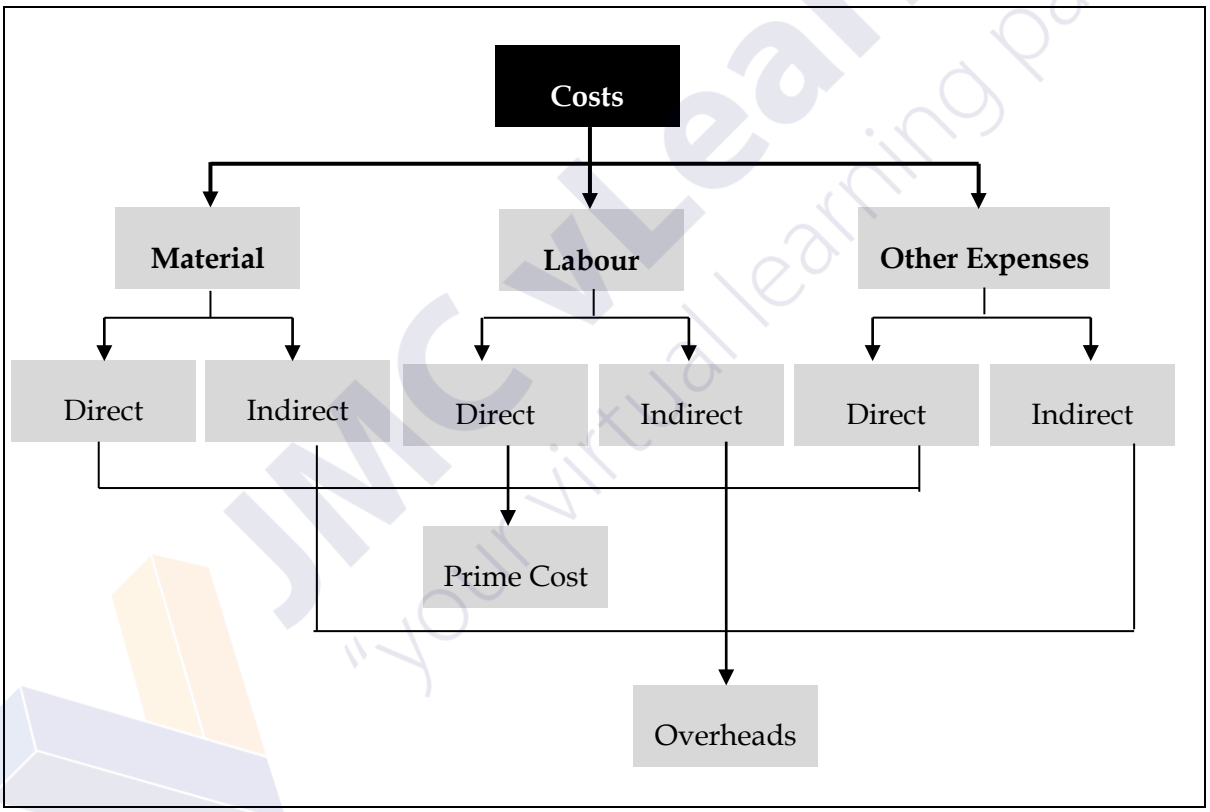
# CHAPTER 04

## Overhead Costs

In a previous chapter, under "cost classification" we learnt that costs can be classified into three groups as "Material costs", "Labour costs" and "Other expenses". This classification was based on the nature of the expenses incurred. According to their indentifiability/traceability, costs can again be classified into two groups, as "direct costs" and "indirect costs". Direct costs are the costs which can easily be identified/traced with the cost unit. They are again devided into; Direct Material, Direct Labour and Other Direct expenses. Indirect costs are those, which can not be identified with the cost unit. They are also in three forms; Indirect Material, Indirect Labour and Other Indirect expenses.




The above diagram demonstrates, how the overhead costs are constituted.

