

CHAPTER -2 MATERIAL COSTEconomic Order Quantity

$$EOQ = \sqrt{\frac{2AO}{C}}$$

Where, A → Annual Requirement

O → Ordering cost per order

C → Carrying cost per unit per annum [ccpupa]

And,

$$\text{No. of orders to be placed for the year} = \frac{\text{Annual Requirement of Mat.}}{EOQ}$$

Quantitative Levels

ROL

$$\text{Reorder level} = \text{Maximum consumption} \times \text{Maximum lead time}$$

OR

$$\text{Reorder level} = \text{Minimum stock level} + \left[\text{Average Rate of Consumption} \times \text{Average Reorder period} \right]$$

★

[Safety stock]

lead time

ROQ

$$\text{Reorder Quantity} = \sqrt{\frac{2AO}{C}}$$

MinSL

$$\text{Minimum Stock level} = \text{Reorder stock level} - \left[\text{Average Rate of Consumption} \times \text{Average lead time} \right]$$

Safety stock

MaxSL

$$\text{Maximum Stock level} = \text{Reorder stock level} + \text{Reorder quantity} - \left[\text{Minimum Rate of Consumption} \times \text{Minimum lead time} \right]$$

ASL

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

OR

$$\text{Average Stock level} = \text{Minimum Stock level} + \frac{1}{2} \text{Reorder quantity}$$

DL

$$\text{Danger level} = \text{Average Consumption} \times \text{lead time for emergency purchases.}$$

Safety stocks

$$\text{Safety stock} = \frac{\text{Annual Demand}}{360 \text{ days}} \times \left[\begin{array}{l} \text{Max. lead time} \\ \text{or Avg. lead time} \end{array} \right]$$

Total cost calculation under EOQ

$$\text{Purchase cost} \rightarrow [\text{Annual req.} \times \text{cost per unit}]$$

$$\text{Ordering cost} \rightarrow [\text{cost per order per annum} \times \text{Annual req.} / \text{EOQ}]$$

$$\text{Carrying cost} \rightarrow \left[\frac{1}{2} \times \text{EOQ} \times \text{carrying cost per unit per annum} \right]$$

Total cost calculation under Safety Stock

$$\text{Purchase cost} \rightarrow [\text{Annual demand} \times \text{cost per unit}]$$

$$\text{Ordering cost} \rightarrow [\text{Annual demand} / \text{EOQ} \times \text{cost per order}]$$

$$\text{Carrying cost} \rightarrow \left[\text{Safety stock} + \frac{1}{2} \text{EOQ} \right] \times [\text{carrying cost per unit per annum}]$$

Inventory Turnover Ratio

$$\text{ITR} = \frac{\text{Cost of stock of Raw Materials Consumed}}{\text{Average stock of Raw Materials}}$$

No. of days for which the average inventory is held

$$= \frac{365 \text{ days}}{\text{ITR}}$$

FIFO Method

Returned from department $\rightarrow$ in Balance column

[given priority]

Treated as earlier lot [written first]

[Refer Q.No. 6, Page 2-74]

CHAPTER - 3 EMPLOYEE COST

Wage payment system

1) Time Based System

$$\text{Wages} = \text{Time Worked} \times \text{Rate per hour}$$

2) Output Based System

$$\text{Wages} = \text{No. of units produced} \times \text{Rate per unit}$$

3) Premium Bonus Method

i) Halsey plan

$$\text{Earnings} = [\text{Time taken} \times \text{Rate p.h.}] + [50\% \times \text{Time saved} \times \text{Rate p.h.}]$$

ii) Rowan plan

$$\text{Earnings} = [\text{Time taken} \times \text{Rate p.h.}] + \left[\frac{\text{Actual time} \times \text{Time saved} \times \text{Rate p.h.}}{\text{Std. time}} \right]$$

Under Rowan plan:

- The entire gains due to time saved by a worker, will not pass to him.
- A worker cannot increase his earnings or bonus by merely increasing its work speed.

