

4

Overheads

Basic Concepts

Overheads	Overheads represent expenditure on labour, materials or services that cannot be economically identified with specific saleable cost unit.
Types of Overheads on the Basis of Function	<ul style="list-style-type: none"> • Factory or Manufacturing Overheads • Office and Administration Overheads • Selling and Distribution Overheads • Research and Development Overheads
Types of Overheads on the Basis of Nature	<ul style="list-style-type: none"> • Fixed Overhead- Expenses that are not affected by any variation in the volume of activity. • Variable- Expenses that change in proportion to the change in the volume of activity. • Semi variable- The expenses that do not change when there is a small change in the level of activity but change whenever there is a slightly big change or change in the same direction as change in the level of activity but not in the same proportion.
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.
	Methods used for Re-appointment
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 service department.
Step Method or Non-	This method gives cognizance to the service rendered by service department to another service department. The sequence here begins

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reciprocal Method	with the department that renders service to the maximum number of other service departments.
Reciprocal Service Method	This method is 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.
Simultaneous Equation Method	Under this method at first the costs of service department is ascertained with the help of equations and then the cost so ascertained is re-distributed to the production departments on the basis of given percentage.
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 a very small amount.
Trial and Error Method	Under this method the cost of one service department is apportioned to another service department/s. The cost of another service department 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.
Methods for the Computation of the Overheads Rate	
Percentage of Direct Material Method	Under this method, the cost of direct material consumed is taken as the base for calculating the amount of overhead absorbed.
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 (and other direct expenses) i.e. Prime cost are taken as base for absorbing the factory overhead.
Percentage of Direct Labour Cost Method	Under this method, the cost of direct labour is taken as the base for calculating the amount of overhead absorbed.
Labour Hour Rate Method	This method is an improvement on the percentage of direct labour cost method, as it fully recognises the significance of the time element in the incurring and absorbing the manufacturing overheads. Under this method, direct labour hours are taken as the base for calculating the amount of overhead absorbed.

Machine Hour Rate Method	Under this method, machine hours are taken as the base for calculating the amount of overhead absorbed.
	Types of Overhead Rates
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.
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 separator
Departmental Overhead Rate	Where the product lines are varied or machinery is used to a varying degree in the different departments, i.e. where conditions throughout the factory are not uniform, the use of departmental rates is to be preferred for each individual cost centre or department.

Basic Formulae

Overhead Recovery Rate or Overhead Absorption Rate	Overhead Absorption Rate = $\frac{\text{Amount of overhead incurred}}{\text{Basis for absorption}}$
Predetermined Overhead Rate	Predetermined Overhead Rate = $\frac{\text{Budgeted overhead for the period}}{\text{Budgeted basis for the period}}$
Blanket Overhead Rate	Blanket Overhead Rate = $\frac{\text{Overhead cost for the entire factory for the period}}{\text{Base for the period (Total labour hours, total machine hours, etc.)}}$
Multiple Overhead Rate	Multiple Overhead Rate = $\frac{\text{Overheads allocated / apportioned to each Deptt.}}{\text{Corresponding base}}$
Variable Overhead in Semi-Variable Overhead	Variable Overhead Rate = $\frac{\text{Change in amount of expense}}{\text{Change in activity level or quantity}}$

SECTION-A

Question-1

What is blanket overhead rate? In which situations, blanket rate is to be used and why?

Solution:

Blanket overhead rate is one single overhead absorption rate for the whole factory. It may be computed by using the following formula:

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

* The selected base can be the total output; total labour hours; machine hours etc.

Situation for using blanket rate:

The use of blanket rate may be considered appropriate for factories which produce only one major product on a continuous basis. It may also be used in those units in which all products utilise same amount of time in each department. If such conditions do not exist, the use of blanket rate will give misleading results in the determination of the production cost, specially when such a cost ascertainment is carried out for giving quotations for tenders.

Question-2

Discuss the step method and reciprocal service method of secondary distribution of overheads.

Solution:

Step method and Reciprocal Service method of secondary distribution of overheads

Step method: This method gives cognizance to the service rendered by service department to another service department, thus sequence of apportionments has to be selected. The sequence here begins with the department that renders service to the maximum number of other service department. After this, the cost of service department serving the next largest number of department is apportioned.

Reciprocal service method: This method recognises the fact that where there are two or more service department, they may render services to each other and, therefore, these inter departmental services are to be given due weight while re-distributing the expense of service department. The methods available for dealing with reciprocal servicing are:

- Simultaneous equation method
 - Repeated distribution method
 - Trial and error method
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Question-3

Discuss the problems of controlling the selling and distribution overheads.

Solution:

Problems of controlling the selling & distribution overheads are

- (i) The incidence of selling & distribution overheads depends on external factors such as distance of market, nature of competition etc. which are beyond the control of management.
- (ii) They are dependent upon customers' behaviour, liking etc.
- (iii) These expenses are of the nature of policy costs and hence not amenable to control.

The above problems of controlling selling & distribution overheads can be tackled by adopting the following steps:

- (a) Comparing the figures of selling & distribution overhead with the figures of previous period.
 - (b) Selling & distribution overhead budgets may be used to control such overhead expenses by making a comparison of budgetary figures with actual figures of overhead expenses, ascertaining variances and finally taking suitable actions,
 - (c) Standards of selling & distribution expenses may be set up for salesmen, territories, products etc. The laid down standards on comparison with actual overhead expenses will reveal variances, which can be controlled by suitable action.
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Question-4

Distinguish between cost allocation and cost absorption.

Solution:**Cost allocation and Cost absorption:**

Cost allocation is the allotment of whole item of cost to a cost centre or a cost unit. In other words, it is the process of identifying, assigning or allowing cost to a cost centre or a cost, unit.

Cost absorption is the process of absorbing all indirect costs or overhead costs allocated or apportioned over particular cost center or production department by the units produced.

Question-5

Discuss in brief three main methods of allocating support departments costs to operating departments. Out of these three, which method is conceptually preferable?

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Solution:

The three main methods of allocating support departments costs to operating departments are:

- (i) *Direct re-distribution method:* Under this method, support department costs are directly apportioned to various production departments only. This method does not consider the service provided by one support department to another support department.
- (ii) *Step method:* Under this method the cost of the support departments that serves the maximum numbers of departments is first apportioned to other support departments and production departments. After this the cost of support department serving the next largest number of departments is apportioned. In this manner we finally arrive on the cost of production departments only.
- (iii) *Reciprocal service method:* This method recognises the fact that where there are two or more support 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 support departments. The methods available for dealing with reciprocal services are:
 - (a) Simultaneous equation method
 - (b) Repeated distribution method
 - (c) Trial and error method.

The reciprocal service method is conceptually preferable. This method is widely used even if the number of service departments is more than two because due to the availability of computer software it is not difficult to solve sets of simultaneous equations.

Question-6

Explain Single and Multiple Overhead Rates.

Solution:

Single and Multiple Overhead Rates:

Single overhead rate: It is one single overhead absorption rate for the whole factory.

It may be computed as follows:

$$\text{Single overhead rate} = \frac{\text{Overhead costs for the entire factory}}{\text{Total quantity of the base selected}}$$

The base can be total output, total labour hours, total machine hours, etc.

The single overhead rate may be applied in factories which produces only one major product on a continuous basis. It may also be used in factories where the work performed in each department is fairly uniform and standardized.

Multiple overhead rate: It involves computation of separate rates for each production department, service department, cost center and each product for both fixed and variable overheads. It may be computed as follows:

Multiple overhead rate

$$= \frac{\text{Overhead allocated/ apportioned to each department/ cost centre or product}}{\text{Corresponding base}}$$

Under multiple overheads rate, jobs or products are charged with varying amount of factory overheads depending on the type and number of departments through which they pass. However, the number of overheads rate which a firm may compute would depend upon two opposing factors viz. the degree of accuracy desired and the clerical cost involved.

Question-7

How do you deal with the following in cost accounts?

- (i) *Fringe benefits*
- (ii) *Bad debts.*

Solution:

Treatment of Cost Accounts

- (i) *Fringe benefits:* the benefits paid to workers in every organisation in addition to their normal wages or salaries are known as fringe benefits. They include – Housing facility, children education allowance, holiday pay, leave pay, leave travel concession to home town or any place in India, etc.

Expenditure incurred on fringe benefits in respect of factory workers should be apportioned among all the production and service departments on the basis of the number of workers in each department.

- (ii) *Bad debts:* There is no unanimity among various authors about the treatment of bad debts. Some authors believe that bad debts are financial losses and therefore should not be included in the cost of a particular product or job. Another view is that, bad debts are a part of selling and distribution overhead, especially where they arise in the normal course of trading. Therefore they should be treated in cost accounts in the same way as any other selling and distribution expense.
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Question-8

Distinguish between fixed and variable overheads.

Solution:

Fixed and Variable Overheads: Fixed overheads do not vary with the volume of production within certain limits. In other words, the amount of fixed overhead tends to remain constant for

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volumes of production within the installed capacity of plant. For example, rent of office, salary of works manger, etc.

Variable overhead varies in direct proportion to the volume of production. It increases or decreases in direct relation to any increase or decrease in output.

Question-9

How would you treat the idle capacity costs in Cost Accounts?

Solution:

Treatment of idle capacity cost in Cost Accounts:

It is that part of the capacity of a plant, machine or equipment which cannot be effectively utilised in production. The idle capacity may arise due to lack of product demand, non availability of raw-material, shortage of skilled labour, shortage of power, etc. Costs associated with idle capacity are mostly fixed in nature. These costs remain unabsorbed or unrecovered due to under-utilisation of plant and service capacity. Idle capacity costs are treated in the following ways in Cost Accounts.

- (i) If the idle capacity cost is due to unavoidable reasons - 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.
 - (ii) If the idle capacity cost is due to avoidable reasons - such as faulty planning, etc. the cost should be charged to Costing Profit and Loss Account.
 - (iii) If the idle capacity cost is due to trade depression, etc., - being abnormal in nature the cost should also be charged to the Costing Profit and Loss Account.
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Question-10

Discuss the treatment in cost accounts of the cost of small tools of short effective life.

Solution:

Small tools are mechanical appliances used for various operations on a work place, specially in engineering industries. Such tools include drill bits, chisels, screw cutter, files etc.