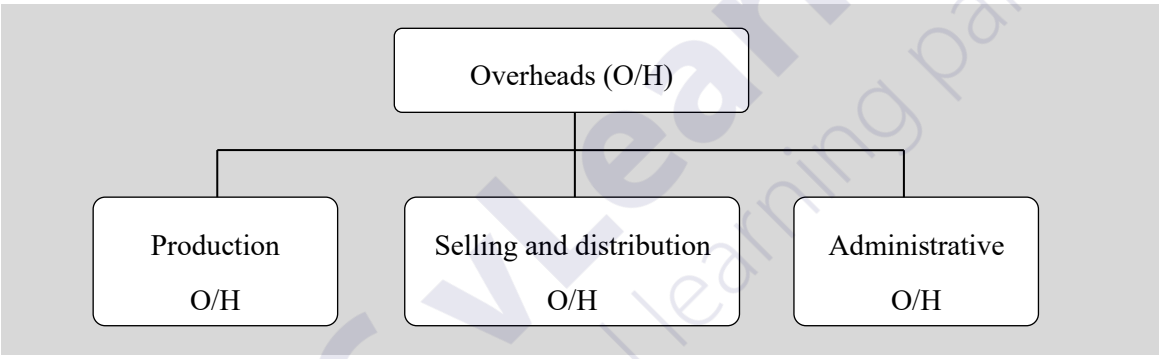
As depicted in the above diagram, overhead costs can be defined as "the aggregate of indirect material, indirect labour and other indirect expenses. In other words, overhead costs are the total of all indirect expenses. (it comprises all indirect costs).

Due to this indirect nature, it is a bit difficult to determine the overhead cost per unit. This does not mean, the cost accountants ignore the overhead costs in ascertaining the cost of a product (cost unit). The overhead costs need to be attributed to the product as fairly and accurately as possible. The costing technique used to do this attribution is called "absorption costing". The main reason for absorbing overhead costs in to the product (cost unit) is the purpose of inventory valuation.

Sri Lanka Accounting Standard on inventory valuation (that is LKAS – 02) too, recommends that the element of fixed production overheads should be taken in to account in the valuation of inventories.

## 1. Classification of Overhead Costs

### 1.1 Functional classification




This is the most common basis of classifying overheads. In this chapter, we will mainly focus on production overheads. (also known as manufacturing overheads).

### 1.2 Classification of overheads according to their nature

According to their nature, overheads can be classified into (a) Indirect material (b) Indirect labour (c) Indirect expenses. (Please read the chapter – cost classification).

### 1.3 Classification according to the variability

Based on the variability / behaviour, overheads can be classified in to;

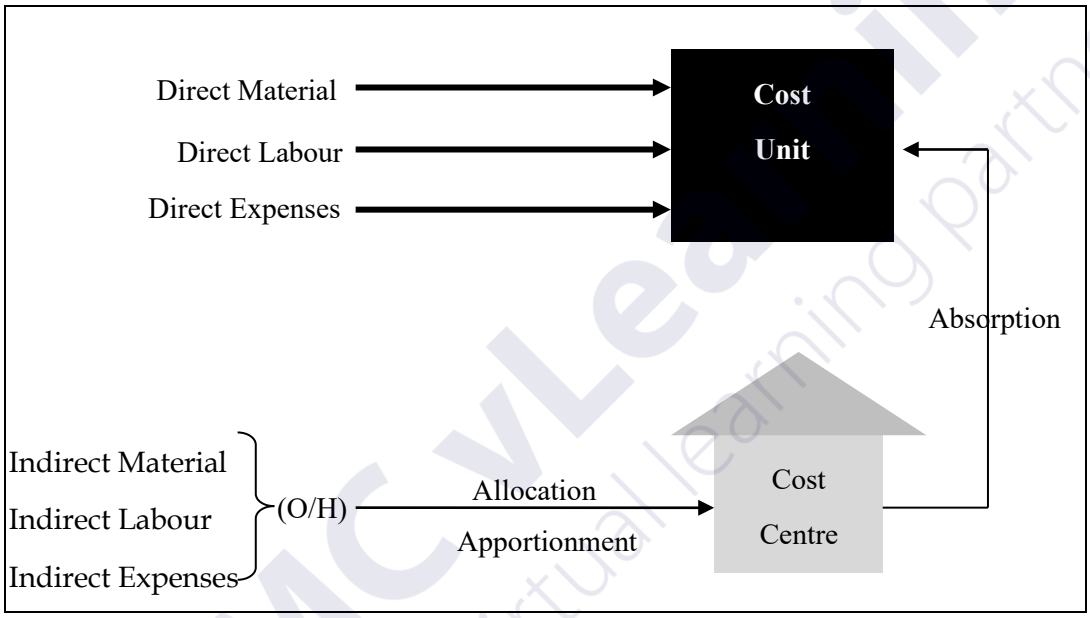
(a) Variable O/H (varying with the output)
(b) Fixed O/H (constant ; not varying with the output)
(c) Semi – variable / Semi – fixed O/H (Partially varying)

## 2. Process of overhead absorption

One of the main challenges faced by a Cost Accountant in ascertaining the cost of a product is the linking overhead costs to the cost unit. This is accomplished through a long procedure which involves following steps.

