 60% of ₹ 4,00,000)	2,40,000
Balance of unabsorbed overhead	1,60,000

Treatment of unabsorbed overheads in Cost Accounts

(i) The unabsorbed overheads of ₹ 2,40,000 due to defective planning to be treated as abnormal and therefore be charged to Costing Profit and Loss Account.

(ii) The balance unabsorbed overheads of ₹ 1,60,000 be charged to production i.e., 40,000 units at the supplementary overhead absorption rate i.e., ₹ 4 per unit (Refer to Working Note)

	(₹)
Charge to Costing Profit and Loss Account as part of the cost of unit sold (30,000 units @ ₹ 4 p.u.)	1,20,000

Add: To closing stock of finished goods	40,000
(10,000 units @ ₹ 4 p.u.)	
Total	1,60,000

Working Note :

Supplementary overhead absorption rate = $\frac{₹\,1,60,000}{40,000 \text{ units}}$ = ₹ 4 p.u.

9. (i) Computation of overhead absorption rate

(as per the current policy of the company)

Department	Budgeted factory Overheads (₹)	Budgeted direct wages (₹)
Machinery	3,60,000	80,000
Assembly	1,40,000	3,50,000
Packing	1,25,000	70,000
Total	6,25,000	5,00,000

Overhead absorption rate = $\frac{\text{Budgeted factory overheads}}{\text{Budgeted direct wages}} \times 100$

$= \frac{₹\,6,25,000}{₹\,5,00,000} \times 100$ = 125% of Direct wages

Selling Price of the Job No. CW-7083

	(₹)
Direct materials (₹ 1,200 + ₹ 600 + ₹ 300)	2,100.00
Direct wages (₹ 240 + ₹ 360 + ₹ 60)	660.00
Overheads (125% × ₹ 660)	825.00
Total factory cost	3,585.00
Add: Mark-up (30% × ₹ 3,585)	1,075.50
Selling price	4,660.50

(ii) Methods available for absorbing factory overheads and their overhead recovery rates in different departments

1. Machining Department

In the machining department, the use of machine time is the predominant factor of production. Hence machine hour rate should be used to recover overheads in this department. The overhead recovery rate based on machine hours has been calculated as under:—

$$\text{Machine hour rate} = \frac{\text{Budgeted factory overheads}}{\text{Budgeted machine hours}}$$

$$= \frac{₹\,3,60,000}{80,000 \text{ hours}} = ₹\,4.50 \text{ per hour}$$

2. Assembly Department

In this department direct labour hours is the main factor of production. Hence direct labour hour rate method should be used to recover overheads in this department. The overheads recovery rate in this case is:

$$\textbf{Direct labour hour rate} = \frac{\text{Budgeted factory overheads}}{\text{Budgeted direct labour hours}}$$

$$= \frac{₹\,1,40,000}{1,00,000 \text{ hours}} = ₹\,1.40 \text{ per hour}$$

3. Packing Department

Labour is the most important factor of production in this department. Hence direct labour hour rate method should be used to recover overheads in this department.

The overhead recovery rate in this case comes to:

Budgeted factory overhead

$$\text{Direct labour hour rate} = \frac{\text{Budgeted factory overheads}}{\text{Direct labour hours}}$$

$$= \frac{₹\,1,25,000}{50,000 \text{ hours}} = ₹\,2.50 \text{ per hour}$$

(iii) Selling Price of Job CW-7083 [based on the overhead application rates calculated in (ii) above]

	(₹)
Direct materials	2,100.00
Direct wages	660.00
Overheads (Refer to Working note)	1,078.00
Factory cost	3,838.00
Add: Mark up (30% of ₹ 3,838)	1,151.40
Selling price	4,989.40

Working note:

Overhead Summary Statement

Dept.	Basis	Hours	Rate (₹)	Overheads (₹)
Machining	Machine hour	180	4.50	810
Assembly	Direct labour hour	120	1.40	168
Packing	Direct labour hour	40	2.50	100
			Total	1,078

