SFOM - SCMPE Formulae

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Chp 2: Modern Business environment

(1) Cost of Quality = Cost of Good Quality (Cost of conformance) + Cost of Poor Quality (Cost of non conformance)

- Cost of conformance → Prevention costs, Appraisal cost
- Cost of non conformance → Internal Failure cost, External failure cost.

(2) Optimal COQ = Where combined cost of Good & Poor Quality is MINIMUM.

However, for non financial perspective, better option is where cost of poor quality is LOWEST.

(3) Customer Lifetime Value = PV of Inflow - PV of Outflow

- PV of Inflow → PV of expected income from customer during lifetime
- PV of Outflow → Offers, discounts, cost at beginning etc.

Chp 3: Lean System & Innovation

(1) Just in time (JIT)

Savings due to JIT
- Reduction in storage/ Holding cost
- Reduction in Insurance cost
- Reduction in Carrying cost

Costs incurred due to JIT
- Extra payment to supplier
- Overtime cost
- Ordering cost
- Stockout cost
- Contribution loss

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NOTE:

Holding / Insurance & Carrying cost is calculated on AVERAGE INVENTORY.

Average Inventory → JIT Purchase = $\frac{\text{Order Size / EOQ}}{2}$

→ JIT Production = $\frac{\text{Op. Stock} + \text{Cl. Stock}}{2}$

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

A = Annual Consumption of Raw Material
O = Ordering cost per order
C = Carrying cost p.u. p.a.

Incremental / Extra Overtime cost in case of JIT Production

If labour is paid on MINIMUM CONTRACTED HRS. → Overtime Wages + Premium को consider करो

Other cases → Consider Only Overtime Premium.

JIT Purchase question – Total Method से solve करने के लिए → Total cost under JIT (COMPARE) Total cost under current system

JIT Production question – Incremental Method से solve करना है → Extra cost due to JIT Prod. (–) Savings due to JIT Prod.

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(2) Manufacturing Cycle Time Efficiency

Calculation of MCE = $\frac{\text{Value Added Activities}}{\text{Total Cycle time}} \times 100$

↳ [VA Activities + NVA Activities]

Value Added = Processing time

Non Value Added = Wait time, Queue time, Inspection time, Storage time, Moving time etc.

(3) Takt time = 1 Product बनाने में Average time.

$= \frac{\text{Net time Available for Prod}^n}{\text{Total Qty. Produced}}$

↓

(Total time Available (−) Downtime)

↓

[Shutdown, Cleaning etc]