(1) Collection and classification of overheads
(2) Allocation and apportionment of overheads
(3) Re-apportionment of overheads
(4) Absorption of overheads

This procedure is illustrated in the figure given below.




### 2.1 Collection and Classification of overheads

The first step is to collect overhead costs from a variety of source documents. Following are the examples for source documents from which overhead expenses are collected.

Eg: MRNs, Invoices, Pay-roll, Journal vouchers, Payments vouchers ------- etc.

Once the overhead costs are collected, the next step is to classify them in a systematic way to facilitate the purpose.

## 2.2 Allocation and apportionment of overheads

After the overhead costs are collected and classified, the next step is to allocate or apportion them to cost centres.

**Allocation:** If any overhead cost is directly attributable to a particular cost centre, it must be fully charged to that centre. This charging procedure is called allocation. However the allocation is possible, when the cost centre for which the cost is incurred, can be identified. For example, salary cost of the packing manager is allocated to the packing department only.

**Apportionment:** Overhead costs which can not be directly attributed / allocated to a particular cost centre, should be distributed among the relevant cost centres for which they are incurred, using a reasonable / rational basis. The technique of such distribution is referred to as apportionment. In other words, apportionment is where, the expenses are incurred in common and therefore they must be allotted to a number of cost centres, proportionately on an appropriate basis. This allotment is called Apportionment.

### 2.2.1 The fair basis of Apportionment

As already explained above, the benefit of some expenses (such as electricity, rent, depreciation ------- etc) are shared by a number of departments or cost centres. Therefore such expenses should be apportioned to those departments or cost centres, using a rational or fair basis.

Below is a list of fair bases which are commonly accepted in apportionment of overhead costs.

| Overhead cost | Fair basis to apportion |
|---|---|
| (1) Indirect wages | Allocation (direct basis) |
| (2) Indirect material | Allocation (direct basis) |
| (3) Maintenance | Area occupied or hours maintained |
| (4) Power – lighting and heating | Area occupied |
| (5) Power – machine running | Horse power |
| (6) Rent and rates | Area occupied |
| (7) Building insurance | Area occupied |
| (8) Insurance on plants | Costs of plants |
| (9) Depreciation on building | Area occupied |

| | | |
|---|---|---|
| (10) | Depreciation on plants | Costs of plants |
| (11) | Wage related costs | No. of employees or wages |
| (12) | Factory cleaning | Area occupied |
| (13) | Staff welfare | No. of employees |
| (14) | Supervision | No. of employees |
| (15) | Canteen expenses | No. of employees |
| (16) | Safety | No. of employees |
| (17) | EPF and ETF | Wages |
| (18) | Factory administration | No. of employees |

If any other type of expenditure is given, make sure to use the most suitable basis out of the bases given or available.

### 2.3 Re-apportionment of overheads

The primary distribution of overheads (ie: allocation and apportionment) apportions all overhead costs to different departments, both production and service departments. Production departments are directly involved in manufacturing the items whereas services departments are not. Therefore the overhead costs allocated and apportioned to service cost centres should be reapportioned to the production cost centres before to proceed to the next step; that is "absorption". In other words, service departments' overhead costs should be borne by the production departments which obtained services from them.

The process of this re-distribution (secondary distribution) is termed as "reapportionment". The basis for the re-distribution should be the extent to which the production departments obtain services from service departments. (Percentage of benefits received by each department)

#### 2.3.1 Reciprocal services

This situation arised where two or more service departments exist and they serve each other. For example, maintenance department provide services to canteen and canteen provide meals to the employees of maintenance department. This situation/state is know as reciprocal services.

**2.3.2 Techniques used for re-apportionment**

There are mainly three methods used for re-apportionment of service departments' overheads to the production departments.

(a) Continuous allotment method

(b) Simultaneous equation method (out of syllabus) (c) Elimination method

**(a) Continuous allotment method:**

This method is also known as "repeated distribution method". In this method, overhead costs allocated and apportioned to service departments are redistributed to production departments as well as to service departments using an agreed percentage (%) decided on the benefits received by them. This process should be repeated until the service departments' overhead costs are totally exhausted.