$$\text{* Effective Hourly earnings} = \frac{\text{Total wages}}{\text{Working hours}}$$

While calculating employee's earnings,

Employer's contribution to PF and ESI are deducted from Gross income to calculate Net income.
[Basic + DA]

While calculating employee's cost,

Employer's contribution to PF and ESI are added to the cost.
Wages and Total wages earned is calculated.
[Gross]

Employee Turnover

- 1) Replacement Method = $\frac{\text{No. of employees replaced}}{\text{Avg. no. of employees during the period}} \times 100$
- 2) Separation Method = $\frac{\text{No. of employees separated during the period}}{\text{Avg. no. of employees during the period}} \times 100$
- 3) New Recruitment = $\frac{\text{No. of new employees joining [excluding replacements]}}{\text{Avg. no. of employees during the period}} \times 100$
- 4) Flux Method = $\frac{[\text{No. of separation} + \text{No. of Replacements} + \text{No. of new joinings}]}{\text{Avg. no. of employees during the period}} \times 100$
- 5) Including accessions = $\frac{\text{No. of separations} + \text{No. of accessions}}{\text{Avg. no. of employees during the period}} \times 100$

Savings in labour cost per unit

Actual cost	xx
(-) Labour cost p.u. [Earnings/Total production]	xx
Savings in labour cost p.u. →	xx

*

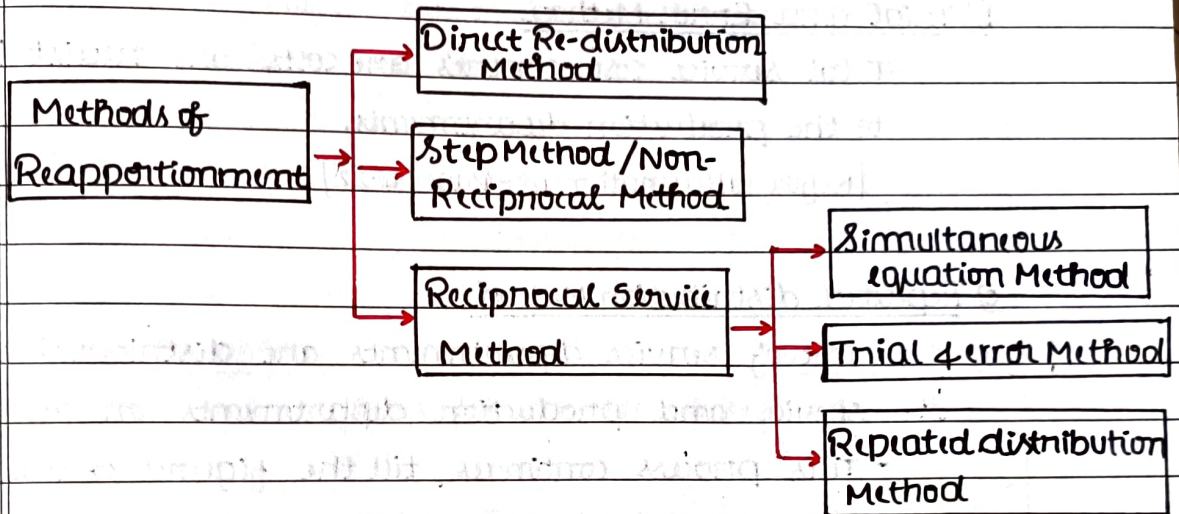
Overtime premium

- Overtime worked regularly due to worker's shortage
 $[\text{Total hours} \times \text{inflated wage rate}] \rightarrow \text{Employee cost}$
- Overtime worked irregularly to meet production requirements
 Basic wage rate - charged to Job as **Employee cost**.
 Overtime prem. - charged as **Factory overhead**.
- Overtime worked on customer's request / urgency of work

Basic wage rate	} Charged to Job as overtime premium under Employee cost .
Overtime prem.	

CHAPTER - 4 OVERHEADS

Reapportionment of Service Department's overheads over Production Departments - Refer ICAT Page 4-15.