Treatment of cost of small tools of short effective life:

- (i) Small tools purchased may be capitalized and depreciated over life if their life is ascertainable. Revaluation method of depreciation may be used in respect of very small tools of short effective life. Depreciation of small tools may be charged to:
 - Factory overheads
 - Overheads of the department using the small tool.

- (ii) Cost of small tools should be charged fully to the departments to which they have been issued, if their life is not ascertainable.
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Question-11

Explain what do you mean by Chargeable Expenses and state its treatment in Cost Accounts.

Solution:

Chargeable expenses: All expenses, other than direct materials and direct labour cost which are specifically and solely incurred on production, process or job are treated as chargeable or direct expenses. These expenses in cost accounting are treated as part of prime cost,

Examples of chargeable expenses include - Rental of a machine or plant hired for specific job, royalty, and cost of making a specific pattern, design, drawing or making tools for a job.

Question-12

Define Selling and Distribution Expenses. Discuss the accounting for selling and distribution expenses.

Solution:

Selling expenses: Expenses incurred for the purpose of promoting, marketing and sales of different products.

Distribution expenses: Expenses relating to delivery and despatch of goods/products to customers.

Accounting treatment for selling and distribution expenses:

These expenses may be recovered by using any one of following method of recovery.

1. Percentage on cost of production / cost of goods sold.
 2. Percentage on selling price.
 3. Rate per unit sold.
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Question-13

Indicate the base or bases that you would recommend to apportion overhead costs to production department:

- | | |
|-------------------------------|-------------------------|
| (i) Supplies | (ii) Repairs |
| (iii) Maintenance of building | (iv) Executive salaries |
| (v) Rent | (vi) Power and light |
| (vii) Fire insurance | (viii) Indirect labour. |

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Solution:

Item	Bases of apportionment
(i) Supplies	Actual supplies made to different departments
(ii) Repair	Direct labour hours; Machine hours; Direct labour wages; Plant value.
(iii) Maintenance of building	Floor area occupied by each department
(iv) Executive salaries	Actual basis; Number of workers.
(v) Rent	Floor area
(vi) Power and light	K W hours or H P (power) Number of light points; Floor space; Meter readings (light)
(vii) Fire insurance	Capital cost of plant and building; Value of stock
(viii) Indirect labour	Direct labour cost.

Question-14

Explain briefly the conditions when supplementary rates are used.

Solution:

When the amount of under absorbed and over absorbed overhead is significant or large, because of differences due to wrong estimation, then the cost of product needs to be adjusted by using supplementary rates (under and over absorption/ actual overhead) to avoid misleading impression.

Question-15

Explain the cost accounting treatment of unsuccessful Research and Development cost.

Solution:

Cost of unsuccessful research is treated as factory overhead, provided the expenditure is normal and is provided in the budget. If it is not budgeted, it is written off to the profit and loss account. If the research is extended for long time, some failure cost is spread over to successful research.

Question-16

Discuss the difference between allocation and apportionment of overhead.

Solution:

The following are the differences between allocation and apportionment.

1. Allocation costs are directly allocated to cost centre. Overheads which cannot be directly allocated are apportioned on some suitable basis.

2. Allocation allots whole amount of cost to cost centre or cost unit where as apportionment allots part of cost to cost centre or cost unit.
 3. No basis required for allocation. Apportionment is made on the basis of area, assets value, number of workers etc.
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Question-17

Explain the treatment of over and under absorption of Overheads in Cost accounting.

Solution:

Treatment of over and under absorption of overheads are:-

- (i) **Writing off to costing P&L A/c:**– Small difference between the actual and absorbed amount should simply be transferred to costing P&L A/c, if difference is large then investigate the causes and after that abnormal loss shall be transferred to costing P&L A/c.
 - (ii) **Use of supplementary Rate:** Under this method the balance of under and over absorbed overheads may be charged to cost of W.I.P., finished stock and cost of sales proportionately with the help of supplementary rate of overhead.
 - (iii) **Carry Forward to Subsequent Year:** Difference should be carried forward in the expectation that next year the position will be automatically corrected. This would really mean that costing data of two years would be wrong.
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Question-18

What are the methods of re-apportionment of service department expenses over the production departments? Discuss.

Solution:

Methods of re-apportionment of service department expenses over the production departments

- (i) Direct re-distribution method.
- (ii) Step method or non-reciprocal method.
- (iii) Reciprocal Service method

Direct re-distribution Method: Service department costs under this method are apportioned over the production departments only, ignoring services rendered by one service department to another. The basis of apportionment could be no. of workers. H.P of machines.

Step Method or Non-Reciprocal Method

This method gives cognizance to the service 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

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here begins with the department that renders service to the maximum number of other service departments.

Production Department			Service Department		
P ₁	P	P ₃	S ₁	S ₂	S ₃
↑	↑	↑	↑	↑	↓
↑	↑	↑	↑	↓	
↑	↑	↑	↓		

Reciprocal Service Method

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

The methods available for dealing with reciprocal services are:

- Simultaneous equation method
- Repeated distribution method
- Trial & Error method.

SECTION-B

Calculation of Machine Hour Rate

Question-1

In a factory, a machine is considered to work for 208 hours in a month. It includes maintenance time of 8 hours and set up time of 20 hours.

The expense data relating to the machine are as under:

- *Cost of the machine is ₹ 5,00,000. Life 10 years. Estimated scrap value at the end of life is ₹ 20,000.*

	(₹)
– Repairs and maintenance per annum	60,480
– Consumable stores per annum	47,520
– Rent of building per annum (The machine under reference occupies 1/6 of the area)	72,000
– Supervisor's salary per month (Common to three machines)	6,000
– Wages of operator per month per machine	2,500
– General lighting charges per month allocated to the machine	1,000
– Power 25 units per hour at ₹ 2 per unit	

Power is required for productive purposes only. Set up time, though productive, does not require power. The Supervisor and Operator are permanent. Repairs and maintenance and consumable stores vary with the running of the machine.

Required

Calculate a two-tier machine hour rate for (a) set up time, and (b) running time

Solution:

Working Notes:

1. (i) Effective hours for standing charges (208 hours – 8 hours) = 200 hours
(ii) Effective hours for variable costs (208 hours – 28 hours) = 180 hours
2. Standing Charges per hour

	Cost per month (₹)	Cost per hour (₹) (Cost per month ÷ 200 hours)
Supervisor's salary $\left(\frac{₹6,000}{3\text{machines}}\right)$	2,000	10.00
Rent of building $\left(\frac{1}{6} \times \frac{₹72,000}{12\text{months}}\right)$	1,000	5.00
General lighting	1,000	5.00
Total Standing Charges	4,000	20.00

3. Machine running expenses per hour

	Cost per month (₹)	Cost per hour (₹)
Depreciation $\left(\frac{₹(5,00,000 - 20,000)}{10\text{years}} \times \frac{1}{12\text{months}}\right)$	4,000	20.00 $\left(\frac{₹4,000}{200\text{hours}}\right)$
Wages	2,500	12.50 $\left(\frac{₹2,500}{200\text{hours}}\right)$
Repairs & Maintenance $\left(\frac{₹60,480}{12\text{months}}\right)$	5,040	28.00 $\left(\frac{₹5,040}{180\text{hours}}\right)$
Consumable stores	3,960	22.00

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$\left(\frac{₹ 47,520}{12 \text{ months}} \right)$		$\left(\frac{₹ 3,960}{180 \text{ hours}} \right)$
Power (25 units × ₹2 × 180 hours)	9,000	50.00
Total Machine Expenses	24,500	132.50

Computation of Two – tier machine hour rate

	Set up time rate per machine hour (₹)	Running time rate per machine hour (₹)
Standing Charges	20.00	20.00
Machine expenses :		
Depreciation	20.00	20.00
Repair and maintenance	–	28.00
Consumable stores	–	22.00
Power	–	50.00
Machine hour rate of overheads	40.00	140.00
Wages	12.50	12.50
Comprehensive machine hour rate	52.50	152.50

Question-2

A manufacturing unit has purchased and installed a new machine of ₹ 12,70,000 to its fleet of 7 existing machines. The new machine has an estimated life of 12 years and is expected to realise ₹ 70,000 as scrap at the end of its working life. Other relevant data are as follows:

- Budgeted working hours are 2,592 based on 8 hours per day for 324 days. This includes 300 hours for plant maintenance and 92 hours for setting up of plant.
- Estimated cost of maintenance of the machine is ₹25,000 p.a.
- The machine requires a special chemical solution, which is replaced at the end of each week (6 days in a week) at a cost of ₹400 each time.
- Four operators control operation of 8 machines and the average wages per person amounts to ₹420 per week plus 15% fringe benefits.
- Electricity used by the machine during the production is 16 units per hour at a cost of ₹ 3 per unit. No electricity is consumed during unproductive maintenance and setting up time.
- Departmental and general works overhead allocated to the operation during last year was ₹ 50,000. During the current year it is estimated to increase by 10% of this amount.

Calculate machine hour rate, if (a) setting up time is unproductive; (b) setting up time is productive.

