

UNIT III

OVERHEAD

DEFINITION

Overhead is defined as, "the aggregate of indirect material cost, indirect wages and indirect expenses. The term indirect means that which cannot be allocated, but which can be apportioned to, absorbed by cost units, or cost centers. Therefore, overhead refers to those expenses, which cannot be identified with particular products, process or jobs.

CLASSIFICATION OF OVERHEADS

Classification is the process of grouping of costs according to their common characteristics. Classification of overhead is important in order to identify costs with cost units or cost centers. There are various methods for the classification of overhead. The method to be adopted depends upon the type of business, nature of product or services rendered and policy of management. Overheads may be classified in the following ways.

1. CLASSIFICATION ACCORDING TO NATURE

i. Indirect Materials:

Indirect materials are those materials, which do not form a part of the finished product. Cost of indirect materials cannot be identified with and allocated but can be apportioned to a particular product, process or job. Example: Cotton waste, lubricant, grease etc.,

ii. Indirect Labour:

Indirect labor is that labour which is not directly engaged in production of goods or services. It indirectly helps the direct labour engaged in production. The wages paid for indirect labour is known as indirect wages. Indirect wages are those which cannot be identified with and allocated but can be apportioned to a particular product, process or job. Example: Wages of mechanics, supervisors, security guard etc.,

iii. Indirect Expenses:

Expenses (other than indirect material and indirect labour) that are not directly charged to production are indirect expenses. Example: Office expenses and selling and distribution expense

2. CLASSIFICATION ACCORDING TO FUNCTIONS

i. Factory Overheads:

These are also called as Manufacturing overheads, works overhead or factory on cost. Factory overheads cover all expenses incurred from the stage of raw materials to finished goods. It includes indirect material, indirect labour and indirect expenses in producing an article. Example: factory rent, supervisor's salary, power and fuel, heating and lighting etc.,

ii. Administrative Overheads:

These are expenses incurred for running the administrative office. Example: Office rent and salaries, printing and stationery, telephone expenses etc.,

iii. Selling Overheads:

These are expenses incurred for actual sales and promotion of sales. Examples: salaries of sales manager, commission, traveling expenses etc.,

iv. Distribution Overheads:

These are expenses concerned with packing and delivery of goods to the customer. Example: packing charges, warehouse expenses etc.,

3. CLASSIFICATION ACCORDING TO VARIABILITY

i. Fixed Overheads:

Expenses that do not vary with the volume of production are known as fixed overheads. Examples salaries, rent, insurance etc.,

ii. Variable Overheads:

Expenses that vary with the volume of production are known as variable overheads. These are direct costs. Examples material, wages, selling commission etc.,

iii. Semi Variable Overheads:

Expenses that are partly fixed and partly variable are called semi variable overheads. These expenses do not vary in the same ration in which the output changes.

4. CLASSIFICATION ACCORDING TO NORMALITY

i. Normal Overheads:

Normal overheads refer to such overheads, which are expected to incur in attaining a given output. These overheads are unavoidable. They are, therefore, included in production costs.

ii. Abnormal Overheads:

Abnormal overheads refer to such overheads, which are not expected to incur in attaining a given output. Such overhead costs are charged to costing profit and loss account. Example: cost of abnormal idle time, abnormal wastage etc.

5. CLASSIFICATION ACCORDING TO CONTROLLABILITY

i. Controllable Overheads:

Controllable costs are variable costs, which can be controlled. Examples cost of power used in a particular department is controllable by the departmental manager.

ii. Un Controllable Overheads:

Uncontrollable costs are fixed costs, which cannot be controlled. Examples rent, salaries. These expenses are incurred on time basis.

SOURCES OF OVERHEAD ALLOCATION

Allocation is defined as the allotment of whole item of cost-to-cost centers or cost units. In other words, it is the process of charging the full amount of overhead without division to a particular department or cost centers. Examples salary of sales manager is allocated to sales department. Similarly, overtime premium of a particular department can be allocated to that department.

APPORTIONMENT

Apportionment is defined as the allotment of proportions of cost center or cost units. In other words, it is the process of distribution of overheads to various departments or cost centers on some equitable basis. Example factory rent is an expense, which cannot be allocated to any one department but is to be shared by all production departments based on floor areas.

