COST FORMULA BOOK

For CA IPCC/INTER

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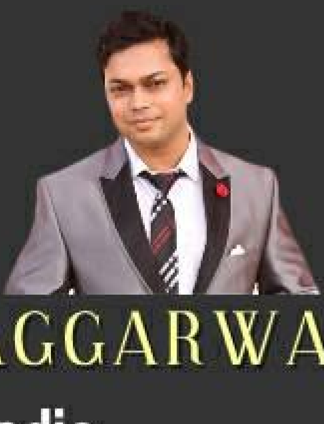

CA PURUSHOTTAM AGGARWAL

110+ Centre All Over India

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Formulas of Costing

Material

Maximum Stock Level= Re-order level + Re-order quantity – (Minimum consumption × Minimum re-order period)

Minimum Stock Level= Re-order level – (Average lead time × Average consumption)

Average Stock Level = $\frac{Maximum\ Stock\ Level + Minimum\ Stock\ Level}{2}$

Or,

Minimum Stock Level + ½ Re-order Quantity

Re-order Level = Maximum Re-order period × Maximum consumption

Or

(Normal Usage × Average Delivery Time) + Minimum Stock Level

Or

Safety Stock + Lead Time Consumption

Danger Level = Minimum Consumption × Emergency Delivery Time

(EOQ) Economic Order Quantity = $\sqrt{\frac{2 \times Annual\ Consumption \times Cost\ of\ placing\ an\ order}{Cost\ of\ carrying\ per\ unit\ per\ annum}}$

Inventory Turnover Ratio = $\frac{Material\ Consumed}{Average\ Inventory}$

Inventory Turnover Period = 365 ÷ Inventory Turnover Ratio

Safety Stock = $\frac{Annual\ Demand}{365}$ × (Maximum lead time – Average lead time)

Total Inventory Cost= Ordering Cost + Carrying Cost + Purchase Cost

Ordering Cost = $\frac{Annual\ consumption \times Cost\ of\ placing\ an\ order}{Quantity\ Ordered}$

Carrying Cost = $\frac{Quantity\ ordered}{2}$ × Price per unit × Carrying Cost expressed as % of average inventory

Note: For calculation of total inventory carrying cost, average inventory should be taken as half of EOQ. Average inventory cost is normally given as a percentage of cost per unit.

Note: To decide whether discount on purchase of material should be availed or not, compare total inventory cost before discount and after discount. Total inventory cost will include ordering cost, carrying cost and purchase cost.

Labour

Time Rate System:- Earnings = Hours worked × Rate per hour

Straight Piece Rate System:- Earnings = Number of units × Piece rate per unit

Merrick Differential Piece Rate System:-

Efficiency	***Payment***
Up to 83 %	Ordinary piece rate
83% to 100%	110% of ordinary piece rate (10% above the ordinary piece rate)
Above 100%	120% or 130% of ordinary piece rate (20% to 30% above ordinary piece rate)

Combination of Time and Piece Rate

Gantt Task And Bonus System

Output	***Payment***
Output below standard	Guaranteed time rate
Output at standard	120% of time rate
Output above standard	120% of piece rate

Emerson Efficiency System
Earning is calculated as follows :

Efficiency	***Payment***
Below 66-2/3%	No bonus, only guaranteed time rate is paid.
66-2/3% to 100%	Worker is paid by hourly rate for the time he actually worked plus in increase in bonus according to degree of efficiency on the basis of

	step bonus rates. Bonus rate can be up to 20%.
Above 100%	120% of time wage rate plus additional bonus of 1% for each of 1% increase in efficiency.