Solution:

Working Note:

1. Effective machine hour when set-up time is unproductive:
 = Budgeted working hours – (Maintenance time + Setting-up time)
 = [2,592 – (300 + 92)] hours. = 2,200 hours.
2. Effective machine hour when set-up time is productive:
 = Budgeted working hours – maintenance time
 = (2,592 - 300) hours. = 2,292 hours.
3. Operators' wages per annum
 Basic wages (4 operators × ₹420 × 54 weeks) = ₹ 90,720
 Add: Fringe benefits (15% of ₹90,720) = ₹ 13,608
 ₹1,04,328
4. Depreciation per annum

$$\frac{₹12,70,000 - ₹70,000}{12 \text{ years}} = ₹ 1,00,000$$
5. Cost of special chemical solution
 324 days ÷ 6 days × ₹ 400 = ₹ 21,600

Computation of Machine hour Rate

	Amount p.a. (₹)	Amount per hour (₹) (when set-up time is unproductive)	Amount per hour (₹) (when set-up time is productive)
<u>Standing charges</u>			
Operators wages	1,04,328		
$\left(\frac{₹1,04,328}{8 \text{ machines}} \times \frac{1}{2,200 \text{ hours}} \right)$;		5.93	
$\left(\frac{₹1,04,328}{8 \text{ machines}} \times \frac{1}{2,292 \text{ hours}} \right)$			5.69

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Departmental and general overhead (50,000 × 110%) $\left(\frac{₹55,000}{8 \text{ machines}} \times \frac{1}{2,200 \text{ hours}} \right)$; $\left(\frac{₹55,000}{8 \text{ machines}} \times \frac{1}{2,292 \text{ hours}} \right)$	55,000	3.13	3.00
(A)	1,59,328	9.06	8.69
<u>Machine Expenses</u>			
Depreciation $\left(\frac{₹1,00,000}{2,200 \text{ hours}} \right)$; $\left(\frac{₹1,00,000}{2,292 \text{ hours}} \right)$	1,00,000	45.45	43.63
Electricity (16 units × ₹3)		48.00	48.00
Special chemical solution $\left(\frac{₹21,600}{2,200 \text{ hours}} \right)$; $\left(\frac{₹21,600}{2,292 \text{ hours}} \right)$	21,600	9.82	9.42
Maintenance $\left(\frac{₹25,000}{2,200 \text{ hours}} \right)$; $\left(\frac{₹25,000}{2,292 \text{ hours}} \right)$	25,000	11.36	10.91
(B)		114.63	111.96
Machine Hour Rate (A + B)		123.69	120.65

Question-3

From the details furnished below you are required to compute a comprehensive machine-hour rate:

Original purchase price of the machine (subject to depreciation at 10% per annum on original cost)	₹ 3,24,000
Normal working hours for the month (The machine works for only 75% of normal capacity)	200 hours
Wages to Machine-man	₹ 125 per day (of 8 hours)
Wages to Helper (machine attendant)	₹ 75 per day (of 8 hours)
Power cost for the month for the time worked	₹ 15,000
Supervision charges apportioned for the machine centre	

<i>for the month</i>	₹ 3,000
<i>Electricity & Lighting for the month</i>	₹ 7,500
<i>Repairs & maintenance (machine) including Consumable stores per month</i>	₹ 17,500
<i>Insurance of Plant & Building (apportioned) for the year</i>	₹ 16,250
<i>Other general expense per annum</i>	₹ 27,500

The workers are paid a fixed Dearness allowance of ₹1,575 per month. Production bonus payable to workers in terms of an award is equal to 33.33% of basic wages and dearness allowance. Add 10% of the basic wage and dearness allowance against leave wages and holidays with pay to arrive at a comprehensive labour-wage for debit to production.

Solution:

Effective machine hours = 200 hours × 75% = 150 hours

Computation of Comprehensive Machine Hour Rate

	Per month(₹)	Per hour (₹)
Fixed cost		
Supervision charges	3,000.00	
Electricity and lighting	7,500.00	
Insurance of Plant and building (₹16,250 ÷ 12)	1,354.17	
Other General Expenses (₹27,500 ÷ 12)	2,291.67	
Depreciation (₹32,400 ÷ 12)	2,700.00	
	16,845.84	112.31
Direct Cost		
Repairs and maintenance	17,500.00	116.67
Power	15,000.00	100.00
Wages of machine man		44.91
Wages of Helper		32.97
Machine Hour rate (Comprehensive)		406.86

Wages per machine hour

	Machine man	Helper
Wages for 200 hours		
Machine-man (₹125 × 25)	₹3,125.00	---
Helper (₹75 × 25)	---	₹1,875.00
Dearness Allowance (DA)	₹1,575.00	₹1,575.00
	₹4,700.00	₹3,450.00

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Production bonus (1/3 of Basic and DA)	1,567.00	1,150.00
Leave wages (10% of Basic and DA)	470.00	345.00
	6,737.00	4,945.00
Effective wage rate per machine hour	₹44.91	₹32.97

Question-4

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

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

- Depreciation 10% per annum on original cost of the machine. Original cost of the each machine is ₹52,000.
- Maintenance and repairs per week per machine is ₹60.
- Consumable stores per week per machine are ₹75.
- Power : 20 units per hour per machine at the rate of 80 paise per unit.
- Apportionment to the cost centre : Rent per annum ₹5,400, Heat and Light per annum ₹9,720, foreman's salary per annum ₹12,960 and other miscellaneous expenditure per annum ₹18,000.

Required:

- (i) Calculate the cost of running one machine for a four week period.
- (ii) Calculate machine hour rate.

Solution:

Effective Machine hour for four-week period
= Total working hours – unproductive set-up time
= {(48 hours × 4 weeks) – {(4 hours × 4 weeks)}
= (192 – 16) hours) =176 hours.

(i) Computation of cost of running one machine for a four week period

		(₹)	(₹)
(A)	Standing charges (per annum)		
	Rent	5,400.00	
	Heat and light	9,720.00	
	Forman's salary	12,960.00	
	Other miscellaneous expenditure	18,000.00	
	Standing charges (per annum)	46,080.00	
	Total expenses for one machine for four week period $\left(\frac{₹46,080}{3 \text{ machines} \times 13 \text{ four-week period}} \right)$		1,181.54
	Wages (48 hours × 4 weeks × ₹ 20 × 3 operators)		11,520.00
	Bonus {(176 hours × ₹ 20 × 3 operators) × 10%}		1,056.00
	Total standing charges		13,757.54
(B)	Machine Expenses		
	Depreciation = $\left(₹52,000 \times 10\% \times \frac{1}{13 \text{ four-week period}} \right)$		400.00
	Repairs and maintenance (₹60 × 4 weeks)		240.00
	Consumable stores (₹ 75 × 4 weeks)		300.00
	Power (176 hours × 20 units × ₹ 0.80)		2,816.00
	Total machine expenses		3,756.00
(C)	Total expenses (A) + (B)		17,513.54

(ii) Machine hour rate = $\frac{₹ 17,513.54}{176 \text{ hours}} = ₹99.51$

Question-5

A machine costing ₹ 10 lakhs, was purchased on 1-4-2014. The expected life of the machine is 10 years. At the end of this period its scrap value is likely to be ₹ 10,000. The total cost of all the machines including new one was ₹ 90 lakhs.

The other information is given as follows:

- (i) Working hours of the machine for the year was 4,200 including 200 non-productive hours.
- (ii) Repairs and maintenance for the new machine during the year was ₹ 5,000.
- (iii) Insurance Premium was paid for all the machine ₹ 9,000.

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- (iv) New machine consumes 8 units of electricity per hour, the rate per unit being ₹ 3.75
- (v) The new machine occupies 1/10th area of the department. Rent of the department is ₹ 2,400 per month.
- (vi) Depreciation is charged on straight line basis.
- Compute machine hour rate for the new machine.

Solution:

Computation of machine hour rate of new Machine

	Total (₹)	Per hour (₹)
A. <u>Standing Charges</u>		
I. Insurance Premium ₹ 9,000 × $\frac{1}{9}$	1,000	
II. Rent $\frac{1}{10} \times ₹2,400 \times 12$ months	2,880	
	3,880	0.97*
B. <u>Machine expenses</u>		
I. Repairs and Maintenance (₹5,000 ÷ 4,000 hours)		1.25
II. Depreciation $\left[\frac{₹10,00,000 - ₹10,000}{10 \text{ years} \times 4,000 \text{ hours}} \right]$		24.75
III. Electricity (8 units × ₹ 3.75)		30.00
Machine hour rate		56.97

Working Note

1 Calculation of productive Machine hour rate

Total hours	4,200
Less: Non-Productive hours	<u>200</u>
Effective machine hours	<u>4,000</u>

* ₹ 3,880 ÷ 4,000 hours = ₹ 0.97

Question-6

You are given the following information of the three machines of a manufacturing department of X Ltd.:

	<i>Preliminary estimates of expenses (per annum)</i>			
	<i>Total (₹)</i>	<i>Machines</i>		
		<i>A (₹)</i>	<i>B (₹)</i>	<i>C (₹)</i>
<i>Depreciation</i>	20,000	7,500	7,500	5,000
<i>Spare parts</i>	10,000	4,000	4,000	2,000
<i>Power</i>	40,000			
<i>Consumable stores</i>	8,000	3,000	2,500	2,500
<i>Insurance of machinery</i>	8,000			
<i>Indirect labour</i>	20,000			
<i>Building maintenance expenses</i>	20,000			
<i>Annual interest on capital outlay</i>	50,000	20,000	20,000	10,000
<i>Monthly charge for rent and rates</i>	10,000			
<i>Salary of foreman (per month)</i>	20,000			
<i>Salary of Attendant (per month)</i>	5,000			

(The foreman and the attendant control all the three machines and spend equal time on them.)

The following additional information is also available:

	<i>Machines</i>		
	<i>A</i>	<i>B</i>	<i>C</i>
<i>Estimated Direct Labour Hours</i>	1,00,000	1,50,000	1,50,000
<i>Ratio of K.W. Rating</i>	3	2	3
<i>Floor space (sq. ft.)</i>	40,000	40,000	20,000

There are 12 holidays besides Sundays in the year, of which two were on Saturdays. The manufacturing department works 8 hours in a day but Saturdays are half days. All machines work at 90% capacity throughout the year and 2% is reasonable for breakdown.

You are required to :

Calculate predetermined machine hour rates for the above machines after taking into consideration the following factors:

- An increase of 15% in the price of spare parts.*
- An increase of 25% in the consumption of spare parts for machine 'B' & 'C' only.*
- 20% general increase in wages rates.*

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Solution:

(a) **Computation of Machine Hour Rate**

	Basis of apportionment	Total (₹)	Machines		
			A (₹)	B (₹)	C (₹)
(A) Standing Charges					
Insurance	Depreciation Basis (3:3:2)	8,000	3,000	3,000	2,000
Indirect Labour	Direct Labour (2:3:3)	24,000	6,000	9,000	9,000
Building maintenance expenses	Floor Space (2:2:1)	20,000	8,000	8,000	4,000
Rent and Rates	Floor Space (2:2:1)	1,20,000	48,000	48,000	24,000
Salary of foreman	Equal	2,40,000	80,000	80,000	80,000
Salary of attendant	Equal	60,000	20,000	20,000	20,000
Total standing charges		4,72,000	1,65,000	1,68,000	1,39,000
Hourly rate for standing charges			84.70	86.24	71.36
(B) Machine Expenses:					
Depreciation	Direct	20,000	7,500	7,500	5,000
Spare parts	Final estimates	13,225	4,600	5,750	2,875
Power	K.W. rating (3:2:3)	40,000	15,000	10,000	15,000
Consumable Stores	Direct	8,000	3,000	2,500	2,500
Total Machine expenses		81,225	30,100	25,750	25,375
Hourly Rate for Machine expenses			15.45	13.22	13.03
Total (A + B)		553,225	1,95,100	1,93,750	1,64,375
Machine Hour rate			100.15	99.46	84.38

Working Notes:

(i) Calculation of effective working hours:

No. of full off-days = No. of Sunday + No. of holidays

= 52 + 12 = 64 days

No. of half working days = 52 days – 2 holidays = 50 days

No. of full working days = 365 days – 64 days – 50 days = 251 days
 Total working Hours = {(251 days × 8 hours) + (50 days × 4 hours)}
 = 2,008 hours + 200 = 2,208 hours.
 Total effective hours = Total working hours × 90% - 2% for break-down
 = 2,208 hours × 90% - 2% (2,208 hours × 90%)
 = 1,987.2 hours – 39.74 hours
 = 1947.46 or Rounded up to 1948 hours.