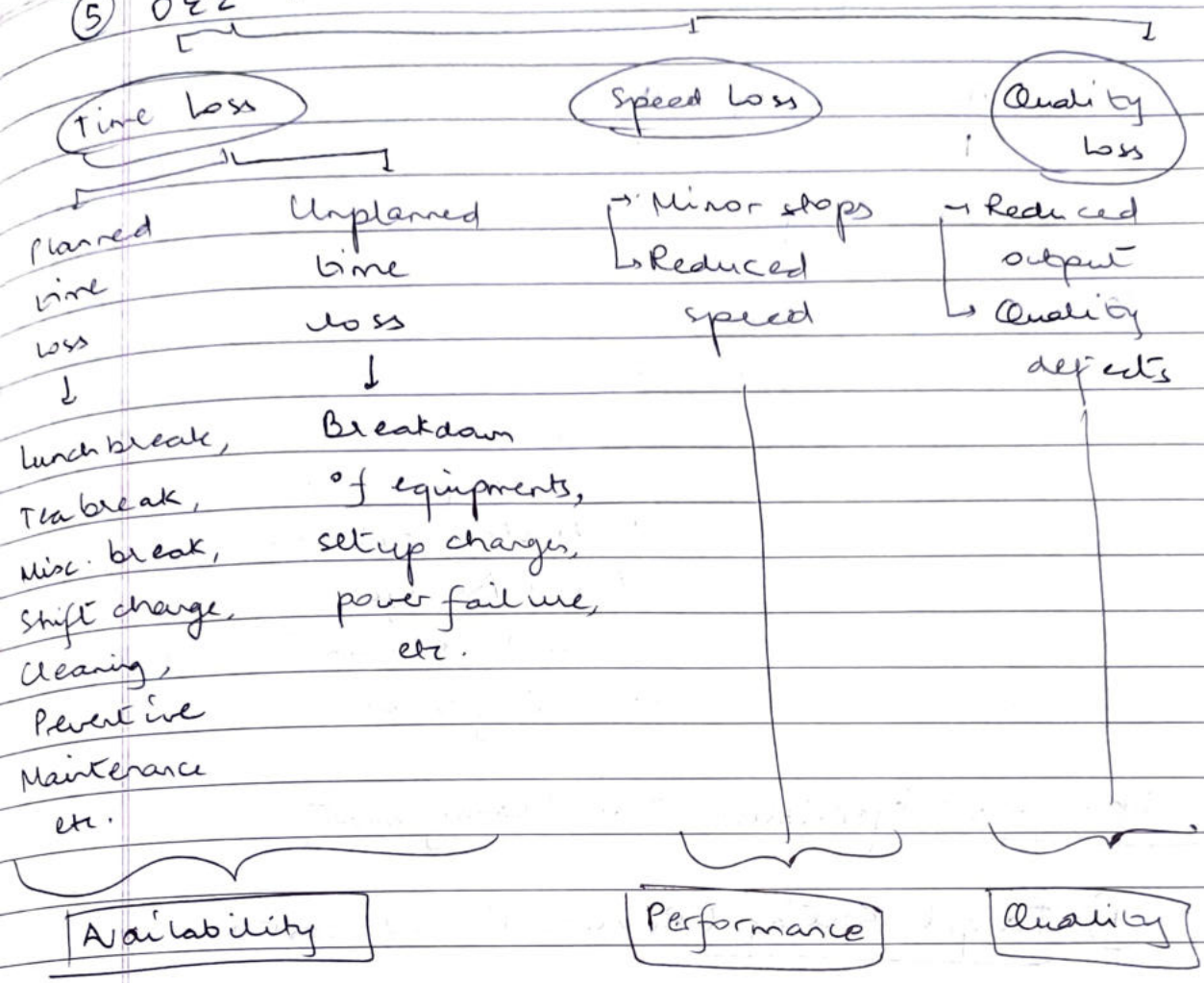
(4) Kanban System

Kanban Size = C × LT × L × SF

- C → Consumption Per day
- LT → Lead time
- L → Location of Kanban [2]
- SF → Smoothing Factor [1]

No of Kanban = $\frac{\text{Safety Stock + Consumption during lead period}}{\text{Kanban Size}}$

(5) OEE :



Calculation of OEE :

OEE = Availability × Performance × Quality

Availability = Actual time worked / Planned time available

Performance = Std. time for output produced / Actual time worked

Quality = Good units produced / Total units produced

Actual time worked = Total time available − Total time loss

Planned time available = Total time available − Planned time loss

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Note: If OEE is 85% or more ⇒ World class Performance

Availability > 90%.
Performance > 95%.
Quality > 99%.

⑥ Six Sigma Levels

	Quality / Profitability
1σ	loss
2σ	Non-competitive.
3σ	Industry Average
4σ	Above Average
5σ	Below Maximum Productivity
6σ	Near Perfection

Chp 4: ~~Cost~~ Specialist Cost Management

① Target Costing (Reduce Overall cost)

Traditional costing	Target costing
[Sellers' Market]	[Buyer's Market]
↓	↕
Product design	Target selling Price
↓	↓
Total Estimated Cost	Market/ Target selling Price
(+)	(−)
Desired Profit	Desired Profit
=	=
Selling Price	Target cost
	↓
	Product design.

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(2) Product life cycle Cost :

Particulars (Expected to be incurred)	(₹)
Research / Design / Development cost →	xx
Manufacturing cost	xx
Marketing cost	xx
Selling & Distribution cost	xx
End of Product cost	xx
Cost of machine	xx
(-) Salvage value	(xx)
	xx

Product life cycle Profit

Product life cycle Sales (Estimated)	xx
(-) Product life cycle cost	(xx)
	xx

Note: If PV given :-

	(₹)
Machine Acquisition cost	xx
(+) PV of Annual Operating cost	xx
(-) PV of Salvage Value	(xx)
	xx

(3) Throughput Accounting

(1) Throughput Contribution p.u.
= Sales - Direct Material cost

(A) [Assumption in Throughput A/c'ing is that direct material cost is the only VARIABLE cost rest all costs are fixed]

(2) Throughput Contributions per bottleneck resource

= Throughput Contribution p.u / Bottleneck Resource p.u.

[Allocate Rank to Product according to (2) & then produce the products as per Rank]

(*) [Highest Rank = High throughput contribution per bottleneck resource]

(3) Throughput A/c'ing Ratio:

Throughput Contribution per bottleneck resource / Factory cost per bottleneck resource

Factory cost per bottleneck resource = Total Factory Cost / Total bottleneck resource.