DIFFERENCES

1. Allocation means the allotment of whole item of cost-to-cost center or cost units. Apportionment means the allotment of proportions of cost-to-cost centers or cost units.
2. Expenses that can be directly identified with a particular department or cost centers is called allocation. On the other hand, expense that cannot be directly identified with a particular department or cost centers is called apportionment.
3. Allocation is much wider than apportionment.

BASES OF APPORTIONMENT

The main bases of overhead apportionment utilized are as follows:

1. Direct Allocation:

Overheads are directly allocated to various departments based on expenses for each department. Example: Overtime wages, Power etc.

2. Direct Labor Hours:

Under this basis, the overhead expenses are distributed to various departments in the ratio of total labor worked in each department. Example: Salary of the Supervisor

3. Direct Wages:

According to this basis, expenses are distributed amongst the departments in the ratio of direct wages. This method is used only for those items of expenses, which are booked with the amount of wages. Example: P.F. Contribution, Workmen Compensation

4. Number of Workers:

Under this, total number of workers in each department is taken as the base for apportionment of overhead among departments.

5. Relative areas of departments:

This basis is adopted for the apportionment of certain expenses like lighting, heating, rent, rates and taxes on building etc.

6. Capital Values:

In this method, the capital values of certain assets like plant and building are used as a basis for the apportionment of certain expenses. Examples: Rates, taxes, depreciation, insurance charges on the building etc.,

7. Light Points:

This method is used for apportioning lighting expenses.

8. Kilowatt Hours:

This basis is used for the apportionment of power expenses.

9. Technical estimates:

This base is used for the apportionment of those expenses for which it is difficult to find out any other basis of apportionment. Examples: works manager salary, internal transport, steam, water etc.

COST CLASSIFICATION

Cost classification is the process of grouping of costs according to their common characteristics. Classification of overhead is important in order to identify costs with cost units or cost centers. There are various methods of classification of overheads. The method to be adopted depends upon the type and size of business, nature of product or service rendered and policy of the management. Cost may be classified according to their function, variability, normality and controllability.

VARIOUS COSTS

FIXED COST

Fixed costs are commonly described as those, which remain fixed in total amount with the increase or decrease in the volume of output for a given period of time. Fixed cost per unit decreases as production increases and increases as production declines. These costs are known as period costs because these are dependent on time rather than an output. Example: Rent, insurance of factory building, factory manager's salary

VARIABLE COST

Variable Costs are those, which vary in total in direct proportion to the volume of output. These costs per unit remain relatively constant with changes in production. The variable cost fluctuates in total amount but tend to remain constant per unit. Example: direct material, direct labor, power, repairs etc.,

SEMI VARIABLE COST

These costs are those, which are partly fixed and partly variable. Examples: Telephone expenses include a fixed portion of annual charges plus variable charges according to calls. Thus total telephone expenses are semi variable.

DIFFERENT METHODS OF OVERHEADS ABSORPTION

The following are the different methods of overheads absorption.

1. DIRECT MATERIAL COST PERCENTAGE:

This rate is obtained by dividing, the amount of overheads by the direct material cost and expressing as a percentage. The formula is:

$\text{Factory Overheads} / \text{direct material cost} \times 100$.

SUITABILITY

It is suitable when,

1. Only one kind of article is produced.
2. Prices of materials are stable.
3. Materials cost forms a very high percentage of total cost.

MERITS

1. It is simple and easy to operate.

DEMERITS

1. This method does not take in to account the time factor, which is important for calculating overhead costs.
2. This method makes no distinction between jobs done by unskilled workers and skilled workers. Similarly, it does not distinguish between jobs done by machine and manual labour.
3. No distinction is made between fixed and variable expenses.
4. Fluctuations in prices of raw materials are not accompanied by similar fluctuations in overhead expenses. So overhead rate based on the material cost would be misleading.

2. PERCENTAGE OF DIRECT LABOUR COST:

This rate is obtained by dividing, the amount of overheads by the direct wages cost and expressing this as a percentage. The formula is

$\text{Factory overhead} / \text{direct wages} \times 100$

SUITABILITY

It is suitable when:

1. The rates of wages are uniform.
2. The ratio of skilled and unskilled labour is constant.
3. The direct labour forms a greater part of the total cost.