(ii) Amount of spare parts is calculated as under:

	A (₹)	B (₹)	C (₹)
Preliminary estimates	4,000	4,000	2,000
Add: Increase in price @ 15%	600	600	300
	4,600	4,600	2,300
Add: Increase in consumption @ 25%	–	1,150	575
Estimated cost	4,600	5,750	2,875

(iii) Amount of Indirect Labour is calculated as under:

	(₹)
Preliminary estimates	20,000
Add: Increase in wages @ 20%	4,000
	24,000

(iv) Interest on capital outlay is a finance cost, therefore it has been excluded from the cost accounts.

Question-7

M.L. Auto Ltd. is a manufacturer of auto components and the details of its expenses for the year 2014 are given below:

	(₹)
(i) Opening Stock of Material	1,50,000
(ii) Closing Stock of Material	2,00,000
(iii) Purchase of Material	18,50,000
(iv) Direct Labour	9,50,000
(v) Factory Overhead	3,80,000
(vi) Administrative Overhead	2,50,400

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During 2015, the company has received an order from a car manufacturer where it estimates that the cost of material and labour will be ₹ 8,00,000 and ₹ 4,50,000 respectively. M.L. Auto Ltd. charges factory overhead as a percentage of direct labour and administrative overhead as a percentage of factory cost based on previous year's cost.

Cost of delivery of the components at customer's premises is estimated at ₹ 45,000.

You are required to:

- (i) Calculate the overhead recovery rates based on actual costs for 2014.
- (ii) Prepare a detailed cost statement for the order received in 2015 and the price to be quoted if the company wants to earn a profit of 10% on sales.

Solution:

(i) Calculation of Overhead Recovery Rate:

$$\begin{aligned}\text{Factory Overhead Recovery Rate} &= \frac{\text{Factory Overhead in 2014}}{\text{Direct Labour Costs in 2014}} \times 100 \\ &= \frac{\text{₹ } 3,80,000}{\text{₹ } 9,50,000} \times 100 = 40\% \text{ of Direct labour}\end{aligned}$$

Administrative Overhead Recovery Rate

$$\begin{aligned}&= \frac{\text{Administrative Overhead in 2014}}{\text{Factory Costs in 2014 (W.N.)}} \times 100 \\ &= \frac{\text{₹ } 2,50,400}{\text{₹ } 31,30,000} \times 100 = 8\% \text{ of Factory Cost}\end{aligned}$$

Working Note: Calculation of Factory Cost in 2014

Particulars	Amount (₹)
Opening Stock of Material	1,50,000
Add: Purchase of Material	18,50,000
Less: Closing Stock of Material	(2,00,000)
Material Consumed	18,00,000
Direct Labour	9,50,000
Prime Cost	27,50,000
Factory Overhead	3,80,000
Factory Cost	31,30,000

(ii) Detailed Cost Statement for the Order received from M.L. Auto Ltd. during 2015

Particulars	Amount (₹)
Material	8,00,000
Labour	4,50,000
Factory Overhead (40% of ₹ 4,50,000)	1,80,000
Factory Cost	14,30,000
Administrative Overhead (8% of ₹ 14,30,000)	1,14,400
Cost of delivery	45,000
Total Cost	15,89,400
Add: Profit @ 10% of Sales or 11.11% of cost or 1/9 of 15,89,400	1,76,600
Sales value (Price to be quoted for the order) (₹ 15,89,400 / 0.9)	17,66,000

Hence the price to be quoted is ₹17,66,000 if the company wants to earn a profit of 10% on sales.

Under-absorption/ Over absorption of Overheads and use of Supplementary Rate

Question-8

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 2013-14, 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 2013-14 is as under:

Production:

Finished goods 20,000 units

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

Sales:

Finished goods 18,000 units

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

4.26 Cost Accounting

You are required to:

- (i) Calculate the amount of under – absorption of production overheads during the year 2013-14; and
- (ii) Show the accounting treatment of under – absorption of production overheads.

Solution:

- (i) Amount of under-absorption of production overheads during the year 2013-14

	(₹)
Total production overheads actually incurred during the year 2013-14	6,00,000
Less: 'Written off' obsolete stores	₹ 45,000
Wages paid for strike period	<u>₹ 30,000</u>
Net production overheads actually incurred: (A)	5,25,000
Production overheads absorbed by 48,000 machines 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 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

Accounting treatment:

Work-in-progress control A/c	Dr.	₹ 5,000	
Finished goods control A/c	Dr.	₹ 2,500	
Cost of Sales A/c	Dr.	₹22,500	
Profit & Loss A/c	Dr.	₹15,000	
			₹ 45,000
	To Overhead control A/c		

Working Note:

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

Question-9

Your company uses a historical cost system and applies overheads on the basis of "pre-determined" rates. The following are the figure from the Trial Balance as at 30th September, 2013:-

Manufacturing overheads	₹ 4,26,544 Dr.
Manufacturing overheads applied	₹ 3,65,904 Cr.
Work-in-progress	₹ 1,41,480 Dr.
Finished goods stocks	₹ 2,30,732 Dr.
Cost of goods sold	₹ 8,40,588 Dr.

Give two methods for the disposal of the unabsorbed overheads and show the profit implications of each method.

Solution:

Calculation of manufacturing overhead under absorbed	(₹)
Actual overheads	4,26,544
Overhead recovered (applied)	<u>3,65,904</u>
Under absorption (recovery) of overhead	<u>60,640</u>

The two methods for the disposal of the under-absorbed overheads in this problem may be:-

- (1) Write off the under – absorbed overhead to Costing Profit & Loss Account.
- (2) Use supplementary rate, to recover the under-absorbed overhead.

According to first method, the total unabsorbed overhead amount of ₹60,640 will be written off to Costing Profit & Loss Account. The use of this method will reduce the profits of the concern by ₹ 60,640 for the period.

According to second method, a supplementary rate may be used to adjust the overhead cost of each cost unit. The under-absorbed amount in total may, at the end of the accounting

4.28 Cost Accounting

period, be apportioned on ratio basis to the three control accounts, viz, Work-in-progress, Finished goods stock and Cost of goods sold account. Apportioning of under-absorbed overhead can be carried out by using direct labour hours/ machine hours/ the value of the balances in each of these accounts, as the basis. Prorated figures of under-absorbed overhead over Work-in-progress, Finished goods stock and Cost of goods sold in this question on the basis of values, of the balances in each of these accounts are as follows:-

	Additional Overhead (Under-absorbed) Total		
	(₹)	(₹)	(₹)
Work-in-progress	1,41,480	7,074*	1,48,554
Finished Goods Stock	2,30,732	11,537@	2,42,269
Cost of Goods Sold	8,40,588	42,029#	8,82,617
	12,12,800	60,640	12,73,440

By using this method, the profit for the period will be reduced by ₹42,029 and the value of stock will increase by ₹18,611. The latter will affect the profit of the subsequent period.

Working Notes

The apportionment of under-absorbed overhead over Work-in-progress, Finished goods stock and Cost of goods sold on the basis of their value in the respective account is as follows:-

$$\text{*Overhead to be absorbed by work-in-progress} = \frac{\text{₹ } 60,640}{12,12,800} \times 1,41,480 = \text{₹ } 7,074$$

$$\text{@Overhead to be absorbed by finished goods} = \frac{\text{₹ } 60,640}{12,12,800} \times 2,30,732 = \text{₹ } 11,537$$

$$\text{\#Overhead to be absorbed by cost of goods sold} = \frac{\text{₹ } 60,640}{12,12,800} \times 8,40,588 = \text{₹ } 42,029$$

Question-10

PQR manufacturers – a small scale enterprise produces a single product and has adopted a policy to recover the production overheads of the factory by adopting a single blanket rate based on machine hours. The budgeted production overheads of the factory are ₹ 10,08,000 and budgeted machine hours are 96,000.

For a period of first six months of the financial year 2013–2014, following information were extracted from the books:

Actual production overheads ₹ 6,79,000

Amount included in the production overheads:

Paid as per court's order ₹ 45,000

Expenses of previous year booked in current year ₹ 10,000

<i>Paid to workers for strike period under an award</i>	₹ 42,000
<i>Obsolete stores written off</i>	₹ 18,000

Production and sales data of the concern for the first six months are as under:

Production:

<i>Finished goods</i>	<i>22,000 units</i>
<i>Works-in-progress</i> <i>(50% complete in every respect)</i>	<i>16,000 units</i>

Sale:

<i>Finished goods</i>	<i>18,000 units</i>
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The actual machine hours worked during the period were 48,000 hours. It is revealed from the analysis of information that ¼ of the under-absorption was due to defective production policies and the balance was attributable to increase in costs.