[Ratio → Greater than 1 = Product Profitable]

Chp 6: Strategic Revenue Management

(1)

Sales ~~Rate~~	
(-) Variable Cost	
Contribution	
(-) Fixed Cost	
Profit	

(2) Contribution = Sales - VC

(or)

= Fixed Cost + Profit

(3) PV Ratio = Contribution p.u / Sales p.u. × 100

(4) Breakeven ~~for~~ Point

In units = $\frac{\text{Fixed Cost}}{\text{Contribution p.u.}}$

In value = $\frac{\text{Fixed Cost}}{\text{P/V Ratio}}$ or Breakeven Point [units] × Selling Price p.u.

Activity Based Breakeven Point

$$\frac{\text{Fixed Cost (ABC)} + (\text{Setup cost} \times \text{No. of setups}) + (\text{Engg. cost} \times \text{No. of Engg. hrs})}{\text{Contribution p.u.}}$$

Fixed Cost (ABC) → Unanalyzed

(5) Margin of Safety

MOS (In Value) = Actual Sales − Breakeven Sales

MOS (In Units) = Actual Sales units − Breakeven Sales units

(6) Indifference Point = $\frac{\Delta \text{ in Fixed Cost}}{\Delta \text{ in Variable Cost}}$

IDP = Expected Prod^{n}	IDP < Expected Prod^{n}	IDP > Expected Prod^{n}
↓	↓	↓
Select ANY alternative	Select alternative with HIGH FIXED COST	Select alternative with LOW FIXED COST

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(7) Minimum Pricing Decision

(1) For Special Order / One time order job

Min Price to be charged
↓
Relevant cost

Evaluation of Special order
↓

Relevant Revenue	XX
(-) Relevant cost	(XX)
Net Benefit / (loss)	XX

(2) Relevant (RC) cost of Each Element of Cost

Material

Not in Stock
↓
RC = Purchase Price

In Stock

- **If Saleable Only** → ↓ → RC = NRV
- **If can be used / substitute** → ↓ → RC = NRV or Benefit from other use
- **Cost to be incurred on disposal** → ↓ → RC = Negative (Savings)

Labour

Temporary / Casual labour
↓
RC = Wages Payable

Permanent Labour

- **Surplus / Excess capacity** → RC = Nil
- **Shortage / No capacity** → RC = Wages + Opportunity cost

Overhead

Variable

RC = To be incurred in special order

Fixed

Allocated

Irrelevant

RC = Nil

Additional

Relevant

RC = To be incurred for special order.

(8) Sell / Further Process

Incremental Revenue from further processing	xx
(-) Total Further Processing cost [VC + FC]	(xx)
∴ Net Benefit	xx / (xx)
	Further Process / Split off पे Sale कर दो

(9) Special Priced Order Decision (SPO)

Revenue (From SPO)	xx
(-) variable cost (From SPO)	(xx)
(-) Addition cost (For SPO)	(xx)
(-) Opportunity cost of Regular Sale (Only if capacity is in constraint)	(xx)
∴ Net Benefit	xx / (xx)
	Accept SPO / Reject SPO

(10) Make / Buy decision

Making cost	(p.u)(₹)	Buying cost	(p.u)(₹)
Variable cost	xx	Purchase Price	xx
Special Fixed cost	xx	Any other cost	xx
Opportunity cost	xx		
	xx		xx

Whichever LOWER → Select

(11) Keep or Drop / Continue or Discontinue decision

Case I → Temporary discontinuance of business / product

Calculate Expected loss

If continued		If discontinued	
Sales	xx	Contribution	xx
(-) VC	(xx)	Fixed cost	
Contribution	xx	[Total FC - Avoidable FC]	xx
(-) FC	(xx)		
loss →	(xx)	Shutdown & Repair cost	xx
		∴ loss →	(xx)

Compare → Whichever LOWER → Select

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Case II → Discontinue of Product

Gain/Savings due to discontinuance		Loss due to discontinuance	
Specific/Avoidable FC	XX	Contribution loss	XX
Opportunity ~~cost~~ gain due to discontinuance	XX	Any other loss	XX
(A)	XX	(B)	XX

(A) - (B) ⇒ Positive = Discontinue
⇒ Negative = Continue

(12) Profit Maximization Model

(a) Marginal Revenue = Marginal cost

$P = a - bQ$.