MERITS

1. It is simple to understand and easy to calculate.
2. This method takes into account the time factor since wages are generally paid on time wages.
3. This is a stable method because labour rates are more stable than material prices.

DEMERITS

1. If piece rate system is adopted, the time factor is completely ignored.
2. No distinction is made between the production of hand workers and that of machine workers.
3. No distinction is made between fixed and variable costs.
4. This method gives inaccurate result when workers are paid overtime premium. The reason is, higher hourly rates are paid for overtime work. However, overhead expenses will not increase in the same proportion. In fact, many factory expenses remain constant.

3. PERCENTAGE ON PRIME COST METHOD:

This rate is obtained by dividing, the amount of overheads by the prime cost and expressing this as a percentage. The formula is

$\text{Factory overheads} / \text{prime cost} \times 100$

As this method is a combination of the above two methods, it has all the merits and demerits of the first two methods.

4. DIRECT LABOUR HOUR METHOD:

This is obtained by dividing the amount of overheads by the labour hours. The formula is

Factory overheads/direct-labour hours

SUITABILITY

This is suitable when most of the work is done manually.

MERITS

1. Time factor is taken into consideration.
2. This method is easy to compute because labour hours are available from the time sheet, job cards etc.

DEMERITS

1. This method cannot be used where machines are used extensively for production.
2. This method does not take into consideration the expenses, which are not dependent on labour hours such as insurance, depreciation, power etc.

5. MACHINE HOUR RATE METHOD:

This is obtained by dividing the amount of overheads by the machine hours. The formula is

Factory overheads/Machine hours

SUITABILITY

This method is suitable where work is performed predominantly machine based.

MERITS

1. It is a scientific method of recovering overhead.
2. It helps to compare the relative efficiencies and cost of operating different machines.
3. It brings to light the existence and extent of idle time of machines.
4. It enables the management to decide how for the use of machine work is preferable to manual work.
5. The time factor is taken into account.
6. Cost reports prepared with the help of such rate are dependable and help the management in decision-making.
7. It provides useful data for estimating cost of production, setting standards and for fixing selling price for quotations.

DEMERITS

1. It involves more clerical work and thus it is costly.
2. It does not take into account the expenses that are not dependent on the working hours of machines.
3. It does not give accurate result if manual labour is equally important.
4. It is difficult to estimate the machine hours especially when the production performance is not available in advance.

DEPARTMENTALIZATION OF OVERHEAD EXPENSES

Allocation and apportionment of overhead expenses to various production and service departments is known as departmentalization of overhead expenses.

Usually factory is divided into number of departments in order to facilitate work and supervision. Departments can be divided into production departments and service departments. Production departments are concerned with production of goods. Service departments are those, which enable other departments to work. For ascertaining the expenses of each department, first of all no distinction is made between the production

departments and service departments. After finding the cost of service department, the total cost of each service department is apportioned to the production departments.

ADVANTAGES OF DEPARTMENTALIZATION

1. It ensures greater accuracy in cost ascertainment.
2. It enables management to fix responsibility.
3. It facilitates work and supervision.
4. It is essential for budgetary control.
5. It ensures greater control over costs by eliminating unnecessary fluctuations in overheads.
6. It helps in selecting a proper method of costing for the department.
7. It helps in the estimation and equitable distribution of overheads among various departments.

UNDER ABSORPTION AND OVER ABSORPTION OF OVERHEADS

INTRODUCTION

Overheads in cost accounts are usually charged based on pre-determined rates. When the overheads are charged based on pre-determined rates, there is a possibility of arising differences between the overhead absorbed and the amount of overheads actually incurred.

ABSORPTION

Absorption actually means the distribution of the overhead expenses allotted to a particular department over the units produced in that department.

UNDER OR OVER ABSORPTION

Under Absorption, means that the overheads absorbed in the production are less than the actual overhead.

Over Absorption, means that the overheads absorbed in the production are more than the actual overheads.