You are required:

- (i) to determine the amount of under absorption of production overheads for the period,*
- (ii) to show the accounting treatment of under-absorption of production overheads, and*
- (iii) to apportion the unabsorbed overheads over the items.*

Solution:

- (i)** Amount of under absorption of production overheads during the period of first six months of the year 2013-2014:

	Amount (₹)	Amount (₹)
Total production overheads actually incurred during the period		6,79,000
<i>Less: Amount paid to worker as per court order</i>	45,000	
<i>Expenses of previous year booked in the current year</i>	10,000	
<i>Wages paid for the strike period under an award</i>	42,000	
<i>Obsolete stores written off</i>	18,000	1,15,000
		5,64,000
<i>Less: Production overheads absorbed as per machine hour rate (48,000 hours × ₹10.50*)</i>		5,04,000
Amount of under absorbed production overheads		60,000

$$\text{Budgeted Machine hour rate (Blanket rate)} = \frac{\text{₹ } 10,08,000}{96,000 \text{ hours}} = \text{₹ } 10.50 \text{ per hour}$$

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- (ii) **Accounting treatment of under absorbed production overheads:** As, one fourth of the under absorbed overheads were due to defective production policies, this being abnormal, hence should be debited to Costing Profit and Loss Account.

Amount to be debited to Costing Profit and Loss Account = $(60,000 \times \frac{1}{4})$ ₹15,000.

Balance of under absorbed production overheads should be distributed over Works in progress, Finished goods and Cost of sales by applying supplementary rate*.

Amount to be distributed = $(60,000 \times \frac{3}{4})$ ₹45,000.

Supplementary rate = $\frac{₹ 45,000}{30,000 \text{ units}}$ = ₹ 1.50 per unit

- (iii) Apportionment of under absorbed production overheads over WIP, Finished goods and Cost of sales:

	Equivalent completed units	Amount (₹)
Work-in-Progress (16,000 units \times 50% \times 1.50)	8,000	12,000
Finished goods (4,000 units \times 1.50)	4,000	6,000
Cost of sales (18,000 units \times 1.50)	18,000	27,000
Total	30,000	45,000

Question-11

X Ltd. recovers overheads at a pre-determined rate of ₹ 50 per man-day. The total factory overheads incurred and the man-days actually worked were ₹ 79 lakhs and 1.5 lakhs days respectively. During the period 30,000 units were sold. At the end of the period 5,000 completed units were held in stock but there was no opening stock of finished goods. Similarly, there was no stock of uncompleted units at the beginning of the period but at the end of the period there were 10,000 uncompleted units which may be treated as 50% complete.

On analyzing the reasons, it was found that 60% of the unabsorbed overheads were due to defective planning and the balance were attributable to increase in overhead cost.

How would unabsorbed overheads be treated in cost accounts?

Solution:

Absorbed overheads = Actual Man- days \times Rate per day
= 1,50,000 days \times ₹50
= ₹ 75,00,000

$$\begin{aligned} \text{Under absorption of overheads} &= \text{Actual overheads} - \text{Absorbed overheads} \\ &= ₹ 79,00,000 - ₹ 75,00,000 \\ &= ₹ 4,00,000 \end{aligned}$$

Reasons for under – absorption:

1. Defective Planning ₹ 4,00,000 x 60% = ₹2,40,000
2. Increase in overhead cost ₹ 4,00,000 x 40% = ₹1,60,000

Treatment in Cost Accounts:

- (i). The unabsorbed overheads of ₹ 2,40,000 on account of defective planning to be treated as abnormal and thus be charged to Costing profit & loss account.
- (ii) The balance of unabsorbed overheads i.e. ₹ 1,60,000 be charged as below on the basis of supplementary overhead absorption rate

$$\text{Supplementary Rate} = ₹1,60,000 \div \{30,000 \text{ units} + 5,000 \text{ units} + (50\% \text{ of } 10,000 \text{ units})\} = ₹ 4$$

- (a) To Cost of sales Account = 30,000 units x ₹ 4 = ₹ 1,20,000
- (b) To Finished stock account = 5,000 units x ₹ 4 = ₹ 20,000
- (c) To WIP Account = 50% of 10,000 units x ₹4 = ₹ 20,000
₹ 1,60,000

Distribution of Overheads

Question-12

E-books is an online book retailer. The Company has four departments. The two sales departments are Corporate Sales and Consumer Sales. The two support – departments are Administrative (Human Resources Accounting) and Information Systems each of the sales departments conducts merchandising and marketing operations independently.

The following data are available for October, 2013:

Departments	Revenues	Number of Employees	Processing time used (in minutes)
Corporate Sales	₹ 16,67,750	42	2,400
Consumer Sales	₹ 8,33,875	28	2,000
Administrative	--	14	400
Information system	--	21	1,400

Cost incurred in each of four departments for October, 2013 are as follow:

Corporate Sales	₹ 12,97,751
Consumer Sales	₹ 6,36,818

4.32 Cost Accounting

<i>Administrative</i>	₹ 94,510
<i>Information systems</i>	₹ 3,04,720

The company uses number of employees as a basis to allocate Administrative costs and processing time as a basis to allocate Information systems costs.

Required:

- (i) Allocate the support department costs to the sales departments using the direct method.
- (ii) Rank the support departments based on percentage of their services rendered to other support departments. Use this ranking to allocate support costs based on the step-down allocation method.
- (iii) How could you have ranked the support departments differently?
- (iv) Allocate the support department costs to two sales departments using the reciprocal allocation method.

Solution:

- (i) Statement showing the allocation of support department costs to the sales departments (using the Direct Method)

<i>Particulars</i>	<i>Basis of allocation</i>	<i>Sales department</i>		<i>Support department</i>	
		<i>Corporate sales (₹)</i>	<i>Consumer sales (₹)</i>	<i>Administrative (₹)</i>	<i>Information systems (₹)</i>
Cost incurred		12,97,751	6,36,818	94,510	3,04,720
Re-allocation of cost of administrative department	Number of employees (6:4:-:-)	56,706	37,804	(94,510)	---
Re-allocation of costs of information systems department	Processing time (6:5:-:-)	1,66,211	1,38,509	---	(3,04,720)
Total		<u>15,20,668</u>	<u>8,13,131</u>		

- (ii) Ranking of support departments based on percentage of their services rendered to other support departments

- Administration support department provides $23.077\% \left(\frac{21 \times 100}{42 + 28 + 21} \right)$ of its services to information systems support department. Thus 23.077% of ₹ 94,510 = ₹ 21,810.

- Information system support department provides 8.33% $\left(\frac{400}{2,400 + 2,000 + 400} \times 100 \right)$ of its services to Administration support department. Thus 8.33% of ₹3,04,720 = ₹ 25,383.

**Statement showing allocation of support costs
(By using step-down allocation method)**

Particulars	Basis of allocation	Sales department		Support department	
		Corporate sales	Consumer sales	Administrative	Information systems.
		(₹)	(₹)	(₹)	(₹)
Cost incurred		12,97,751	6,36,818	94,510	3,04,720
Re-allocation of cost of administrative department	Number of employees (6:4:-:3)	43,620	29,080	(94,510)	<u>21,810</u> 3,26,530
Re-allocation of costs of information systems department	Processing time (6:5:-:-)	1,78,107	1,48,423		<u>(3,26,530)</u>
Total		<u>15,19,478</u>	<u>8,14,321</u>		

(iii) An alternative ranking is based on the rupee amount of services rendered to other service departments, using the rupee figures obtained under requirement (ii) This approach would use the following sequence of ranking.

- Allocation of information systems overheads as first (₹25,383 provided to administrative).
- Allocated administrative overheads as second (₹21,810 provided to information systems).

(iv) Working notes:

- (1) Percentage of services provided by each service department to other service department and sales departments.

Particulars	Service departments		Sale departments	
	Administrative	Information system	Corporate Sales	Consumer Sales
Administrative	–	23.08%	46.15%	30.77%
Information systems	8.33%	–	50%	41.67%

- (2) Total cost of the support department: (By using simultaneous equation method).

Let AD and IS be the total costs of support departments Administrative and Information systems respectively. These costs can be determined by using the following simultaneous equations:

4.34 Cost Accounting

$$\begin{aligned}
 \text{AD} &= 94,510 + 0.0833 \text{ IS} \\
 \text{IS} &= 3,04,720 + 0.2308 \text{ AD} \\
 \text{Or, AD} &= 94,510 + 0.0833 \{3,04,720 + 0.2308 \text{ AD}\} \\
 \text{Or, AD} &= 94,510 + 25,383 + 0.01922 \text{ AD} \\
 \text{Or, } 0.98077\text{AD} &= 1,19,893 \\
 \text{Or, AD} &= ₹1,22,243 \\
 \text{and IS} &= ₹3,32,934
 \end{aligned}$$

Statement showing the allocation of support department costs to the sales departments (Using reciprocal allocation method)

Particulars	Sales department	
	Corporate sales (₹)	Consumer sales (₹)
Costs incurred	12,97,751	6,36,818
Re-allocation of cost administrative department (46.16% and 30.77% of ₹1,22,243)	56,427	37,614
Re-allocation of costs of information systems department (50% and 41.67% of ₹3,32,934)	1,66,467	1,38,734
Total	15,20,645	8,13,166

Question-13

ABC Ltd. has three production departments P_1 , P_2 and P_3 and two service departments S_1 and S_2 . The following data are extracted from the records of the Company for the month of October, 2013:

	(₹)
Rent and rates	62,500
General lighting	7,500
Indirect Wages	18,750
Power	25,000
Depreciation on machinery	50,000
Insurance of machinery	20,000
Other Information:	

	P_1	P_2	P_3	S_1	S_2
Direct wages (₹)	37,500	25,000	37,500	18,750	6,250
Horse Power of Machines used	60	30	50	10	–
Cost of machinery (₹)	3,00,000	4,00,000	5,00,000	25,000	25,000
Floor space (Sq. ft)	2,000	2,500	3,000	2,000	500
Number of light points	10	15	20	10	5
Production hours worked	6,225	4,050	4,100	–	–

Expenses of the service departments S_1 and S_2 are reapportioned as below:

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

Required:

- Compute overhead absorption rate per production hour of each production department.
- Determine the total cost of product X which is processed for manufacture in department P_1 , P_2 and P_3 for 5 hours, 3 hours and 4 hours respectively, given that its direct material cost is ₹ 625 and direct labour cost is ₹ 375.