(b) Marginal Revenue ⇒ $P = a - 2bQ$

P ⇒ Price

a ⇒ Selling Price where demand of qty = 0.

b ⇒ $\frac{\Delta \text{ in Price}}{\Delta \text{ in Quantity}}$

Q ⇒ Quantity demanded

First solve (a) & then solve (b)

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(13) Pricing under different Market structure

Perfect competition	Monopoly Market	Monopolistic Market	Oligopoly Market
↓	↓	↓	↓
Large no. of sellers selling same products	One supplier of homogeneous products & no substitute	Large no. of sellers selling similar but not identical products	Few firms selling same/ identical Product
↓	↓	↓	↓
Eg: Cement industry	Eg: Microsoft windows, Intel	Eg: Smartphone companies	Eg: Jio, Vi, Airtel
↓	↓	↓	↓
Sellers have to take the price determined by market	Seller can fix price at rate they want [Maximum price]	Lower price [A bit more than ~~Marginal~~ cost] [where MC & MR are maximum]	• Predatory Price • Raise price together

(14) Pricing of New Products

Revolutionary Product	Evolutionary Product	Me-too Product
↓	↓	↓
Premium Price	Price bit more than last version of the product	Similar to Revolutionary/ Evolutionary product
- New product for market - R&D costs are HIGH	- Upgraded version of a product Example: Smartphones version ~~Pixels~~	Price as per market

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Skimming Price ⇒ High Price initially
⇒ Premium product
⇒ Huge R&D cost incurred
⇒ Innovative product
⇒ Demand is inelastic
⇒ Price Market is not sensitive

Penetration Price ⇒ Low price initially
⇒ Economies of scale
⇒ Demand is elastic
⇒ Price Market is sensitive

(15) Pricing Methods of Existing Finished Products

- Competition Based (Perfect competition)
  - Going Rate Price
  - Sealed Bid Price
- Cost Based
  - Mark up Price
  - Target Rate ~~Price~~ of Return
- Value Based
  - True Economic value
  - Perceived value
- Psychological

(1) Mark up Price = Total Cost (VC + FC) + Desired Profit

(2) Target Rate of Return = Total Cost (VC + FC) + [Desired ~~Cost~~ Return Rate × Invested capital / No. of sale units]

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(3) True Economic Value = Cost of next best alternative
(4) Value of Performance differentiation

(4) Perceived Value = What Price is CUSTOMER WILLING to pay

(5) Psychological Price = ₹99, ₹199, ₹299, ₹999 etc

KANO'S PERFORMANCE ATTRIBUTES:

⇒ Positive Attributes

(1) Threshold Attributes → Must Have Attributes
→ अगर product / service में ये attributes नहीं होंगे तो customer will not be satisfied.

(2) ~~Expected~~
Performance attribute → One dimensional qualities

(3) ~~Excite~~ Excitement → Attractive qualities attributes

⇒ Negative Attributes

(1) Indifferent qualities → अगर product / service में [Logo size change, look of emblems etc] ये attributes हो या ना हो customer को फरक नहीं पड़ता

(2) Reverse attributions → यदि product/ services में ये (eg: Pop-Up Messages attributes होते तो customer while using a website) will be dissatisfied.

(3) ~~Quality~~ Questionable attributes

Chp 7: Strategic Profit Management

(1) Strategic Profitability Analysis

- Growth component
  - Market size change
  - Market share change.
- Price Recovery component
- Productivity component.

Reconciliation Statement

Op. Income of last year	XX ₹
+/-	
Charges due to Market Size	XX
Charges due to Productivity	XX
Charges due to Product differentiation [Price Recovery & Market share]	XX
∴ Op. Income of Current Year.	XX

Charges due to Market Size

= Growth component × Change in sales unit due to market size / Total sales unit change.

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Charges due to Productivity = Productivity component

Charges due to Product differentiation

Price Recovery	XX
Charges due to Market Share	XX
[Growth component × (Change in sale unit due to Mkt Share / Total sale unit change)]	
	XX

(2) Direct Product Profitability

	Product X	Product Y
Selling Price p.u.	XX	XX
(-) COGS / Purchase price p.u.	(XX)	(XX)
∴ Gross Margin p.u.	XX	XX
(-) Direct Product cost p.u.	(XX)	(XX)
(Warehousing, Retail, transport)		
∴ Direct Product Profit p.u. ⟶ XX		XX

[IGNORE HEAD OFFICE COST]