CAUSES FOR OVER OR UNDER ABSORPTION OF OVERHEADS

1. Wrong estimation of overhead expenses
2. Wrong estimation of output or hours to be worked
3. Under or over utilization of production capacity
4. Seasonal fluctuations in the level of production
5. Changes in the techniques and methods of production

TREATMENT OF UNDER OR OVER ABSORPTION OF OVERHEADS

Under or over absorption of overheads may be treated in any one of the following ways:

i. Use of supplementary rates:

When the amount of under or over absorbed overhead is substantial, it is reasonable to charge that to the cost of production itself by using supplementary rate. The supplementary rate is worked out as follows:

Supplementary rate = Amount of under or over absorbed overheads/Actual base.

Either the actual base may be units of products, direct labour, labour hours, machine hours or any base adopted for recovery of overheads.

In case of under absorption the supplementary rate is termed as positive, while in the case of over absorption the supplementary rate is termed as negative.

In case of under absorption, a positive supplementary rate is used and the cost of production is increased by that amount. In case of over absorption, a negative supplementary rate is used and the total cost is deducted by that amount. The basic aim is to charge the true overheads to cost to production.

ii. Write off to costing profit and loss account:

In case the amount of under or over absorbed overhead is nominal, it may be transferred to costing profit and loss account. Where the amount of under or over absorbed

overhead is large, and is due to some abnormal factors, it should be transferred to costing profit and loss account.

iii. Carry over to next year Account:

Another method is to transfer the amount of under or over absorbed overhead to the next year. This method is suitable when the normal business cycle is more than one year.

This method is criticized on the ground that the cost should be absorbed in the period in which it is incurred and it is not proper to transfer the cost of one period to another. By doing so, the comparison between one period and another period is rendered difficult.

Problem 1

The New Enterprises Ltd., has three Production Departments A,B,C and two Service Departments D and E. The following figures are extracted from the records of the company:

	Rs.
Rent and rates	5,000
General lighting	600
Indirect Wages	1,500
Power	1,500
Depreciation of Machinery	10,000
Sundries	10,000

The following further details are available:

	Total	A	B	C	D	E
Floor Space (Sq. ft)	10,000	2,000	2,500	3,000	2,000	500
Light points	60	10	15	20	10	5
Direct Wages (Rs.)	10,000	3,000	2,000	3,000	1,500	500
H.P. of Machines	150	60	30	50	10	-
Value of Machinery (Rs.)	2,50,000	60,000	80,000	1,00,000	5,000	5,000
Working Hours	-	6,226	4,028	4,066	-	-

The expenses of D and E are allocated as follows:

	A	B	C	D	E
D	20%	30%	40%	-	10%
E	40%	20%	30%	10%	-

What is the total cost of an article if its raw material cost is Rs. 50, labour cost Rs. 30 and it passes through Departments A, B and C for 4, 5 and 3 hours respectively?

Solution

Statement of Allocation and Apportionment of Overhead:

	Total	Production		Service			Rate of Apportionment	
	Rs.	A	B	C	D	E		
Direct Wages	2000	-	-	-	1500	500	Actual	
Rent & Rates	5000	1000	1250	1500	1000	250	Re. 0.5 per sq.ft.	
General Lighting	600	100	150	200	100	50	Rs. 10 per Point	
Indirect Wages	1500	450	300	450	225	75	Rs. 0.15 per Re. of Direct wages	
Power	1500	600	300	500	100	-	Rs. Per H.P.	
Depreciation	10000	2400	3200	4000	200	200	4% of value of machinery	
Sundries	10000	3000	2000	3000	1500	500	100% of Direct Wages	
	30600	7550	7200	9650	4625	1575		
Service Dept. D	-	966	1449	1933	-	483		
	30600	8516	8649	11583	-206	2058		
Service Dept. D	-	823	412	617	206	-		
	30600	9339	9061	1220	-	-		
Working hours	-	6226	4028	4066	-	-		
Rate per hours	-	150	225	300	-	-		
Ascertainment of cost of an article							Rs.	
Material							50.00	
Labour Cost							30.00	
							80.00	
Overhead cost								
Dept. A, 4 hrs @ 1.50 = 6.00								
Dept. B, 5 hrs @ 2.25 = 11.25								
Dept. C, 3 hrs @ 3.00 = 9.00							26.50	
							Rs. 106.25	

Note: Sundry expenses are apportioned on the basis of direct wages.