Solution:

Primary Distribution Summary

Item of cost	Basis of apportionment	Total (₹)	P_1 (₹)	P_2 (₹)	P_3 (₹)	S_1 (₹)	S_2 (₹)
Direct wages	Actual	25,000	--	--	--	18,750	6,250
Rent and Rates	Floor area (4 : 5 : 6 : 4 : 1)	62,500	12,500	15,625	18,750	12,500	3,125
General lighting	Light points (2 : 3 : 4 : 2 : 1)	7,500	1,250	1,875	2,500	1,250	625
Indirect wages	Direct wages (6 : 4 : 6 : 3 : 1)	18,750	5,625	3,750	5,625	2813	938
Power	Horse Power of machines used (6 : 3 : 5 : 1)	25,000	10,000	5,000	8,333	1,667	–
Depreciation of machinery	Value of machinery (12 : 16 : 20 : 1 : 1)	50,000	12,000	16,000	20,000	1,000	1,000
Insurance of machinery	Value of machinery (12 : 16 : 20 : 1 : 1)	20,000	4,800	6,400	8,000	400	400
		2,08,750	46,175	48,650	63,208	38,380	12,338

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Overheads of service cost centres Let S_1 be the overhead of service cost centre S_1 and S_2 be the overhead of service cost centre S_2 .

$$S_1 = 38,380 + 0.10 S_2$$

$$S_2 = 12,338 + 0.10 S_1$$

Substituting the value of S_2 in S_1 we get

$$S_1 = 38,380 + 0.10 (12,338 + 0.10 S_1)$$

$$S_1 = 38,380 + 1,233.80 + 0.01 S_1$$

$$0.99 S_1 = 39,613.80$$

$$\therefore S_1 = ₹40,014.$$

$$\therefore S_2 = 12,338 + 0.10 \times 40,014.$$

$$= ₹16,339$$

Secondary Distribution Summary

Particulars	Total (₹)	P ₁ (₹)	P ₂ (₹)	P ₃ (₹)
Allocated and Apportioned overheads as per primary distribution	1,58,033	46,175	48,650	63,208
S_1	40,014	8,003	12,004	16,006
S_2	16,339	6,536	3,268	4,902
		60,714	63,922	84,116

(i) Overhead rate per hour

	P ₁	P ₂	P ₃
Total overheads cost	₹60,714	₹63,922	₹84,116
Production hours worked	6,225	4,050	4,100
Rate per hour (₹)	₹9.75	₹15.78	₹20.52

(ii) Cost of Product X

	(₹)
Direct material	625.00
Direct labour	375.00
Prime cost	1,000.00
Production on overheads	
P ₁ 5 hours × ₹9.75 =	48.75

P ₂	3 hours × ₹15.78 = 47.34	
P ₃	4 hours × ₹20.52 = <u>82.08</u>	178.17
Factory cost		1,178.17

Question-14

A company has three production departments (M_1 , M_2 and A_1) and three service department, one of which Engineering service department, servicing the M_1 and M_2 only. The relevant information are as follows:

	Product X	Product Y
M_1	10 Machine hours	6 Machine hours
M_2	4 Machine hours	14 Machine hours
A_1	14 Direct Labour hours	18 Direct Labour hours

The annual budgeted overhead cost for the year are

	Indirect Wages (₹)	Consumable Supplies(₹)
M_1	46,520	12,600
M_2	41,340	18,200
A_1	16,220	4,200
Stores	8,200	2,800
Engineering Service	5,340	4,200
General Service	7,520	3,200

	(₹)	
– Depreciation on Machinery	39,600	
– Insurance of Machinery	7,200	
– Insurance of Building	3,240	(Total building insurance cost for M_1 is one third of annual premium)
– Power	6,480	
– Light	5,400	
– Rent	12,675	(The general service deptt. is located in a building owned by the company. It is valued at ₹6,000 and is charged into cost at notional value of 8% per annum. This cost is additional to the rent shown above)

4.38 Cost Accounting

The value of issues of materials to the production departments are in the same proportion as shown above for the Consumable supplies.

The following data are also available:

Department	Book value Machinery (₹)	Area (Sq. ft.)	Effective H.P. hours %	Production Direct Labour hour	Capacity Machine hour
M ₁	1,20,000	5,000	50	2,00,000	40,000
M ₂	90,000	6,000	35	1,50,000	50,000
A ₁	30,000	8,000	05	3,00,000	—
Stores	12,000	2,000	—	—	—
Engg. Service	36,000	2,500	10	—	—
General Service	12,000	1,500	—	—	—

Required:

- Prepare a overhead analysis sheet, showing the bases of apportionment of overhead to departments.
- Allocate service department overheads to production department ignoring the apportionment of service department costs among service departments.
- Calculate suitable overhead absorption rate for the production departments.
- Calculate the overheads to be absorbed by two products, X and Y.

Solution:

(i) Summary of Apportionment of Overheads

(₹)

Items	Basis of Apportionment	Total Amount	Production Deptt.			Service Deptt.		
			M ₁	M ₂	A ₁	Store Service	Engineering Service	General Service
Indirect wages	Allocation given	1,25,140	46,520	41,340	16,220	8,200	5,340	7,520
Consumable stores	Allocation given	45,200	12,600	18,200	4,200	2,800	4,200	3,200
Depreciation	Capital value of machine (20:15:5:2:6:2)	39,600	15,840	11,880	3,960	1,584	4,752	1,584
Insurance of Machine	Capital value of machine	7,200	2,880	2,160	720	288	864	288

	(20:15:5:2:6:2)							
Insurance on Building	1/3 rd to M ₁ Balance area basis (-:12:16:4:5:3)	3,240	1,080	648	864	216	270	162
Power	HP Hr% (10:7:1::2:-)	6,480	3,240	2,268	324	–	648	–
Light	Area (10:12:16:4:5:3)	5,400	1,080	1,296	1,728	432	540	324
Rent*	Area (10:12:16:4:5:-)	12,675	2,697	3,236	4,315	1,079	1,348	--
Total		2,44,935	85,937	81,028	32,331	14,599	17,962	13,078

*Rent to be apportioned among the departments which actually use the rented building. The notional rent is imputed cost and is not included in the calculation.

(ii) Allocation of service departments overheads

Service Deptt.	Basis of Apportionment	Production Deptt.			Service Deptt.		
		M ₁	M ₂	A ₁	Store Service	Engineering Service	General Service
Store	Ratio of consumable value (126 :182 : 42)	5,256	7,591	1,752	(14,599)	–	–
Engineering service	In Machine hours Ratio of M ₁ and M ₂ (4 : 5)	7,983	9,979	–	–	(17,962)	–
General service	Labour hour Basis (20 : 15 : 30)	4,024	3,018	6,036	–	–	(13,078)
Production Department allocated in (i)		85,937	81,028	32,331			
Total		1,03,200	1,01,616	40,119			

(iii) Overhead Absorption rate

	M ₁	M ₂	A ₁
Total overhead allocated	1,03,200	1,01,616	40,119
Machine hours	40,000	50,000	–

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Labour hours	–	–	3,00,000
Rate per machine hour	2.58	2.032	–
Rate per Direct labour	–	–	0.134

(iv) Statement showing overhead absorption for Product X and Y

Machine Deptt.	Absorption Rate	Product X		Product Y	
		Hours	(₹)	Hours	(₹)
M ₁	2.58	10	25.80	6	15.48
M ₂	2.032	4	8.13	14	28.45
A ₁	0.134	14	1.88	18	2.41
			35.81		46.34

Question-15

The following account balances and distribution of indirect charges are taken from the accounts of a manufacturing concern for the year ending on 31st March, 2014:

Item	Total Amount	Production Departments			Service Departments	
		(₹)	X (₹)	Y (₹)	Z (₹)	A (₹)
Indirect Material	1,25,000	20,000	30,000	45,000	25,000	5,000
Indirect Labour	2,60,000	45,000	50,000	70,000	60,000	35,000
Superintendent's Salary	96,000	-	-	96,000	-	-
Fuel & Heat	15,000					
Power	1,80,000					
Rent & Rates	1,50,000					
Insurance	18,000					
Meal Charges	60,000					
Depreciation	2,70,000					

The following departmental data are also available:

	Production Departments			Service Departments	
	X	Y	Z	A	B
Area (Sq. ft.)	4,400	4,000	3,000	2,400	1,200
Capital Value of					

Assets (₹)	4,00,000	6,00,000	5,00,000	1,00,000	2,00,000
Kilowatt Hours	3,500	4,000	3,000	1,500	-
Radiator Sections	20	40	60	50	30
No. of Employees	60	70	120	30	20

Expenses charged to the service departments are to be distributed to other departments by the following percentages:

	X	Y	Z	A	B
Department A (%)	30	30	20	-	20
Department B (%)	25	40	25	10	-

Prepare an overhead distribution statement to show the total overheads of production departments after re-apportioning service departments' overhead by using simultaneous equation method. Show all the calculations to the nearest rupee.

Solution:

Primary Distribution of Overheads

Item	Basis	Total Amount (₹)	Production Departments			Service Departments	
			X (₹)	Y (₹)	Z (₹)	A (₹)	B (₹)
Indirect Material	Actual	1,25,000	20,000	30,000	45,000	25,000	5,000
Indirect Labour	Actual	2,60,000	45,000	50,000	70,000	60,000	35,000
Superintendent's Salary	Actual	96,000	-	-	96,000	-	-
Fuel & Heat	Radiator Sections {2:4:6:5:3}	15,000	1,500	3,000	4,500	3,750	2,250
Power	Kilowatt Hours {7:8:6:3:-}	1,80,000	52,500	60,000	45,000	22,500	-
Rent & Rates	Area (Sq. ft.) {22:20:15:12:6}	1,50,000	44,000	40,000	30,000	24,000	12,000
Insurance	Capital Value of Assets {4:6:5:1:2}	18,000	4,000	6,000	5,000	1,000	2,000
Meal Charges	No. of Employees {6:7:12:3:2}	60,000	12,000	14,000	24,000	6,000	4,000

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Depreciation	Capital Value of Assets {4:6:5:1:2}	2,70,000	60,000	90,000	75,000	15,000	30,000
Total overheads		11,74,000	2,39,000	2,93,000	3,94,500	1,57,250	90,250

Re-distribution of Overheads of Service Department A and B

Total overheads of Service Departments may be distributed using simultaneous equation method