(3) Customer Profitability Statement

	A	B
Gross / List Selling Price p.u.	XX	XX
(-) Sales Return (if any)	(XX)	(XX)
(-) Discounts	(XX)	(XX)
∴ Net Sales price p.u.	XX	XX

(-) Variable cost / Purchase cost / Buying cost etc. (xx) (xx)

∴ Contribution Margin p.u. xx xx

x

No. of units sold xx xx

∴ Contribution total ⟶ xx xx

(-) OH cost allocation in ABC (xx) (xx)

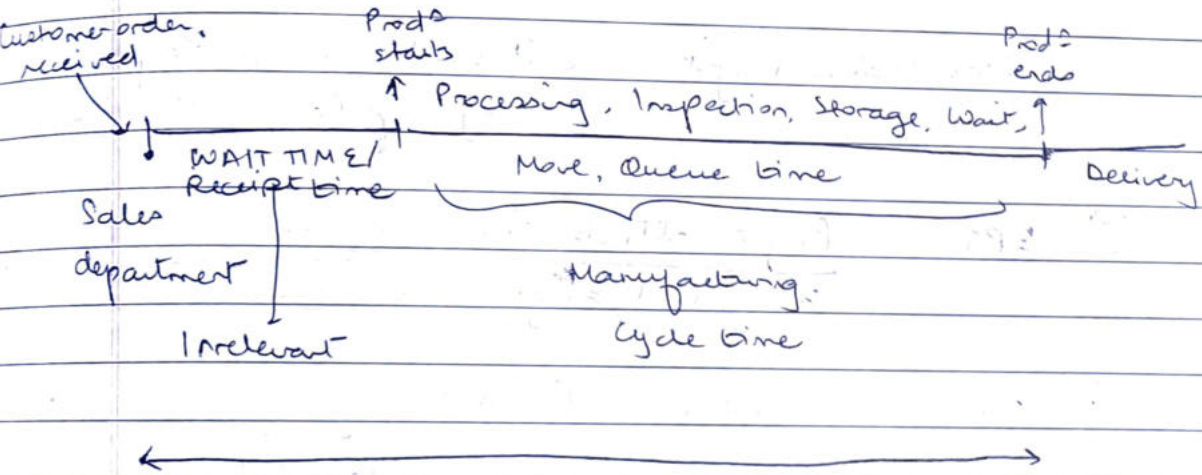
∴ Total Profit per customer ⟶ xx xx

÷

No. of units sold xx xx

∴ Profit per unit per customer ⟶ xx xx

(4) Value Added / Non Value Added Activities



Delivery Cycle time = Receipt time + Manufacturing cycle time.

Manufacturing cycle time = Value Added activity time + Non Value Added activity time.

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Chp 9: Strategic Performance Measures in Private Sector

(1) Gross Profit = Net Sales - COGS

↓

[Op. stock + Purchase + Wages + Direct expenses - Cl. stock]

(2) ROCE = $\frac{\text{PBIT}}{\text{Avg. cap. employed}} \times 100$

(3) Return on Investment (ROI) → Relative Measure

$\frac{\text{Controllable Profit (PBIT)}}{\text{Net Assets / Cap. Employed}} \times 100$

(4) Residual Income (RI) → Absolute Measure

Controllable Profit - (Overall cost of capital × Proposed investment)

(5) EPS = $\frac{\text{Profit attributable to ordinary SH}}{\text{weighted avg. no. of ordinary SH}}$

(6) EVA = NOPAT - (WACC × Op. Cap. Employed)

↓

[Op. SC + R&S + Long term debt]

NOPAT = PBIT - Tax

WACC = $k_d \times W_d + W_e \times k_e + k_p \times W_p$

k_d → [Post tax]

W_d → [Long term debt / SC + R&S + long term debt]

W_e → [SC + R&S / SC + R&S + long term debt]

$k_p \times W_p$ → Preference SH (if any)

① NPV = PV of cash Inflow − PV of cash Outflow

If ~~adjusted~~ given adjustments given:

- Non cash exp → Add
- Deferred Revenue Exp → Add
- Depreciation
  - A/c'ing → Add
  - Economic → Less

Adjusted NOPAT	(₹)	Adjusted Op. Cap. Employed	(₹)
PBIT	xx	Op. Cap. Employed	xx
(+) Non Cash Exp	xx	⊕ Non Cash Exp	xx
(+) Deferred Revenue Exp	xx	⊕ Deferred Revenue Exp	xx
(+) Accounting dep^{n}	xx	⊕ A/c'ing dep^{n}	xx
(−) Economic dep^{n}	(xx)	⊖ Economic dep^{n}	(xx)
(−) Tax PAID*	(xx)		
(−) Tax on interest	(xx)		
Adjusted NOPAT →	xx	Adjusted Op. C.E.	xx

Chp 8: Introduction to SPM

McKinsey's 7S

① Soft S
- Skill
- Staff
- Style
- Shared values.