Bedeaux Point System

Earning= Hours Worked X Rate per hour + ($\frac{75}{100}$ X $\frac{\text{Bedeaux Points saved}}{60}$ X Rate per hour)

Haynes Manit System

This system is similar to Bedeaux Point system. Instead of Bedeaux points saved, 'MANIT'(Man-minutes) saved are measured for payment of bonus. Bonus is distributed as follows :

- 50% bonus to the workers
- 10% bonus to the supervisors
- 40% bonus to the employer

Accelerated Premium System

In this system individual employer makes his own formula. The following formula may be used for a general idea of the scheme:

$$y = 0.8 \times x^2$$

Where y = wages
x = efficiency

Premium Bonus Plan

Halsey Premium Plan

Earnings = Hours worked × Rate per hour +($\frac{50}{100}$ X Time Saved X Rate per Hour)

Halsey-Weir Premium Plan

Earnings = Hours worked × Rate per hour + ($\frac{30}{100}$ X Time Saved X Rate per Hour)

Rowan System

Earnings = Hours worked × Rate per hour +($\frac{Time\ Saved}{Time\ allowed}$ X Hours Worked X Rate per hour)

Labour Turnover Rate

Separation Method

$$\text{Separation Method} = \frac{Number\ of\ separations\ during\ the\ period}{Average\ number\ of\ Workers\ on\ Roll} \text{ X } 100$$

Replacement Method

$$\text{Replacement Method} = \frac{Number\ of\ workers\ replaced\ in\ a\ period}{Average\ number\ of\ Workers\ on\ roll} \text{ X } 100$$

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Flux Method

$$\text{Flux Method} = \frac{No.of\ separations + No.of\ replacements}{Average\ number\ of\ Workers\ on\ roll} \text{ X } 100$$

OR

$$= \frac{No.of\ separations + No.of\ replacements + No.of\ New\ Recruitments}{Average\ number\ of\ Workers\ on\ roll} \text{ X}100$$

Overhead

Overhead Recovery Rate or Overhead Absorption Rate

$$\text{Overhead Absorption Rate} = \frac{Amount\ of\ overhead\ incurred}{Basis\ for\ Absorption}$$

Predetermined Overhead Rate

$$\text{Predetermined Overhead Rate} = \frac{Budgeted\ overhead\ for\ the\ period}{Budgeted\ basis\ for\ the\ Period}$$

Blanket Overhead Rate

$$\text{Blanket Overhead Rate} = \frac{Overhead\ cost\ for\ the\ entire\ factory\ for\ the\ period}{Base\ for\ the\ period\ (\ total\ labour\ hours, total\ machine\ hours, etc)}$$

Multiple Overhead Rate

$$\text{Multiple Overhead Rate} = \frac{Overheads\ allocated\ /\ apportioned\ to\ each\ Deptt.}{Corresponding\ base}$$

Variable Overhead in Semi-Variable Overhead

$$\text{Variable Overhead Rate} = \frac{Change\ in\ amount\ of\ expense}{Change\ in\ Activity\ Level\ or\ Quantity}$$

Non Integrated Accounts

RECONCILIATION STATEMENT

(When Profit as per Cost Accounts is taken as a starting point)

Format of Reconciliation Statement

Particulars	(`)	(`)
A. Profit as per Cost Accounts		…….

B. Add. Items having the effect of higher profit in financial accounts:		
(a) Over-absorption of Factory Overhead/ Office & Adm. Overheads / Selling & Distribution Overheads in Cost Accounts	……..	
(b) Over-valuation of Opening Stock of Raw Material / Work-in-progress / Finished goods in Cost Accounts	……..	
(c) Under-valuation of Closing Stock of Raw Material / Work-in-progress / Finished Goods in Cost Accounts	……..	
(d) Income excluded from Cost Accounts : (e.g.) Interest & Dividend on Investments Rent received Transfer Fees received etc	…….. …….. ……..	……..
C. Less: Items having the effect of lower profit in financial accounts:		
(a) Under-absorption of Factory Overheads/ Office & Adm. Overheads / Selling & Distribution Overheads in Cost Accounts	……..	
(b) Under-valuation of Opening Stock of Raw Material / Work-in-progress/ Finished goods in Cost Accounts	……..	
(c) Over-valuation of Closing Stock of Raw Material / Work-in-progress / Finished Goods in Cost Accounts	……..	
(d) Expenses excluded from Cost Accounts : (e.g.) Bad Debts written off Preliminary Expenses/ Discount on Issue/ Write-off Legal Charges	…….. …….. ……..	(……..)
D. Profit as per Financial Accounts (A + B – C)		……..
Note: In case of 'Loss', the amount shall appear as a minus item.		