**Example:**

ABC manufacturing company has two service departments $S_1$ an $S_2$, and two production departments $P_1$ and $P_2$. The service departments provide services for each other as well as for production departments. The departmental distribution summary of overheads for the month of January 2020 is as follows.

Production Departments :

| | |
|---|---|
| $P_1$ | Rs. 28,000 |
| $P_2$ | Rs. 40,000 |

Service Departments :

| | |
|---|---|
| $S_1$ | Rs. 9,600 |
| $S_2$ | Rs. 12,300 |
| | Rs. 89,900 |

The service departments' costs should be re-apportioned as follows.

| | **$S_1$** | **$S_2$** | **$P_1$** | **$P_2$** |
|---|---|---|---|---|
| Service - $S_1$ | - | 10% | 50% | 40% |
| - $S_2$ | 50% | - | 10% | 40% |

Calculate total overhead costs of production departments P1 and P2.

**Answer:**

**Re-apportionment** **Rs.**

| | Production depts. | | Service depts. | |
|---|---|---|---|---|
| | $P_1$ | $P_2$ | $S_1$ | $S_2$ |
| Original allotments | 28,000 | 40,000 | 9,600 | 12,300 |
| Costs of $S_1$ | 4,800 | 3,840 | (9,600) | 960 |
| Costs of $S_2$ | 1,326 | 5,304 | 6,630 | (13,260) |
| Costs of $S_1$ | 3,315 | 2,652 | (6,630) | 663 |
| Costs of $S_2$ | 66 | 265 | 332 | (663) |
| Costs of $S_1$ | 166 | 133 | (332) | 33 |
| Costs of $S_2$ | 3 | 13 | 17 | (33) |
| Costs of $S_1$ | 8 | 7 | (17) | 2 |
| Costs of $S_2$ | 1 | 1 | - | (2) |
| | 37,685 | 52,215 | 0 | 0 |

**(b) Simultaneous equation method:**

This method is also referred to as "algebraic method". The total overhead cost (the original allotment plus the amounts received from other service departments) of service departments are ascertained with the help of simultaneous equations and the result so obtained is re-distributed to the other departments following a single step.

**(c) Elimination method:**

This method is also called "ignoring method". Here in this method, the cost effect of reciprocal servicing is ignored. ie. the service departments' costs are reapportioned to production departments only. (it is assumed that, no services are exchanged between service departments).

**Example:**
Using the above ABC Manufacturing Company's figures;

**Answer:**

**Re-apportionment** **Rs.**

| | Production depts. | | Service depts. | |
|---|---|---|---|---|
| | **P1** | **P2** | **S1** | **S2** |
| Original allotments | 28,000 | 40,000 | 9,600 | 12,300 |
| Costs of $S_1$ | 5,333 | 4,267 | (9,600) | - |
| Costs of $S_2$ | 2,460 | 9,840 | - | (12,300) |
| | 35,793 | 54,107 | 0 | 0 |

**Notes:**

$S_1$ costs : $9{,}600 \times \frac{50}{90} = 5{,}333$ (to $P_1$)

$9{,}600 \times \frac{40}{90} = 4{,}267$ (to $P_2$)

$S_2$ costs : $12{,}300 \times \frac{10}{50} = 2{,}460$ (to $P_1$)

$12{,}300 \times \frac{40}{50} = 9{,}840$ (to $P_2$)

## 2.4 Absorption of overheads

This is the final step of the procedure carried out to ascertain the overhead costs per product. (cost unit). After having re-distributed the service departments' overhead costs to the production departments, the process of attributing overhead costs to the cost unit should take place. The term "absorption" refers to charging of overheads accumulated to production departments to different cost units (Products, Services or Jobs) being manufactured in those departments.

### 2.4.1 Methods used for absorbing overheads to the cost unit

Charging overheads to different cost units, (products or jobs) is known as "absorption". For this purpose, an overhead absorption rate (in form of a percentage or ratio) is used.

There are numbers of methods of computing absorption rate. Following methods are commonly used;

(a) Production units method
(b) Direct Labour hour rate method
(c) Machine hour rate method
(d) Direct Labour cost percentage method
(e) Direct Material cost percentage method
(f) Prime cost percentage method

**(a) Production Units Method:**

This method emphasizes that the overhead costs should be absorbed to the product (or cost unit) based on the output or units produced. Formula used to calculate absorption rate is as follows;

$$\text{O/H absorption rate per unit} = \frac{\text{Total Factory Overheads}}{\text{No. of Units}}$$

This formula is valid, only if the products are identical (exactly alike / similar in all aspects).