Let, the total overheads of A = a and the total overheads of B = b

$$a = 1,57,250 + 0.10 b \quad (i)$$

$$\text{or, } 10a - b = 15,72,500 \quad [(i) \times 10]$$

$$b = 90,250 + 0.20 a \quad (ii)$$

$$\text{or, } -0.20a + b = 90,250$$

Solving equation (i) & (ii)

$$\begin{array}{r} 10a - b = 15,72,500 \\ -0.20a + b = 90,250 \\ \hline 9.8a = 16,62,750 \end{array}$$

$$a = 1,69,668$$

Putting the value of a in equation (ii), we get

$$b = 90,250 + 0.20 \times 1,69,668$$

$$b = 1,24,184$$

Secondary Distribution of Overheads

	Production Departments		
	X (₹)	Y (₹)	Z (₹)
Total overhead as per primary distribution	2,39,000	2,93,000	3,94,500
Service Department A (80% of 1,69,668)	50,900	50,900	33,934
Service Department B (90% of 1,24,184)	31,046	49,674	31,046
Total	3,20,946	3,93,574	4,59,480

Question-16

Arnav Ltd. has three production departments M, N and O and two service departments P and Q. The following particulars are available for the month of September, 2013:

	(₹)
Lease rental	35,000
Power & Fuel	4,20,000
Wages to factory supervisor	6,400
Electricity	5,600
Depreciation on machinery	16,100
Depreciation on building	18,000
Payroll expenses	21,000
Canteen expenses	28,000
ESI and Provident Fund Contribution	58,000

Followings are the further details available:

Particulars	M	N	O	P	Q
Floor space (square meter)	1,200	1,000	1,600	400	800
Light points (nos.)	42	52	32	18	16
Cost of machines (₹)	12,00,000	10,00,000	14,00,000	4,00,000	6,00,000
No. of employees (nos.)	48	52	45	15	25
Direct Wages (₹)	1,72,800	1,66,400	1,53,000	36,000	53,000
HP of Machines	150	180	120	-	-
Working hours (hours)	1,240	1,600	1,200	1,440	1,440

The expenses of service department are to be allocated in the following manner:

	M	N	O	P	Q
P	30%	35%	25%	-	10%
Q	40%	25%	20%	15%	-

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

Solution:

Primary Distribution Summary

Item of cost	Basis of apportionment	Total (₹)	Production Dept.			Service Dept.	
			M (₹)	N (₹)	O (₹)	P (₹)	Q (₹)
Lease rental	Floor space	35,000	8,400	7,000	11,200	2,800	5,600

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	(6 : 5 : 8 : 2 : 4)						
Power & Fuel	HP of Machines × Working hours (93: 144 : 72)	4,20,000	1,26,408	1,95,728	97,864	-	-
Supervisor's wages*	Working hours (31 : 40 : 30)	6,400	1,964	2,535	1,901	-	-
Electricity	Light points (21: 26: 16 : 9 : 8)	5,600	1,470	1,820	1,120	630	560
Depreciation on machinery	Value of machinery (6 : 5 : 7 : 2 : 3)	16,100	4,200	3,500	4,900	1,400	2,100
Depreciation on building	Floor space (6 : 5 : 8 : 2 : 4)	18,000	4,320	3,600	5,760	1,440	2,880
Payroll expenses	No. of employees (48: 52: 45: 15: 25)	21,000	5,448	5,903	5,108	1,703	2,838
Canteen expenses	No. of employees (48: 52: 45: 15: 25)	28,000	7,265	7,870	6,811	2,270	3,784
ESI and PF contribution	Direct wages (864: 832: 765: 180: 265)	58,000	17,244	16,606	15,268	3,593	5,289
		6,08,100	1,76,719	2,44,562	1,49,932	13,836	23,051

* Wages to supervisor is to be distributed to production departments only.

Let 'P' be the overhead of service department P and 'Q' be the overhead of service department Q.

$$P = 13,836 + 0.15 Q$$

$$Q = 23,051 + 0.10 P$$

Substituting the value of Q in P we get

$$P = 13,836 + 0.15 (23,051 + 0.10 P)$$

$$P = 13,836 + 3,457.65 + 0.015 P$$

$$0.985 P = 17,293.65$$

$$\therefore P = ₹ 17,557$$

$$\therefore Q = 23,051 + 0.10 \times 17,557$$

$$= ₹ 24,806.70 \text{ or } ₹ 24,807$$

Secondary Distribution Summary

Particulars	Total	M	N	O
	(₹)	(₹)	(₹)	(₹)
Allocated and Apportioned over-heads as per primary distribution	5,71,213	1,76,719	2,44,562	1,49,932
P (90% of ₹17,557)	15,801	5,267	6,145	4,389
Q (85% of ₹24,807)	21,086	9,923	6,202	4,961
		1,91,909	2,56,909	1,59,282

Overhead rate per hour

	M	N	O
Total overheads cost (₹)	1,91,909	2,56,909	1,59,282
Working hours	1,240	1,600	1,200
Rate per hour (₹)	154.77	160.57	132.74

Calculation of Overheads and Selling Price

Question-17

In the current quarter, a company has undertaken two jobs. The data relating to these jobs are as under:

	Job 1102	Job 1108
Selling price	₹ 1,07,325	₹ 1,57,920
Profit as percentage on cost	8%	12%
Direct Materials	₹ 37,500	₹ 54,000
Direct Wages	₹ 30,000	₹ 42,000

It is the policy of the company to charge Factory overheads as percentage on direct wages and Selling and Administration overheads as percentage on Factory cost.

The company has received a new order for manufacturing of a similar job. The estimate of direct materials and direct wages relating to the new order are ₹ 64,000 and ₹ 50,000 respectively. A profit of 20% on sales is required.

You are required to compute

- The rates of Factory overheads and Selling and Administration overheads to be charged.
- The Selling price of the new order

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Solution:

Working notes

1. Computation of total cost of jobs

$$\begin{aligned} \text{Total cost of Job 1102 when 8\% is the profit on Cost} &= \frac{\text{₹ } 1,07,325}{108} \times 100 \\ &= \text{₹ } 99,375 \end{aligned}$$

$$\begin{aligned} \text{Total cost of job 1108 when 12\% is the profit on cost} &= \frac{\text{₹ } 1,57,920}{112} \times 100 \\ &= \text{₹ } 1,41,000 \end{aligned}$$

2. Factory overheads = F% of direct wages
Selling & Administrative overheads = A% of factory cost

- (i) **Computation of rates of factory overheads and selling and administration overheads to be charged.**

Jobs Cost Sheet

	Job 1102 (₹)	Job 1108 (₹)
Direct materials	37,500	54,000
Direct wages	<u>30,000</u>	<u>42,000</u>
Prime cost	67,500	96,000
Add: Factory overheads	<u>30,000F</u>	<u>42,000F</u>
Factory cost (Refer to Working Note 2)	(67,500 + 30,000 F)	(96,000 + 42,000 F)
Add: Selling and Administration Overheads (Refer to Working Note 2)	(67,500 + 30,000 F) A	(96,000 + 42,000 F) A
Total Cost	(67,500 + 30,000 F)(1 + A)	(96,000 + 42,000 F)(1+A)

Since the total cost of jobs 1102 and 1108 are equal to ₹99,375 and ₹1,41,000 respectively, therefore we have the following equations (Refer to Working Note 1)

$$(67,500 + 30,000 F) (1 + A) = 99,375 \dots\dots\dots(i)$$

$$(96,000 + 42,000 F) (1 + A) = 1,41,000 \dots\dots\dots(ii)$$

$$\text{Or, } 67,500 + 30,000 F + 67,500 A + 30,000 FA = 99,375$$

$$\text{Or, } 96,000 + 42,000 F + 96,000 A + 42,000 FA = 1,41,000$$

$$\text{Or, } 30,000 F + 67,500 A + 30,000 FA = 31,875 \dots\dots\dots(iii)$$

$$42,000 F + 96,000 A + 42,000 FA = 45,000 \dots\dots\dots(iv)$$

On solving (iii) and (iv) we get : A = 0.25 and F = 0.40

Hence, A = 25% and F = 40%

(ii) Selling price of the new order:

	(₹)
Direct materials	64,000
Direct wages	<u>50,000</u>
Prime cost	1,14,000
Factory overheads (40% × ₹50,000)	<u>20,000</u>
Factory cost	1,34,000
Selling & Administration overheads (25% × ₹1,34,000)	<u>33,500</u>
Total cost	<u>1,67,500</u>

If selling price of new order is ₹100 then Profit is ₹20 and Cost is ₹80

Hence selling price of the new order = $\frac{₹1,67,500}{80} \times 100 = ₹ 2,09,375$

Question-18

PQR Ltd has its own power plant, which has two users, Cutting Department and Welding Department. When the plans were prepared for the power plant, top management decided that its practical capacity should be 1,50,000 machine hours. Annual budgeted practical capacity fixed costs are ₹ 9,00,000 and budgeted variable costs are ₹ 4 per machine-hour. The following data are available:

	Cutting Department	Welding Department	Total
Actual Usage in 2012-13 (Machine hours)	60,000	40,000	1,00,000
Practical capacity for each department (Machine hours)	90,000	60,000	1,50,000

Required

- (i) Allocate the power plant's cost to the cutting and the welding department using a single rate method in which the budgeted rate is calculated using practical capacity and costs are allocated based on actual usage.
- (ii) Allocate the power plant's cost to the cutting and welding departments, using the dual-rate method in which fixed costs are allocated based on practical capacity and variable costs are allocated based on actual usage.
- (iii) Allocate the power plant's cost to the cutting and welding departments using the dual-rate method in which the fixed-cost rate is calculated using practical capacity, but fixed

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costs are allocated to the cutting and welding department based on actual usage. Variable costs are allocated based on actual usage.

(iv) Comment on your results in requirements (i), (ii) and (iii).

Solution:

Working Notes:

1. *Fixed practical capacity cost per machine hour:*

Practical capacity (machine hours)	1,50,000
Practical capacity fixed costs (₹)	9,00,000
Fixed practical capacity cost per machine hour	₹ 6
(₹ 9,00,000 ÷ 1,50,000 hours)	

2. *Budgeted rate per machine hour (using practical capacity):*

$$= \text{Fixed practical capacity cost per machine hour} + \text{Budgeted variable cost per machine hour}$$

$$= ₹ 6 + ₹ 4 = ₹ 10$$

(i) Statement showing Power Plant's cost allocation to the Cutting & Welding departments by using single rate method on actual usage of machine hours.