Note: When profit as per Cost account is calculated from profit as per financial accounts, then items which are added above will be deducted and vice-versa.

Journal Entries under Non-integrated Accounting System

Material Purchased and Material Issued:-

At the time of purchase

Dr. Stores Ledger Control A/c xxxx
Cr. Cost Ledger Control A/c xxxx

If purchased on special requirement for a job

Dr. Work-in-Progress Control A/c xxxx

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Cr. Cost Ledger Control A/c xxxx

When Materials returned to vendor (Return outwards)

Dr. Cost Ledger Control A/c xxxx
Cr. Store Ledger Control A/c xxxx

When direct material issued to production

Dr. Work-in-Progress Control A/c xxxx
Cr. Store Ledger Control A/c xxxx

When indirect material issued to production

Dr. Production Overhead Control A/c xxxx
Cr. Store Ledger Control A/c xxxx

When Materials returned to Store (Return inwards)

Dr. Store Ledger Control A/c xxxx
Cr. Work-in-Progress Control A/c xxxx

Wages Paid

When wages paid to workers

Dr. Wages Control A/c xxxx
Cr. Cost Ledger Control A/c xxxx

When wages (for direct labour) charged to the production

Dr. Work-in-Progress Control A/c xxxx
Cr. Wages Control A/c xxxx

When wages (for indirect labour) charged to the production

Dr. Production Overhead Control A/c xxxx
Cr. Wages Control A/c xxxx

Production Overheads

When production overheads incurred

Dr. Production Overhead Control A/c xxxx
Cr. Cost Ledger Control A/c xxxx

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When production overheads recovered (absorbed)

Dr. Work-in-Progress Control A/c xxxx
Cr. Production Overhead Control A/c xxxx

Administrative Overheads

When administration overheads incurred

Dr. Administrative Overhead Control A/c xxxx
Cr. Cost Ledger Control A/c xxxx

When administration overheads recovered (absorbed)

Dr. Finished Goods Ledger Control A/c xxxx
Cr. Administration Overhead Control A/c xxxx

Selling and Distribution Overheads

When selling and distribution overheads incurred

Dr. Selling and Distribution Overhead Control A/c xxxx
Cr. Cost Ledger Control A/c xxxx

When selling and distribution overheads recovered (absorbed)

Dr. Cost of Sales A/c xxxx
Cr. Selling and Distribution Overhead Control A/c xxxx

Transfer of under/ over absorbed Overheads

In case of over absorption of overheads

Dr. Production/Administration/Selling & Distribution Overhead Control A/c xxxx
Cr. Cost Ledger Control A/c xxxx

In case of under absorption of overheads

Dr. Cost Ledger Control A/c xxxx
Cr. Production/ Administration/ Selling & Distribution Overhead Control A/c xxxx

Sales

Dr. Cost Ledger Control A/c xxxx
Cr. Costing Profit & Loss A/c xxxx

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<u>Profit/ Loss</u>

In case of Profit

Dr. Costing Profit & Loss A/c xxxx
Cr. Cost Ledger Control A/c xxxx

In case of Loss

Dr. Cost Ledger Control A/c xxxx
Cr. Costing Profit & Loss A/c xxxx

Job Costing & Batch Costing

$$\text{E.B.Q} = \sqrt{\frac{2 \times \text{Annual Demand} \times \text{Setting} - \text{upCost per batch}}{\text{Cost of carrying per unit of production per annum}}}$$

Contract Costing

Value of work certified = Value of Contract × Percentage of work certified.