The absorption rate should always be a pre-determined one, which is calculated with estimated figures instead of actual figures. Therefore the above formula should be revised as follows;

$$\text{O/H absorption rate per unit} = \frac{\text{Total budgeted o/h costs}}{\text{Total budgeted production}}$$

Estimated figures are used on two reasons.

(i) It will take time for the cost Accountant to collect the actual figures since actual figures are come to know after a certain/considerable time period. If so, the product costing will get delayed.

(ii) Actual figures are subject to frequent fluctuations. If they are used, the cost of the product will also be fluctuated. To avoid this, estimated figures are used instead of actual figures.

**Example:**

ABC PLC's total estimated factory overhead cost for the next quarter is Rs. 300,000/- and the company intends to produce 25,000 units during the quarter.

Therefore, O/H absorption rate per unit = Rs. 300,000 / 25,000

= 12/=

If the actual production is 5,000 units,

Absorbed overhead costs = 12 x 5,000

= 60,000

**(b) Direct Labour hour rate method:**

This is one of ideal methods used for absorption of overheads. It is also a scientific and more rational method because almost all overhead expenses are related to the time. The pre-determined O/H absorption rate is computed as follows:

$$\text{O/H absorption rate per direct labour hour} = \frac{\text{Total budgeted o/h costs}}{\text{Total budgeted direct labour hours}}$$

**Example:**

In above ABC PLC, if total budgeted direct labour hours for the next quarter are 150,000.

O/H absorption rate per D/L / hour = 300,000 / 150,000

= 2/=

It is to be noted here that, as long as a department/section is labour oriented/intensive, the direct labour hour method is the most suitable basis for charging overheads.

**(c) Machine hour rate method:**

When the product / department is machine oriented (ie. machine intensive), this method is ideal for absorbing overheads to the cost unit. The formula used to calculate O/H absorption rate is as follows;

$$\text{O/H absorption rate per machine hour} = \frac{\text{Total budgeted overhead costs}}{\text{Total budgeted machine hours}}$$

**Example:**

In above ABC PLC, if the total budgeted machine hours for the next quarter are 100,000;

$$\text{O/H absorption rate per machine hour} = \frac{300,000}{100,000}$$
$$= 3/-$$

**(d) Direct labour cost percentage method:**

This method suggests to absorb overheads to the product according to the direct labour costs. This method is ideal for situations where, there is a direct relationship between labour costs and overheads. The absorption rate is calculated as follows;

$$\text{O/H absorption rate per Rs. 1 of direct labour cost} = \frac{\text{Total budgeted o/h costs}}{\text{Total budgeted direct labour costs}}$$

**Example:**

In above ABC PLC, if the total budgeted direct labour costs for the next quarter is Rs. 600,000/;

$$\text{O/H absorption rate per Rs. 1/- of direct labour cost} = \frac{300,000}{600,000}$$
$$= \text{Rs. } 0.50 \text{ (50 cents)}$$

**(e) Direct material cost percentage method:**

Under this method, production overhead costs are absorbed to the product as a percentage of it's direct material cost. The rate is calculated as follows;

$$\text{O/H absorption rate per Rs. 1 of direct material cost} = \frac{\text{Total budgeted o/h costs}}{\text{Total budgeted direct material costs}}$$

**Example:**

In the above ABC PLC, if the total direct material costs for the next quarter is Rs. 750,000/-.

O/H absorption rate per Rs. 1/- of direct material cost = $\frac{300,000}{750,000}$

= Rs. 0.40 (40 cents)

**(f) Prime cost percentage method:**

This is a combination of direct labour cost and direct material cost percentage methods. It suggests to absorb overhead costs to the cost unit as a percentage of it's prime cost. The formula used in determining the absorption rate is as follows;

$$\text{O/H absorption rate per Rs. 1 of prime cost} = \frac{\text{Total budgeted o/h costs}}{\text{Total budgeted prime costs}}$$

**Example:**

In the above ABC PLC, if the total prime cost is Rs. 1,500,000/-.