Direct Re-Distribution Method

- Service department's costs are apportioned only over the production departments.
- Ignores service rendered by one service dept. to other.

Step Method / Non-Reciprocal Method

- Assumes that, some of the service dept. give/provide its services to other service departments also, along with production departments.
- the sequence of reapportionment begins with the dept. that gives maximum services to other departments.

Reciprocal service Method

- Inter-departmental services are to be given due weight while re-distributing the expenses of the service departments.

a) Simultaneous equation Method

Firstly - Costs of service departments are ascertained.
These costs are reapportioned on basis of given percentages.

b) Trial and Error Method

- Total service cost centre's ~~are~~ costs are redistributed to the production departments.

[Refer Illustration 4 - Page 4-22]

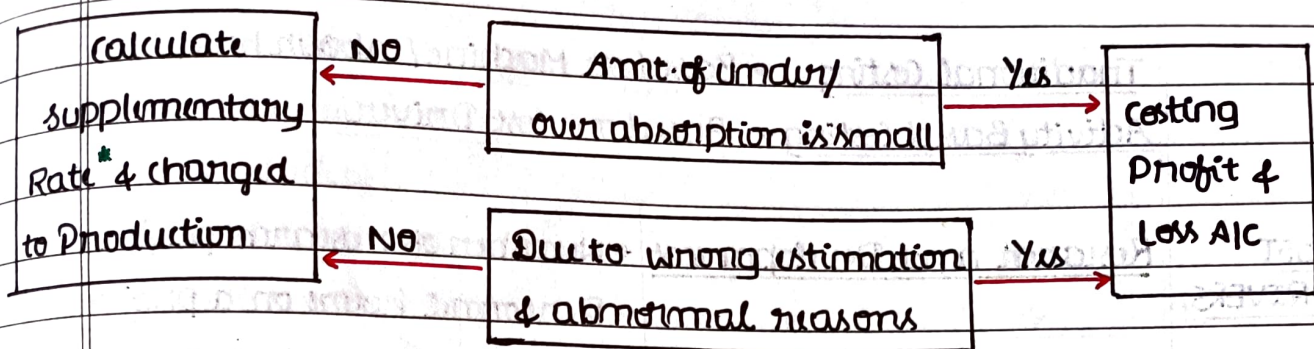
c) Repeated distribution Method

- Cost of service departments are distributed to other service and production departments on agreed %.
- This process continues, till the figures of the service departments become negligible or exhausted.

Types of overhead Rates

1. Normal Rate / = $\frac{\text{Actual amount of overheads}}{\text{Actual base}}$
2. Pre-Determined Rate = $\frac{\text{Budgeted year amount of overheads}}{\text{Budgeted Base}}$
3. Blanket Rate = $\frac{\text{Total Overheads for the factory}}{\text{Total no. of units of base for the factory}}$
4. Departmental OH Rate = $\frac{\text{Overheads of Depts. or cost centre}}{\text{Corresponding base.}}$

Treatment of Under/over absorption



* Supplementary Rate = $\frac{\text{Under/Overabsorbed OH}}{\text{Units produced}}$

<u>Under Absorption</u>	<u>Accounts</u>	<u>Over Absorption</u>
Debit	Stock of Finished Goods A/c	Credit
Debit	WIP A/c [Semi finished]	Credit
Debit	Cost of Sales A/c	Credit

Normal Capacity

installed capacity	xx
time lost due to scheduled preventive or planned maintenance	xx
No. of shifts or machine hrs or man hours	xx
Holidays, normal shut down days, normal idle time	xx
Normal time lost in batch changeover	xx
Normal capacity	xx

* Normal available hours	xx
(-) Absenteeism hours	xx
Paid hours	xx
(-) Leave hours	xx
(-) Idle time hours	xx
Effective working hours	xx

CHAPTER - 5 ACTIVITY BASED COSTING

Traditional Costing → Based on Machine/labour hrs, Volume etc.