	Cutting Department (₹)	Welding Department (₹)	Total (₹)
Power plants cost allocation by using actual usage (machine hours) (Refer to Working Note 2)	6,00,000 (60,000 hours × ₹10)	4,00,000 (40,000 hours × ₹10)	10,00,000

(ii) Statement showing Power Plant's cost allocation to the Cutting & Welding departments by using dual rate method.

	Cutting Department (₹)	Welding Department (₹)	Total (₹)
Fixed Cost (Allocated on practical capacity for each department i.e.): (90,000 hours : 60,000 hours)	5,40,000 $\left(\frac{₹ 9,00,000 \times 3}{5} \right)$	3,60,000 $\left(\frac{₹ 9,00,000 \times 2}{5} \right)$	9,00,000
Variable cost (Based on actual usage of machine hours)	2,40,000 (60,000 hours × ₹ 4)	1,60,000 (40,000 hours × ₹ 4)	4,00,000
Total cost	7,80,000	5,20,000	13,00,000

(iii) Statement showing Power Plant's cost allocation to the Cutting & Welding Departments using dual rate method

	Cutting Department (₹)	Welding Department (₹)	Total (₹)
Fixed Cost	3,60,000	2,40,000	6,00,000
Allocation of fixed cost on actual usage basis (Refer to Working Note 1)	(60,000 hours × ₹ 6)	(40,000 hours × ₹ 6)	
Variable cost (Based on actual usage)	2,40,000 (60,000 hours × ₹ 4)	1,60,000 (40,000 hours × ₹ 4)	4,00,000
Total cost	6,00,000	4,00,000	10,00,000

(iv) Comments:

Under dual rate method, under (iii) and single rate method under (i), the allocation of fixed cost of practical capacity of plant over each department are based on single rate. The major advantage of this approach is that the user departments are allocated fixed capacity costs only for the capacity used. The unused capacity cost ₹ 3,00,000 (₹ 9,00,000 – ₹ 6,00,000) will not be allocated to the user departments. This highlights the cost of unused capacity.

Under (ii) fixed cost of capacity are allocated to operating departments on the basis of practical capacity, so all fixed costs are allocated and there is no unused capacity identified with the power plant.

Question-19

In a manufacturing company factory overheads are charged as fixed percentage basis on direct labour and office overheads are charged on the basis of percentage of factory cost. The following information are available related to the year ending 31st March, 2014 :

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

You are required to find out:

- The percentage of factory overheads on direct labour.
- The percentage of office overheads on factory cost.

4.50 Cost Accounting

Solution:

Let, the percentage of factory overheads on direct labour is 'x' and the percentage of office overheads on factory cost is 'y', then the total cost of product A and product B will be as follows:

	Product A (₹)	Product B (₹)
Direct Materials	19,000	15,000
Direct labour	15,000	25,000
Prime Cost	34,000	40,000
Factory overheads (Direct labour × x)	150 x	250 x
Factory cost (i)	34,000 + 150 x	40,000 + 250 x
Office overheads (Factory cost × y) (ii)	340 y + 1.5 x y	400 y + 2.5 x y
Total Cost [(i) + (ii)]	34,000 + 150 x + 340 y + 1.5 x y	40,000 + 250 x + 400 y + 2.5 x y

Total cost on the basis of sales is:

	Product A (₹)	Product B (₹)
Sales	60,000	80,000
Less: Profit		
Product A – 25% on cost or 20% on Sales	12,000	
Product B – 25% on sales		20,000
Total Cost	48,000	60,000

Thus,

$$\begin{aligned} \text{Total Cost of A is} \quad & 34,000 + 150x + 340y + 1.5xy = 48,000 \\ & \text{Or, } 150x + 340y + 1.5xy = 14,000 \dots\dots\dots(i) \end{aligned}$$

$$\begin{aligned} \text{Total Cost of B is} \quad & 40,000 + 250x + 400y + 2.5xy = 60,000 \\ & \text{Or, } 250x + 400y + 2.5xy = 20,000 \dots\dots\dots(ii) \end{aligned}$$

Equation (ii) multiplied by 0.6 and after deducting from equation (i), we get

$$\begin{aligned} 150x + 340y + 1.5xy &= 14,000 \dots\dots\dots(i) \\ \underline{-150x \pm 240y \pm 1.5xy} &= \underline{-12,000} \dots\dots\dots(ii) \\ \hline 100y &= 2,000 \\ \text{Or, } y &= 20 \end{aligned}$$

Putting value of y in equation (i), we get

$$150x + 340 \times 20 + 1.5x \times 20 = 14,000$$

$$\text{Or, } 150x + 30x = 14,000 - 6,800$$

$$\text{Or, } 180x = 7,200$$

$$\text{Or, } x = 40$$

Hence, (i) the factory overheads on direct labour = 40% and

(ii) the office overheads on factory cost = 20%.

Question-20

Maximum production capacity of JK Ltd. is 5,20,000 units per annum. Details of estimated cost of production are as follows:

- Direct material ₹ 15 per unit.
- Direct wages ₹ 9 per unit (subject to a minimum of ₹ 2,50,000 per month).
- Fixed overheads ₹ 9,60,000 per annum.
- Variable overheads ₹ 8 per unit.
- Semi-variable overheads are ₹ 5,60,000 per annum up to 50 per cent capacity and additional ₹ 1,50,000 per annum for every 25 per cent increase in capacity or a part of it.

JK Ltd. worked at 60 per cent capacity for the first three months during the year 2013-14, but it is expected to work at 90 per cent capacity for the remaining nine months.

The selling price per unit was ₹ 44 during the first three months.

You are required, what selling price per unit should be fixed for the remaining nine months to yield a total profit of ₹ 15,62,500 for the whole year.

Solution:

Statement of Cost and Sales for the year 2013-14 (Maximum production capacity = 5,20,000 units per annum)

Particulars	First 3 months	Next 9 months	Total
Capacity utilized	60%	90%	
Production	$\frac{5,20,000 \times 3 \times 60\%}{12}$ = 78,000 units	$\frac{5,20,000 \times 9 \times 90\%}{12}$ = 3,51,000 units	4,29,000 units
	(₹)	(₹)	(₹)
Direct materials @ ₹15 per unit	11,70,000	52,65,000	64,35,000
Direct wages @ ₹ 9 per unit or ₹ 2,50,000 per month whichever is higher.	7,50,000	31,59,000	39,09,000

4.52 Cost Accounting

Prime cost (A)	19,20,000	84,24,000	1,03,44,000
Overheads			
Fixed	2,40,000	7,20,000	9,60,000
Variable @ ₹8 per unit	6,24,000	28,08,000	34,32,000
Semi Variable (Refer to Working Note-1)	1,77,500	6,45,000	8,22,500
Total overheads (B)	10,41,500	41,73,000	52,14,500
Total Cost (C) [(A + B)]	29,61,500	1,25,97,000	1,55,58,500
Profit during first 3 months (Bal. figure)	4,70,500		
Sales @ ₹44 per unit (78,000 x ₹ 44)	34,32,000		
Desired profit during next 9 months (₹15,62,500 – ₹4,70,500) (D)		10,92,000	
Sales required for next 9 months (E) [(C + D)]		1,36,89,000	
Total profit			15,62,500
Total Sales			1,71,21,000

$$\begin{aligned} \text{Required selling price per unit for last 9 months} &= \frac{\text{Total sales required for last 9 months}}{\text{Units produced during last 9 months}} \\ &= \frac{\text{₹1,36,89,000}}{3,51,000 \text{ units}} = \text{₹ 39 per unit.} \end{aligned}$$

Workings:

- (1) Semi-variable overheads:
- (a) For first 3 months at 60% capacity
- $$\begin{aligned} &= \text{₹}(5,60,000 + \text{₹}1,50,000) \times 3/12 \\ &= \text{₹}7,10,000 \times 3/12 \\ &= \text{₹}1,77,500. \end{aligned}$$
- (b) For remaining 9 months at 90% capacity
- $$\begin{aligned} &= \text{₹}(5,60,000 + \text{₹}3,00,000) \times 9/12 \\ &= \text{₹}8,60,000 \times 9/12 \\ &= \text{₹}6,45,000 \end{aligned}$$

Miscellaneous

Question-21

A machine was purchased from a manufacturer who claimed that his machine could produce 36.5 tonnes in a year consisting of 365 days. Holidays, break-down, etc., were normally allowed in the factory for 65 days. Sales were expected to be 25 tonnes during the year and the plant actually produced 25.2 tonnes during the year. You are required to state the following figures:

- Rated Capacity.
- Practical Capacity.
- Normal Capacity.
- Actual Capacity.

Solution:

- | | | |
|--|------|--------|
| (a) Rated capacity | 36.5 | tonnes |
| (Refers to the capacity of a machine or a plant as indicated by its manufacturer) | | |
| (b) Practical capacity | 30.0 | tonnes |
| [Defined as actually utilised capacity of a plant i.e. $\frac{36.5 \text{ tonnes}}{365 \text{ days}} \times (365 - 65) \text{ days}$] | | |
| (c) Normal capacity | 25.0 | tonnes |
| (It is the capacity of a plant utilized based on sales expectancy) | | |
| (d) Actual capacity | 25.2 | tonnes |
| (Refers to the capacity actually achieved) | | |

Question-22

Following information is available for the first and second quarter of the year 2013-14 of ABC Limited:

	<i>Production (in units)</i>	<i>Semi-variable cost (₹)</i>
<i>Quarter I</i>	<i>36,000</i>	<i>2,80,000</i>
<i>Quarter II</i>	<i>42,000</i>	<i>3,10,000</i>

You are required to segregate the semi-variable cost and calculate :

- Variable cost per unit; and
- Total fixed cost.

4.54 Cost Accounting

Solution:

$$(a) \text{ Variable Cost per Unit} = \frac{\text{Change in Semi - variable cost under two production level}}{\text{Change in production quantity in two levels}}$$

$$= \frac{\text{₹ 3,10,000} - \text{₹ 2,80,000}}{42,000 \text{ units} - 36,000 \text{ units}}$$

$$= \text{₹ 5 per units}$$

$$(b) \text{ Total Fixed Cost} = \text{Semi Variable Cost for 36,000 units} - \text{Variable cost for 36,000 units.}$$

$$= \text{₹ 2,80,000} - (36,000 \text{ units} \times \text{₹ 5})$$

$$= \text{₹ 1,00,000}$$