O/H absorption rate per Rs. 1/- of prime cost = $\frac{300,000}{1,500,000}$

= Rs. 0.20 (20 cents)

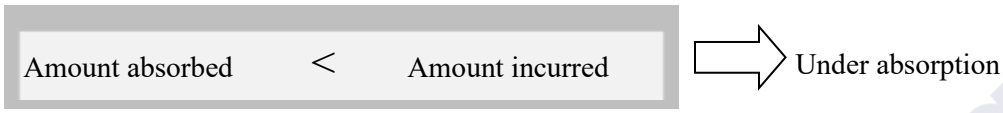
## 2.5 Under or over absorption of overheads

Overheads can be charged / absorbed to the product on an actual rate or on a pre-determined rate. If it is based on an actual rate, the amount of overheads charged to the production would be equal to the amount incurred. Due to the limitations of using an actual rate, overheads are usually absorbed to the product based on a pre-determined rate (ie. standard rate).

When overheads are charged to the product on a pre-determined rate, there will be a difference between the amount absorbed and the amount incurred. The difference between these two amounts is known as the under or over absorption of overheads.

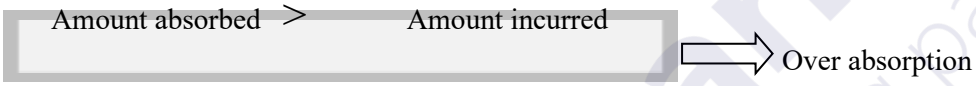
**2.5.1 Under absorption of overheads**

When the amount absorbed is less than the actual overheads incurred, such difference is defined as an under absorption of overheads.




**2.5.2 Over absorption of overheads**

When the amount absorbed is more than the amount of overheads incurred, such difference is identified as an over absorption of overheads.




**Under or over absorption of overheads leads to a difference between financial accounts and cost accounts. Absorbed overheads are charged in cost accounts whereas actual expenses incurred are charged in financial accounts.**

**Example:**

Following data are relating to a particular cost centre of a manufacturing company for a period of 3 months.

| | **Budgeted** | **Actual** |
|---|---|---|
| Production overheads | Rs. 100,000 | Rs. 90,000 |
| Direct labour hours | 20,000 | 19,000 |
| Direct wages | Rs. 70,000 | Rs. 75,000 |
| Direct materials | Rs. 85,000 | Rs. 80,000 |
| Machine hours | 8,000 | 7,400 |
| Units produced | 2,000 | 1,750 |

Using the information given above, you are required to:

(1) Suggest a suitable method to absorb overheads to the product which passes through this cost centre.

(2) Calculate under or over absorption of overheads for the period.

(3) Discuss the way of treating under or over absorption of overheads in cost accounts.

**Answer:**

(1) By comparing the number of labour hours and machine hours, it can be concluded that this particular cost centre is a labour intensive department. Hence direct labour hour method is ideal to use in absorption.

(2) **Under or over absorption of overheads:**

$$\text{O/H absorption rate per direct labour hour} = \frac{100{,}000}{20{,}000}$$

$$= \underline{\text{Rs. 5}}$$

Total overheads absorbed = Rate per hour x Actual hours

= 5 x 19,000

= Rs. 95,000

Actual overheads incurred = Rs. 90,000

over absorption = 95,000 - 90,000

= Rs. 5,000

**(3) Cost accounting treatment :**

**Production O/H Control A/c**

| | | | |
|---|---|---|---|
| Payables (actual) | 90,000 | Work in progress control (absorbed) | 95,000 |
| Cost P/L (over absorption) | 5,000 | | |
| | 95,000 | | 95,000 |

Example 01:

PWS PLC has five departments; P1, P2, P3 and P4 are production departments and S1 is a service department. The information given below relates to a two-weeks period ofPWS.

| | Rs. |
|---|---|
| Repairs to plants | 4,000 |
| Rent | 5,000 |
| Depreciation on plants | 2,400 |
| Supervision | 8,000 |
| Insurance on stocks | 3,000 |
| Employees' insurance | 1,200 |
| Electricity on lighting | 3,600 |

The following data are also available in respect of the five departments:

| | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $S_1$ |
|---|---|---|---|---|---|
| Area occupied (Sq.ft) | 140 | 120 | 110 | 90 | 40 |
| No. of employees | 25 | 20 | 10 | 10 | 5 |
| Total wages (Rs.) | 10,000 | 8,000 | 5,000 | 5,000 | 2,000 |
| Value of plant (Rs.) | 20,000 | 18,000 | 16,000 | 10,000 | 6,000 |
| Value of stock (Rs.) | 15,000 | 10,000 | 5,000 | 2,000 | - |

**You are required to apportion** the costs to the various departments on the equitable basis.

Example 02:

Reallocate the S1 department overhead cost to the other production departments based on the following percentage.

P1-10%

P2-20%

P3-20%

P4-50%