Activity Based Costing → Based on Cost Driver

COST DRIVERS

Research and Development

- Number of research projects
- Personnel hours on a project

Design of products, services and procedures

- Number of products in design
- Number of parts per product
- Number of engineering hours

Customer service

- Number of service calls
- Number of products serviced
- Hours spent on servicing products

Marketing

- Number of advertisements
- Number of sales personnel
- Sales revenue

Distribution

- Number of units distributed.
- Number of customers.

To calculate ABC Rate,

FORMAT

<u>Activity</u>	<u>Cost (₹)</u>	<u>No. of activity drivers</u>	<u>ABC Rate</u> *
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*
$$\text{ABC Rate} = \frac{\text{Cost}}{\text{No. of activity drivers}}$$

CHAPTER -6 COST SHEET

Specimen Format of Cost Sheet

Direct Material consumed

Op. Stock of RM	xx	
(+) Additions / purchases	xx	
(-) Cl. Stock of RM	xx	xx
Direct labour cost (Wages)		xx
Direct expenses		xx
Prime cost		xx
(+) Factory overheads		xx
Gross works cost		xx
(+) Op. WIP	xx	
(-) Cl. WIP	xx	xx
Works / Factory cost		xx
(+) Quality Control cost	xx	
(+) Research and Development cost	xx	
(+) Administrative overheads [production related]	xx	
(+) Packing cost [primary]	xx	
(-) Credit for Recoveries / Scrap / By-products / Miscellaneous income	xx	xx
Cost of production		xx
(+) Op. Stock of Finished Goods	xx	
(-) Cl. Stock of Finished Goods	xx	xx
Cost of Goods Sold		xx
(+) Administrative overheads [general]	xx	
(+) Selling and Distribution Overheads	xx	xx
Cost of Sales		xx
(+) Profit		xx
Sale value		xx

* if Admin. OH relates to production → Add before COP [included in COP]
 if Admin. OH is general & office use → Add after COP [excluded in COP]

CHAPTER - 7

COST ACCOUNTING SYSTEM

Non-Integrated Accounting System

- Separate ledgers are maintained for both Cost & Financial Accounts.
- Also known as cost ledger accounting system.
- Reconciliation is necessary.

Integrated Accounting System

- Cost and Financial accounts are kept in same set of books.
- No need for Reconciliation.
- Based on concept of "centralisation of Accounting function".

Reconciliation of Cost and Financial Accounts

Profit as per Cost Accounts		xx
<u>Add:</u> incomes considered under FA, not considered under CA [purely Fin. income]	xx	
overabsorbed overheads in Cost Accounts	<u>xx</u>	xx
<u>Less:</u> expenses considered under FA, not considered under CA [purely Fin. expenses]	xx	
underabsorbed overheads in Cost Accounts	<u>xx</u>	<u>xx</u>
Profit as per Financial Accounts		<u>xx</u>

Further, Reason for difference can also be,

- item included in Cost Accounts only [Notional expenses]
- items whose treatment is different in two sets of accounts.
- Varying basis of valuation.

CHAPTER - 8

UNIT 4 BATCH COSTING

Range Method - $VC \text{ per unit} = \frac{\text{Change in cost}}{\text{Change in output}}$

Normal loss - loss charged to entire output / borne by good units.

Abnormal loss - loss written off as loss in costing P&L A/c.

* Work Certified includes received and receivable amount.

When contract period is completed,

- Contractee A/c is debited to Contract A/c:

other years - Balance is c/f as WIP [By WIP c/d]

Contract which is near to complete has more reliable data.
[high accuracy]

Calculation of Escalation Amount

Materials $\rightarrow \text{std Qty} [\text{Actual Rate} - \text{std Rate}]$

Labour $\rightarrow \text{std hrs} [\text{Actual Rate} - \text{std Rate}]$

Economic Batch quantity

$$EBQ = \sqrt{\frac{2DS}{C}}$$

where, D = Annual demand for the product

s = Setting up cost per batch

c = Carrying cost per unit per annum

Number of optimum runs = $\frac{\text{Annual demand}}{EBQ}$

Interval between the runs = $\frac{365 \text{ days}}{\text{No. of runs}}$

* Minimum Inventory cost = Average inventory $\times$ Inventory cost
Carrying cost per unit per annum.