Cost of work certified =
Cost of work to date - (Cost of work uncertified + Materials at site + Plant at site)

Cost of work uncertified = Cost of work to date – Cost of work certified

Estimated Profit = Value of Contract – Total estimated cost of contract completion.

Percentage of work completed = Value of Work Certified $\times 100 \div$ Contract Value

<u>Profits on Incomplete Contracts</u>

When work on contract has not reasonably advanced =
No profit is calculated when work certified is less than 25% of the value of the contract.
No Profit is taken

When work certified is 25% or more but less than 50% of the contract price =

<u>1</u> X Notional Profit X <u>Cash Received</u>

3 Work Certified

When work certified is 50% or more but less than90% of the contract price=

$$\frac{2}{3} \times \text{Notional Profit} \times \frac{\text{Cash Received}}{\text{Work Certified}}$$

When the contract is almost complete i.e. 90% or more of the contract price.

An estimated total profit is determined by deducting aggregate of cost to date and estimated additional expenditure from contract price. A portion of this estimated total profit is credited to profit and loss account. The figure to be credited to profit and loss account is ascertained by adopting any of the following formulae:

$$\text{Estimated Total Profit} \times \frac{\text{Work Certified}}{\text{Contract Price}}$$

Or, $$\text{Estimated Total Profit} \times \frac{\text{Cash Received}}{\text{Contract Price}}$$

Or, $$\text{Estimated Total Profit} \times \frac{\text{Cost of Work to date}}{\text{Estimated Total cost}}$$

Or, $$\text{Estimated Total Profit} \times \frac{\text{Cost of Work to date}}{\text{Estimated Total cost}} \times \frac{\text{Cash Received}}{\text{Work Certified}}$$

Joint Products & By-Products

Methods of Apportioning joint costs over Joint Products

Physical Unit Method

Joint Costs are apportioned on the basis of some physical base, such as weight or measure expressed in gallon, tonnes, etc.

Average unit cost method

Under this method process cost (upto the point of separation) is divided by total units of joint products produced.

Survey Method

It is based on the technical survey of all factors involved in the production and distribution of products. Under this method joint costs are apportioned over the joint products on the basis of percentage/ point value assigned to the products according to their relative importance.

Contribution Margin Method

According to this method, joint costs are segregated into two parts-variable and fixed. The variable costs are apportioned over the joint products on the basis of units produced (average method) or physical quantities. In case the products are further processed after the point of separation, then all variable cost incurred be added to the variable costs determined earlier. In this way total variable cost is arrived which is deducted from their respective sales values to ascertain their contribution. The fixed costs are then apportioned over the joint products on the basis of the contribution ratios.

Market Value Method
Under this method joint costs upto the point of separation is apportioned on the basis of market value of the joint products at the point of separation.

Methods of Apportioning joint costs over By- Products

Market Value or realization value method
The realisation on the disposal of the by-product may be deducted from the total cost of production so as to arrive at the cost of the main product.

Standard Cost in technical estimates
The standard may be determined by averaging costs recorded in the past and making technical estimates of the number of units of original raw material going into the main product and the number forming the by-product or by adopting some other consistent basis. This method may be adopted where the by-product is not saleable in the condition in which it emerges or comparative prices of similar products are not available.

Comparative price Method
Value of the by-product is ascertained with reference to the price of a similar or an alternative material.

Re-use basis
The value put on the by-product should be same as that of the materials introduced into the process.