Problem 2

You are supplied with the following information and required to work out the production hour rate of recovery of overhead in Department A,B, and C.

	Total	Production Departments			Service Departments	
		A	B	C	P	Q
Particulars:	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Rent	12000	2400	4800	2000	2000	800
Electricity	4000	800	2000	500	400	300
Indirect Labour	6000	1200	2000	1000	800	1000
Depreciation of Machinery	5000	2500	1600	200	500	200
Sundries	4500	910	2143	847	300	300
Estimated working hrs.		1000	2500	1400		
Expenses of Service Departments P and Q are apportioned as under:						
	A	B	C	P	Q	
P	30%	40%	20%	-	10%	
Q	10%	20%	50%	20%	-	

Solution

a) Repeat Distribution Method

Overhead Distribution Summary for the period.....

	Total	A	B	C	P	Q
Particulars:	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Rent	12000	2400	4800	2000	2000	800
Electricity	4000	800	2000	500	400	300
Indirect Labour	6000	1200	2000	1000	800	1000
Depreciation of Machinery	5000	2500	1600	200	500	200
Sundries	4500	910	2143	847	300	300
Total Rs.	31500	7810	12543	4547	4000	2600
Department P		1200	1600	800	-4000	400
		9010	14143	5347	-	3000
Department Q		300	600	1500	600	-3000
		9310	14743	6847	600	-
Department P		180	240	120	-600	60
		9490	14983	6967	-	60
Department Q		6	12	30	12	-60
		9496	14995	6997	12	-
Department P		4	5	3	-12	-
Total Rs.	31500	9500	15000	7000	-	-
Working Hours		1000	2500	1400		
Rate per Hour		9.50	6.00	5.00		

b) Equation Method (alternative method)

Let x be the expenses of Service Department P; and
y be the expenses of Service Department Q.

Then $x = 4000 + 1/5y$ (since 20% of y will be apportioned to Department P) ; and

$$\begin{aligned}
 y &= 2600 + 1/10x \\
 &= 2600 + 1/10 (4000 + 1/5y), \text{ substituting the value of } x: \\
 &= 2600 + 400 + 1/50y \\
 &= 3000 + 1/50y \\
 50y &= 150000 + y \\
 49y &= 150000 \\
 y &= 3061 \\
 x &= 4000 + 1/5 \times 3061 = 4,612
 \end{aligned}$$

Overheads Distribution Summary

	Production Departments	Service Departments
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	A	B	C	P	Q
	Rs.	Rs.	Rs.	Rs.	Rs.
Total as given above	7,810	12,543	4,547	4,000	2,600
Expenses of Dept. P (Rs. 4,612)	1,384	1,845	922	-4,612	461
Expenses of Dept Q (Rs. 3,061)	306	612	1,531	612	-3,061
Rs.	9,500	15,000	7,000	-	-
No. of working hours	1,000	2,500	1,400		
Rate per hour	9.50	6.00	5.00		

Problem 3

The following information are available for Production departments A,B, & C the Service the Dept D & E.

Particular	Production Dept			Service Dept		
	Total	A	B	C	D	E
Rent	1000	200	400	150	150	100
E.B	200	50	80	30	20	20
Fire Ins	400	80	160	60	60	40
Plant Dept	4000	1000	1500	1000	300	200
Transport	400	50	50	50	100	150

The expenses of services dept D & E are apportioned as under

	A	B	C	D	E
D	30%	40%	20%	-	10%
E	10%	20%	50%	20%	-

Apportion the expenses of service dept to production dept by

- 1) Repeated Distribution Method
- 2) Simultaneous Equation Method

Solution

REPEATED DISTRIBUTION METHOD

Over Head Analysis Sheet

	Production Departments			Service Departments	
	A	B	C	P	Q
	Rs.	Rs.	Rs.	Rs.	Rs.
Rent	200	400	150	150	100
E.B.	50	80	30	20	20
Fire, Insur	80	160	60	60	40

Plant Dept.	1000	1500	1000	300	200
Transport	50	50	50	150	100
Total Exp.	1380	2190	1290	630	510
Service Dept. D%	189	252	126	630	63
	1569	2442	1416	-	573
Service Dept E%	57	115	286	115	573
Service Dept E%	35	46	23	115	11
Service Dept D%	1	2	6	2	11
Service Dept D%	1	1	-	2	-
Total	1663	2606	1731		-