(iv) Department-wise statement of total under or over recovery of overheads

(a) Under current policy

Departments

	Machining (₹)	Assembly (₹)	Packing (₹)	Total (₹)
Direct wages (Actual)	96,000	2,70,000	90,000	
Overheads recovered @				
125% of Direct wages: (A)	1,20,000	3,37,500	1,12,500	5,70,000
Actual overheads: (B)	3,90,000	84,000	1,35,000	6,09,000
(Under)/Over recovery of				
overheads : (A—B)	(2,70,000)	2,53,500	(22,500)	(39,000)

(b) As per methods suggested

Basis of overhead recovery

	Machine hours	Direct labour hours	Direct labour hours	Total (₹)
Hours worked	96,000	90,000	60,000	
Rate/hour (₹)	4.50	1.40	2.50	
Overhead recovered (₹): (A)	4,32,000	1,26,000	1,50,000	7,08,000
Actual overheads (₹): (B)	3,90,000	84,000	1,35,000	6,09,000
(Under)/Over recovery: (A–B)	42,000	42,000	15,000	99,000

10.

	(₹)
Actual factory overhead expenses incurred	4,46,380
Less: Overheads recovered from production (*2,93,104 hours* × *₹ 1.25*)	3,66,380
Unabsorbed overheads	80,000

Reasons for unabsorbed overheads

(i)	50% of the unabsorbed overhead was on account of increased in the cost of indirect materials and indirect labour	40,000
(ii)	50% of the unabsorbed overhead was due to factory inefficiency.	40,000

Treatment of unabsorbed overheads in Cost Accounting

1. Unabsorbed overhead amounting to ₹ 40,000, which were due to increase in the cost of indirect material and labour should be charged to units produced by using a supplementary rate.

$$\text{Supplementary rate} = \frac{₹\ 40{,}000}{(7{,}800 + 200)\ \text{units}} = ₹\ 5 \text{ per unit}$$

The sum of ₹ 40,000 (unabsorbed overhead) should be distributed by using a supplementary rate among cost of sales, finished goods and work-in progress as below:

	(₹)
Cost of sales (*7,000 units* × *₹ 5*)	35,000

Finished goods	4,000
(*800 units* × ₹ *5*)	
Work-in progress	1,000
(*200 units* × ₹ *5*)	
	40,000

The use of cost of sales figure, would reduce the profit for the period by ₹ 35,000 and will increase the value of stock of finished goods and work-in-progress by ₹ 4,000 and ₹ 1,000 respectively.

2. The balance amount of unabsorbed overheads viz. of ₹ 40,000 due to factory inefficiency should be charged to Costing Profit & Loss Account, as this is an abnormal loss.

11. (i) Amount of under-absorption of production overheads during the year 20X8-X9

		(₹)
Total production overheads actually incurred during the year 20X8-X9		6,00,000
Less : 'Written off' obsolete stores	₹ 45,000	
Wages paid for strike period	₹ 30,000	75,000
Net production overheads actually incurred : (A)		5,25,000
Production overheads absorbed by 48,000 machine hours @ ₹ 10 per hour : (B)		4,80,000
Amount of under – absorption of production overheads : [(A) – (B)]		45,000

(ii) Accounting treatment of under absorption of production overheads

It is given in the statement of the question that 20,000 units were completely finished and 8,000 units were 50% complete, one third of the under-absorbed overheads were due to lack of production planning and the rest were attributable to normal increase in costs.

		(₹)
1.	(33 – 1/3% of ₹ 45,000) i.e., ₹ 15,000 of under-absorbed overheads were due to lack of production planning. This being abnormal, should be debited to the Costing Profit and Loss A/c.	15,000

2.	Balance (66–2/3% of ₹ 45,000) i.e., ₹ 30,000 of under-absorbed overheads should be distributed over work-in-progress, finished goods and cost of sales by using supplementary rate.	30,000
	Total under-absorbed overheads	45,000

Apportionment of unabsorbed overheads of ₹ 30,000 over, work-in progress, finished goods and cost of sales

	Equivalent Completed Units	(₹)
Work-in-Progress (4,000 units × ₹ 1.25) (Refer to working note)	4,000	5,000
Finished goods (2,000 units × ₹ 1.25)	2,000	2,500
Cost of sales (18,000 units × ₹ 1.25)	18,000	22,500
	24,000	30,000

Working Note

Supplementary rate per unit = $\frac{₹\,30{,}000}{24{,}000}$ = ₹ 1.25