Standard Costing

Sales Variances (Turnover or Value)

Sales Variance
(Actual Sales) *Less* (Budgeted Sales)
[(AP × AQ) – (BP × BQ)]

Sales Price Variance	**Sales Volume Variance**
(Actual Sales) *Less* (Standard Sales)	(Standard Sales) *Less* (Budgeted Sales)
[(AP × AQ) – (BP × AQ)] *Or* [AQ × (AP – BP)]	[(BP × AQ) – (BP × BQ)] *Or* [BP × (AQ – BQ)]

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Sales Mix Variance	Sales Quantity Variance
(Standard Sales)	(Revised Standard Sales)
Less	*Less*
(Revised Standard Sales)	(Budgeted Sales)
[(BP × AQ) – (BP × RSQ)]	[(BP × RSQ) – (BP × BQ)]
Or	Or
[BP × (AQ – RSQ)]	[BP × (RSQ – BQ)]
Alternative Formula	***Alternative Formula***
[Total Actual Quantity (units) × {*Average*	[*Average* Budgeted Price *per unit* of

Marginal Costing

P/V ratio = $\frac{Sales - Variable\ Cost}{Sales} = \frac{Contribution}{Sales} = \frac{Fixed\ Cost + Profit}{Sales}$

Break-Even Point Sales X P/V ratio = Fixed Cost (Profit is zero at BEP)

Contribution = Sales X P/V ratio

P/V ratio = $\frac{Change\ in\ Profit}{Change\ in\ Sales} = \frac{Change\ in\ Contribution}{Change\ in\ Sales} = \frac{Fixed\ Cost}{BEP\ Sales}$

BEP Sales (₹) = $\frac{Fixed\ Cost}{Profit - Volume\ Ratio}$

BEP Sales (Units) = $\frac{Fixed\ Cost}{Contribution\ per\ unit}$

(Break-even Sales + Margin of Safety Sales) X P/V Ratio = Contribution

Total Sales = Brea-even Sales + Margin of Safety Sales

Margin of Safety Sales X P/V ratio = Profit

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Margin of Safety Ratio = $\frac{Margin\ of\ Safety\ Sales}{Total\ Sales}$

Cash BEP = $\frac{Cash\ Fixed\ Cost}{Contribution\ per\ unit}$

Profit = Sales – Variable Cost – Fixed Cost

Contribution = Sales – Variable Cost = Fixed Cost + Profit = Fixed Cost –Loss

Marginal Costing Equation

	BEP SALES	XXX
+	MOS SALES	XXX
	TOTAL SALES	**XXX**
-	VARIABLE COST	(XXX)
	CONTRIBUTION	**XXX**
-	FIXED COST	(XXX)
	PROFIT	**XXX**

Calculation of BEP Sales

1. In Rupees = $\frac{\text{FIXED COST}}{\text{PROFIT VOLUME RATIO}}$
2. In Units = $\frac{\text{FIXED COST}}{CONTRIBUTION\ PER\ UNIT}$

Calculation of MOS Sales

1. In Rupees = $\frac{PROFIT}{PROFIT\ \ VOLUME\ \ RATIO}$
2. In Units = $\frac{\text{PROFIT}}{\text{CONTRIBUTION PER UNIT}}$

Calculation of Total Sale

1. Total Sale s = BEP Sales + MOS Sales

Calculation of Variable Cost per unit

1. Variable Cost per unit = $\frac{\text{TOTAL VARIABLE COST}}{\text{TOTAL PRODUCED UNITS}}$
2. Variable Cost per unit = $\frac{\text{CHANGE IN TOTAL COST}}{\text{CHANGE IN TOTAL PRODUCED UNITS}}$

Calculation of Contribution

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1. Contribution = Total Sales X P/V Ratio
2. Contribution = Total Sales – Total Variable Cost
3. Contribution = Fixed Cost + Profit
4. Contribution = Fixed Cost – Loss

Calculation of Fixed cost

1. Fixed Cost = BEP Sales X P/v Ratio
2. Fixed Cost = Contribution – Profit
3. Fixed Cost = Contribution + Loss

Calculation of Profit

1. Profit = MOS Sales X P/v Ratio

Equation No. 2

	BEP Sales (In % to Total Sales)	XXX
+	MOS Sales (In % to Total Sales)	XXX
	Total Sales	100%

MOS Ratio = $\frac{\text{MOS SALES}}{\text{TOTAL SALES}}$ X 100