CHAPTER-9

JOB 4 CONTRACT COSTING

Parties to a contract

- 1) Contractee - owner of the project.
- 2) Contractor - person undertaking the project for payment.
- 3) Architect - person who certifies the work of a contractor.

Work certified → It is the work completed by the contractor and certified by architect for payment.

- Always shown as sales price [includes profit]

Work uncertified → Work completed, but not certified.

- pending to be certified.
- Always shown at cost.

Refer points mentioned in previous chapter.

Escalation clause

- covers only that part of increase in cost, caused by inflation.
- Do not cover increase in cost caused due to inefficiency or wrong estimation.

place where the production takes place in small area is shop floor.

CHAPTER-10

PROCESS & OPERATIONAL COSTING

- During the process, Balance transferred to Process A/c. ^(Next process)
- While the process is finished, Balance transferred to Finished Stock A/c.

Valuation of completed units and Abnormal loss
Cost of the process $\div$ income from Normal loss
input units $\times$ Normal loss units.

Valuation of completed units and Abnormal gain
Cost of the process $\div$ income from Normal loss
input units $\times$ Normal loss units.

In FIFO Method

- if there is opening stock $\rightarrow$ units and cost
- in step 1 $\rightarrow$ preparing statement of Eq. production,
in output column, write units of op. WIP and Material
introduced for completed units separately
 - in step 2 $\rightarrow$ calculating cost per Eq. units,
take only the current cost
& at last take the cl. WIP value and deduct the total from
cl. WIP value to obtain transferrable amount ^[to] of next process.
 - in step 3 $\rightarrow$ during cost apportionment,
for equivalent units, take the total of comp. eq. units.
cost

In Weighted Average Method

- if there is opening stock $\rightarrow$ units and cost
- in step 1 $\rightarrow$ preparing statement of Eq. production,
ignore and write the whole units & cost together.
 - in step 2 $\rightarrow$ calculating cost per Eq. units,
take total of op WIP cost and current cost.

CHAPTER -11 JOINT PRODUCTS AND BY PRODUCTS

Methods of Apportionment of Joint cost to Joint products

1) Physical units Method

Joint costs are apportioned on the basis of some physical base, such as weight, numbers etc.

2) Net Realisable value at split off point Method

	<u>Prod. A</u>	<u>Prod. B</u>
Sales value [units after processing x selling price]	xx	xx
(-) profit Margin	xx	xx
(-) Selling and Dist. costs	xx	xx
(-) post split off cost	<u>xx</u>	<u>xx</u>
Net Realisable value	<u>xx</u>	<u>xx</u>

3) Average Unit cost Method

$$AUC = \frac{\text{Total process cost [upto separation point]}}{\text{Total units of joint products produced}}$$

4) Contribution Margin Method

variable cost → apportioned on basis of units produced

Fixed cost → apportioned on basis of contribution ratios.

Methods of Apportionment of Joint cost to By-products

1) Net Realisable value Method

The realisation on disposal of the by-product may be deducted from the total cost of production to arrive at the cost of main product.

2) Standard cost in Technical Estimates Method

- By-products may be valued at standard costs.

- can be adopted, when by product is not in a salable condition or comparative prices of similar prod. are available.

Treatment of By product cost in Cost Accounting

1) When they are of small total value

- Sale value of By products may be credited to Costing P&L A/c.

OR - Sale proceeds of By products of By products may be treated as deductions from the total costs.

2) When they are of considerable total value

- May be regarded as joint products rather than by products.

OR - joint cost may be divided over joint products and by products.

3) When they require further processing

- NRV of the byproduct at split off point is arrived, by subtracting Further processing cost from Realisable value of By products.

