

Sem-II Overhead Costing

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Theory of Overhead Costing

Overheads are a crucial part of the cost of any product or service. **Overheads** are defined as the sum of all *indirect expenses*, which cannot be directly traced to a specific product or service.

Components of Overheads

Overheads include:

- *Indirect Materials*
- *Indirect Labour*
- *Indirect Expenses*

Classification of Overheads

Overheads can be classified in the following ways:

- **Element-wise:** Indirect material, Indirect labour, Indirect expenses.
- **Function-wise:**
 - Factory Overhead (Manufacturing overhead)
 - Office & Administrative Overhead (Non-manufacturing overhead)
 - Selling & Distribution Overhead (Non-manufacturing overhead)
- **Behaviour-wise:**
 - Variable overhead
 - Fixed overhead
 - Semi-variable overhead

This document focuses on the *functional* and *behavioural* classifications.

Functional Classification

- **Factory Overheads:** Costs related to manufacturing, such as factory rent, taxes, and indirect wages.
- **Office & Administrative Overheads:** Costs for managing general office and administration, e.g., salaries of office staff.
- **Selling & Distribution Overheads:** Costs incurred for selling and distributing products, e.g., salesman's commission.

Behavioural Classification

- **Variable Overheads:** Costs that change *directly in proportion* to the level of activity, e.g., indirect wages, salesman's commission.
- **Fixed Overheads:** Costs that *remain constant* regardless of activity level within a certain range, e.g., factory rent.
- **Semi-variable Overheads:** Costs that change with activity level but *not in direct proportion*, e.g., repair and maintenance, electricity charges.

Segregating Semi-variable Costs

Semi-variable costs have both fixed and variable components, requiring separation to understand their behaviour. Two methods are detailed below with an example:

Units Produced	Total Semi-variable Costs (Rs)
1000	5000
2000	6000
3000	7000
4000	8000

(i) High-point and Low-point Method

This method uses the highest and lowest activity levels to calculate the variable cost per unit:

$$\text{Variable cost per unit} = \frac{\text{High-point cost} - \text{Low-point cost}}{\text{High-point unit} - \text{Low-point unit}}$$

Using the data:

$$\text{Variable cost per unit} = \frac{8000 - 5000}{4000 - 1000} = \frac{3000}{3000} = \text{Rs 1 per unit}$$

Fixed cost is calculated as:

$$\text{Fixed cost} = \text{Total cost} - (\text{Variable cost per unit} \times \text{Units})$$

At high point (4000 units, Rs 8000):

$$\text{Fixed cost} = 8000 - (1 \times 4000) = 8000 - 4000 = \text{Rs 4000}$$

Verification at low point (1000 units, Rs 5000):

$$\text{Fixed cost} = 5000 - (1 \times 1000) = 5000 - 1000 = \text{Rs 4000}$$

(ii) Simultaneous Equation Method

Using two activity levels, form equations: Total Cost = (Variable cost per unit $\times$ Units) + Fixed cost. Let a be the variable cost per unit, and b be the fixed cost.

Using low point (1000 units, Rs 5000) and high point (4000 units, Rs 8000):

$$1000a + b = 5000 \quad (i)$$

$$4000a + b = 8000 \quad (ii)$$

Subtract (i) from (ii):

$$(4000a + b) - (1000a + b) = 8000 - 5000$$

$$3000a = 3000 \implies a = 1$$

Substitute $a = 1$ into (i):

$$1000(1) + b = 5000 \implies b = 5000 - 1000 = \mathbf{4000}$$

Thus, variable cost = **Re 1 per unit**, fixed cost = **Rs 4000**.

Steps of Factory Overhead Costing

1. **Collection:** Gather all factory overhead expenses.
2. **Allocation:** Assign overhead costs directly to a specific cost centre.
3. **Apportionment:** Distribute overhead costs to cost centres using logical bases.
4. **Re-distribution:** Transfer service department costs to production departments.
5. **Absorption:** Charge production department overheads to products (overhead recovery).

Allocation and Apportionment

- **Allocation:** Directly assigning overhead to a cost centre, e.g., machine depreciation to its department.
- **Apportionment:** Sharing overhead among cost centres based on logical bases when direct allocation isn't possible.

Bases of Apportionment

Expense	Basis
Rent, rates, taxes	Area occupied / Floor space
Insurance of stock	Value of stock
Depreciation	Value of fixed assets
Stores overhead	Value of materials
Indirect wages	Direct wages
Lighting/Electricity	Wattage $\times$ working hours or light points
Power	Kw $\times$ working hours or H.P. of machine
Canteen expenses	Number of workers
Supervisor's salary	Number of workers

Illustration 1: Apportionment, Redistribution, and Absorption

P.Ltd has three production departments (A, B, C) and two service departments (D, E). Budget for December 2019:

Expense	Total (Rs)
Rent and rates	5000
General lighting	600
Indirect wages	1500
Power	1500
Depreciation of machinery	10000
Sundry expenses	10000
Total	30600

Additional information:

Information	A	B	C	D	E
Area (sq.m)	2000	2500	3000	2000	500
Value of machinery (Rs)	60000	80000	100000	5000	5000
Machine hour	1000	2000	4000	1000	1000
Light points (nos)	10	15	20	10	5
Direct wages (Rs)	3000	2000	3000	1500	500
H.P. of machines	60	30	50	10	—
Working hours	6226	4028	4066	—	—

Service department cost allocation:

- D to A, B, C, E: 20%, 30%, 40%, 10%
- E to A, B, C, D: 40%, 20%, 30%, 10%

(i) Statement of Overhead Apportionment

Item	Basis of Apportionment	Total (Rs)	A	B	C	D
E						
Rent and rates 250	Floor Space (4:5:6:4:1)	5000	1000	1250	1500	1000
General Lighting 50	Light points (2:3:4:2:1)	600	100	150	200	100
Indirect wages 75	Direct wages (6:4:6:3:1)	1500	450	300	450	225
Power —	H.P. of machine (6:3:5:1:0)	1500	600	300	500	100
Depreciation 200	Value of machine (12:16:20:1:1)	10000	2400	3200	4000	200
Sundries 500	Direct wages (6:4:6:3:1)	10000	3000	2000	3000	1500
Direct wages (Service) 500	Actual	2000	—	—	—	1500
TOTAL 1575		30600	7550	7200	9650	4625

(ii) Redistribution of Service Department Costs

Repeated Distribution Method

Item	A	B	C	D	E
Total Overhead	7550	7200	9650	4625	1575
Service D (2:3:4:1)	925	1388	1850	(4625)	462
Service E (4:2:3:1)	815	407	611	204	(2037)
Service D (2:3:4:1)	41	61	82	(204)	20
Service E (4:2:3:1)	8	5	7	20	(20)
Total Overhead	9339	9061	12200	0	0

Simultaneous Equation Method

Let a = total cost of D, b = total cost of E:

$$a = 4625 + 0.10b \quad (i)$$

$$b = 1575 + 0.10a \quad (ii)$$

Solving:

$$a = 4625 + 0.10(1575 + 0.10a) \implies a = 4625 + 157.5 + 0.01a$$

$$0.99a = 4782.5 \implies a \approx 4831$$

$$b = 1575 + 0.10(4831) \approx 2058$$

Distribute to production departments:

Item	A	B	C	D	E
Total Overhead	7550	7200	9650	4625	1575
Service D (2:3:4:1)	966	1449	1932	(4831)	483
Service E (4:2:3:1)	823	412	618	206	(2058)
Total Overhead	9339	9061	12200	0	0

(iii) Overhead Recovery Rate

Using working hours:

- Dept A: $\frac{9339}{6226} \approx \text{Rs } 1.50$ per hour
- Dept B: $\frac{9061}{4026} \approx \text{Rs } 2.25$ per hour
- Dept C: $\frac{12200}{4066} \approx \text{Rs } 3.00$ per hour

(iv) Total Cost of Article

Given: Material cost = Rs 50, Labour cost = Rs 30, Hours: A (4), B (5), C (3). Overheads:

- Dept A: $4 \times 1.50 = 6.00$
- Dept B: $5 \times 2.25 = 11.25$

- Dept C: $3 \times 3.00 = 9.00$

Item	Amount (Rs)
Raw materials	50.00
Labour cost	30.00
Overheads:	
Dept A	6.00
Dept B	11.25
Dept C	9.00
Total Cost	106.25

Machine Hour Rate

Calculation

- **Capital Cost:** Original Cost + Installation + Carriage
- **Depreciation:** $\frac{\text{Total Capital Cost} - \text{Scrap Value}}{\text{Estimated Life}}$
- **Effective Machine Hours:** Booked hours – Normal Idle Time
- **Machine Hour Rate:** $\frac{\text{Total Fixed Expenses}}{\text{Effective Machine Hours}} + \text{Variable Expenses per Hour}$

Over/Under Absorption

Pre-determined Rate: $\frac{\text{Budgeted Overhead}}{\text{Budgeted Base}}$

- **Over absorption:** Absorbed $>$ Actual
- **Under absorption:** Absorbed $<$ Actual

Illustration 2: Over/Under Absorption

Budget for 2018-19:

- Normal working week: 42 hours
- Machines: 15
- Maintenance: 5 hrs/machine/week
- Working weeks: 50
- Annual overhead: Rs 5,55,000

Actuals (4-week period):

- Overhead incurred: Rs 49,000
- Machine hours: 2400

(a) Overhead Rate per Machine Hour

Effective machine hours:

$$50 \times 42 \times 15 - (5 \times 15 \times 50) = 31500 - 3750 = 27750$$

$$\text{Rate} = \frac{555000}{27750} = \text{Rs } 20 \text{ per machine hour}$$

(b) Over/Under Absorption

Absorbed overhead:

$$20 \times 2400 = 48000$$

Under absorption:

$$49000 - 48000 = \text{Rs } 1000$$

Treatment of Over/Under Absorption

- Carry forward to next year.
- Charge to costing profit & loss account.
- Use supplementary rate: $\frac{\text{Under absorption}}{\text{Actual activity level}}$