BY SIMULTANEOUS EQUATION METHOD

Total	A	B	C	D	E
Total	1380	2190	1290	630	510
D%	30%	40%	20%	-	10%
E%	10%	20%	50%	20%	-

Let x be the total exp of D to be apportioned

Let y be the total exp of E to be apportioned

$$x = 0.2y + 630 \quad (1)$$

$$y = 0.1x + 510 \quad (2)$$

Substituting the value of x in (2)

$$y = 0.1(0.2y + 630) + 510$$

$$= 0.02y + 63 + 510$$

$$0.98y = 573$$

$$\text{Therefore } y = 585$$

$$\text{Therefore } x = 747$$

	A	B	C
	1380	2130	1290
Service Dept D 30% :	224	299	149
40% : 20% (of 747)			
Service Dept E (1:2:5 of 585)	58	117	293
Total	1662	2606	1732

Problem 4

Superfine Ltd. has furnished the following particulars for the half year ended March 31, 1982. Compute the deprs O/H rates. For the each of the productions department assuming that the O/H charges are recovered as a % of direct wages.

Particular	Production Dept.			Service Dept.	
	A	B	C	D	E
Direct Wages	4000	6000	8000	2000	4000
Direct Material	2000	4000	4000	3000	3000
No. of Employee	100	150	150	50	50
EB KWH	8000	6000	4000	2000	2000
Light point	10	16	4	6	4
Assert value	120000	80000	60000	20000	20000
Area occupied (sq. meters)	150	250	100	50	50

Over Head expenses for the above period

Motive Power	3300
Lighting	400
Stores exp	800
Staff welfare	4800
Deprecation	30000
Repair	15000
Rent & Rates	1200
General exp	12000

Apportion the expenses of service dept D in proportion to the direct wages & that of E in the ratio 5:3:2 to production dept A,B,C

Solution

OVER HEAD DISTRIBUTION SUMMARY

Particular	A	B	C	D	E
Direct Material	-	-	-	3000	3000
Wages				2000	4000
Power 4:3:2:1:1	1200	900	600	300	300
Lighting 5:8:2:3:2	100	160	40	60	40
Stores exp. 2:4:4:3:3 (Material)	100	200	200	150	150
Staff 2:3:3:1:1	360	1440	1440	480	480
Deprec. 6:4:3:1:1	12000	8000	6000	2000	2000
Rent & rates 3:5:2:1:1	300	500	200	100	100
Repairs (assert ratio)	6000	4000	3000	1000	1000
General exp. (staff ratio)	2400	3600	3600	1200	1200
Total	23060	18800	15080	10290	2270
Abortionment of Ser. dept D in the ratio of wages	2287	3430	4573	-	-
Abortion of E in the ratio 5:3:2	6335	3681	2454	-	-
Total	31702	25811	21907	-	-
Over Head Recovery (as per the rate wages)					

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Dept A	=	$(3170.2/4000) \times 100$	=	792.55%
Dept B	=	$(2581.1/6000) \times 100$	=	430.2%
Dept C	=	$(2190.7/8000) \times 100$	=	272.8%

Absorption of overhead cost

Absorption means allotment of overhead cost of jobs i.e., with a view to charging the same amount of overheads in respect of the departments of cost centre where it is spent.

Methods of Absorptions

There are various methods of absorptions, some of which generally used are given below:

- a) Direct Labour Cost Method.
- b) Direct Labour Hours Method
- c) Machine Hour Rate
- d) Prime Cost Method
- e) Conversion Cost Method

$$\text{i) Direct Labour Cost Method} = \frac{\text{Overhead expenses}}{\text{Direct labour cost}}$$

$$\text{ii) Machine hour rate} = \frac{\text{Overhead expenses}}{\text{Machine Hours}}$$

$$\text{iii) Prime cost method} = \frac{\text{Overhead expenses}}{\text{Direct Material} + \text{Direct Expenses}}$$

$$\text{iv) Conversion cost} = \frac{\text{Overhead expenses}}{\text{Labour cost} + \text{Overhead cost}}$$