CHAPTER-12 SERVICE COSTING

<u>Service industry</u>	<u>Unit of cost</u>
Transport services	Passenger km. [public transport] Ton-km / quint-km [goods carriage]
Electricity supply service	Kilowatt-hour [kwh]
Hospital	patient per day
Canteen	per item, per meal.
Cinema	per ticket
Hotels	Guest Days or Room Days
Bank & Financial institutions	per transaction, per service.
Educational institutions	per course, per student, per batch, per lecture etc.
IT & ITES	Cost per project, per module etc.
Insurance	per policy, per claim, per TPA.

Standing charges or Fixed costs

insurance	Garage cost [incl. rent]
license fees	Depreciation [exhaust of time]
Monthly { Salary to Driver, conductor	Taxes
Salary to cleaners	Administration expenses.

Variable costs or Running costs

Petrol, Lubricant oils
Diesel
Wages to Driver, conductor, cleaners etc [operation related]
Depreciation [related to activity]

Semi Variable or Maintenance costs

Repairs and Maintenance

Tyres

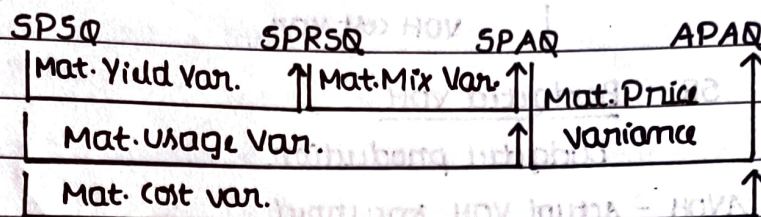
Spare

<u>Sales</u>
(-) Variable cost
<u>Contribution</u>
(-) Fixed cost
<u>Profit</u>

$$\text{Break even point} = \frac{\text{Fixed cost}}{\text{Contribution per unit}}$$

CHAPTER -13 STANDARD COSTING

Material Variance



SP - Std. price per unit of Raw Materials

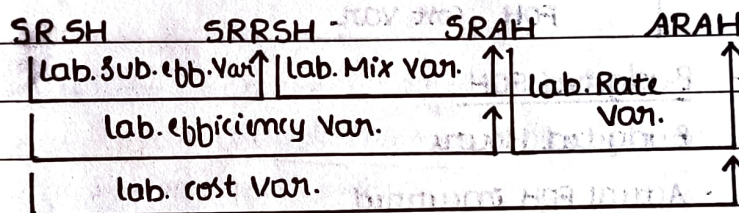
SQ - Std. qty required for Actual output

AP - Actual output per unit of Raw Materials

AQ - Actual qty. consumed

RSQ - Actual qty. in Std. Ratio.

laboun Variance



SR - Std. Rate per hour

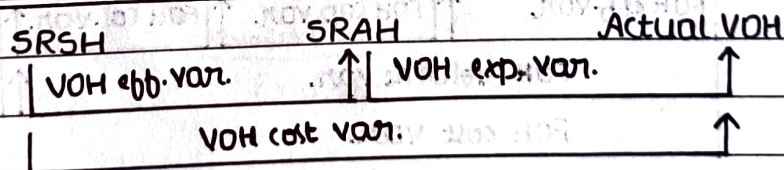
AR - Actual Rate per hour

AH - Actual hour worked

SH - Std. hour required for Actual output

RSH - Revised Std. hours

Variable overhead Variance - Hours Method



SR - Budgeted VOH

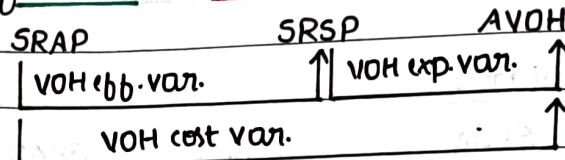
Budgeted hours

AVOH - Actual VOH incurred

SH - Std. hours required for Actual output.

AH - Actual hours worked.

Alternate formula - Production Method



SR - Budgeted VOH

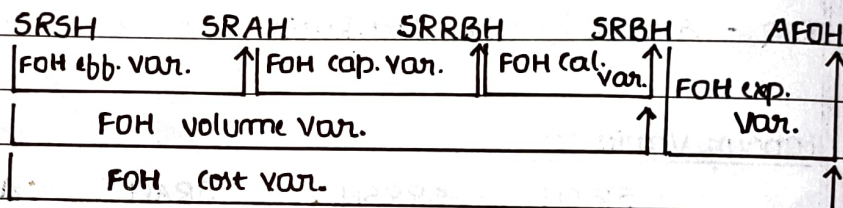
Budgeted production

AVOH - Actual VOH incurred

SP - Std. production in Actual hours.

AP - Actual production.

Fixed Overhead Variance - Hours Method



SR - Budgeted FOH

Budgeted Hours

AFOH - Actual FOH incurred

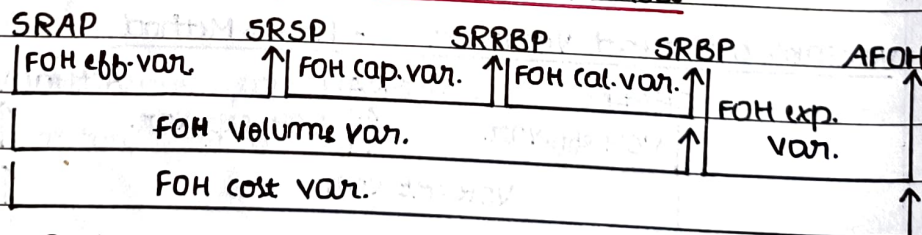
BH - Budgeted hours

RBH - Revised Bud. hours

AH - Actual hours worked

SH - Std. hours based on Actual output

Alternate Formula - Production Method



SR - Budgeted FOH

Budgeted production

AFOH - Actual FOH incurred

SP - Std. production possible in Actual hours.

AP - Actual production.

E	C	C	V	E	C
Efficiency	Capacity	Calendar	Volume	Expenditure	Cost

Marginal Costing

- ① Contribution Ratio (Profit - Volume Ratio)

$$CR = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

- ② Break-even point (in units)

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

$$\text{cash break-even quantity} = \frac{\text{FC - Depreciation}}{\text{contribution per unit}}$$

- ③ Break-even point (in value)

$$BEP = \frac{\text{Fixed Cost}}{\text{Profit-Volume Ratio}}$$

- ④ PV Ratio = $\frac{\text{Change in Profit}}{\text{Change in sales}} \times 100$

- ⑤ Desired sales to achieve target profit

$$= \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{Contribution per unit}} \quad \text{OR} \quad = \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{Profit-Volume Ratio}}$$

- ⑥ Margin of Safety

$$MOS = \text{Actual Sales} - \text{Break-even sales}$$

OR

$$MOS = \frac{\text{Profit}}{\text{P.V ratio}}$$

- ⑦ Shutdown level = $\frac{\text{Avoidable FC}}{\text{PV Ratio}} \left(\frac{\text{Total FC} - \text{Unavoidable FC}}{\text{PV Ratio}} \right)$

Budget

- 1) Efficiency Ratio = $\frac{\text{Standard Hours}}{\text{Actual Hours}} \times 100$
- 2) Activity Ratio = $\frac{\text{Standard Hours}}{\text{Budgeted Hours}} \times 100$
- 3) Calendar Ratio = $\frac{\text{Available working days}}{\text{Budgeted working days}} \times 100$
- 4) Standard Capacity Usage Ratio = $\frac{\text{Budgeted Hours}}{\text{Max. possible hours in the budgeted period}} \times 100$
- 5) Actual Capacity Usage Ratio = $\frac{\text{Actual Hours worked}}{\text{Max. possible working hours in a period}} \times 100$
- 6) Actual Usage of Budgeted Capacity Ratio = $\frac{\text{Actual working Hours}}{\text{Budgeted Hours}} \times 100$