Hard S
- Strategy
- Structure
- System

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(2) Altman's 2 ~~Score~~ Score

	Publicly Held Mfg. Companies	Private Firms	Non-Mfg. Firms: Developed Markets	Non-Mfg. Firms: Emerging Markets
X_1 = Working Cap. / Total Assets	1.2	0.717	6.56	(+) 3.25 / 6.56
(+)				
X_2 = Retained Earnings / Total Assets	1.4	0.847	3.26	3.26
(+)				
X_3 = EBIT / Total Assets	3.3	3.107	6.72	6.72
(+) For Publicly held Mfg. Co.				
X_4 = Market Value or Book Value of Eq. / Total liab. + Reserves	0.6	0.420	1.05	1.05
(+)				
X_5 = Sales / Total assets	1	0.998	-	-
⊗				

Distress	Less than 1.81	Less than 1.23	Less than 1.1
Grey	1.81 - 2.99	1.23 to 2.99	1.1 to 2.6
Safe	More than 2.99	More than 2.99	More than 2.6

③ Argenti's A score

Dimensions of Argenti's A Score →

Defects	Mistakes	Symptoms of failure
↓	↓	↓
Total ⇒ 43 (Group A)	⊕ 45 (Group B)	⊕ 12 (Group C)

For a firm to be cleared as HEALTHY, its overall score must be LESS THAN MAXIMUM ACCEPTABLE SCORE OF 25. (with 10 & 15 being maximum acceptable score for Group A & Group B respectively)

Chp 12: Divisional transfer pricing

① Division wise profit statement

	Division A (Transferor)	Division B (Transferee)	Company Total
Outside sales	XX	XX	XX
Transfer Price (Internal transfer)	XX	-	-
	XX	XX	XX
(-) Variable cost			
→ Own	(XX)	(XX)	(XX)
→ Transfer Price	-	(XX)	
	XX	XX	XX
(-) Fixed cost	(XX)	(XX)	(XX)
∴ Profit	XX	XX	XX

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(2) Transfer Pricing Methods

- **Cost Based**
  - Marginal cost Based TP
  - Std cost based TP
  - Full cost based TP
  - Cost + Markup based TP
- **Market Based**
  - Shared Profit Relative to cost
  - Market Price
- **Negotiation Based**

Market Based

Market Price

↓

Transfer done at Market Price

↓

TP = MP

Shared Profit Relative to cost

↓

Total profit of company will be divided among divisions in total cost Ratio

↓

$$\frac{\text{Total cost of division}}{\text{Total cost of company}} \times \text{Total profit of company}$$

TP = Shared Profit + Total cost of supplying division.

(3) Minimum & Maximum Transfer Price

Minimum

↓

VC + Specific cost of FC + Opportunity cost of transfer [If capacity shortage]

↓

[total VC of transferor − Exp. not incurred in Internal transfer eg: Selling & distribution cost]

Maximum

↓

- External buying cost ± Alterations

OR

- Selling Price of transferee − Other VC of transferee

LOWER.

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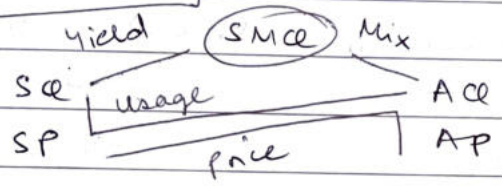
⑤ International TP

Income Statement under International TP

	Division A [Transferor]	Division B [Transferee]
Outside sales	-	xx
Transfer Price [Internal]	xx	-
	xx	xx
(-) Cost		
own – VC	(xx)	(xx)
FC	(xx)	(xx)
Transfer Price	-	(xx)
Profit Before Tax	xx	xx
(-) Tax	(xx)	(xx)
PAT	xx	xx

Chp 13: Standard Costing

① Material Variance



Material Cost Variance = SQ × SP − AQ × AP

Material Price Variance = (SP − AP) AQ

Material Usage Variance = (SQ − AQ) SP

−SMQ + SMQ

Material Yield Variance
(SQ − SMQ) SP

Material Mix Variance
(SMQ − AQ) SP

SMQ = Total Actual qty. of material in Std. Ratio

AP = Actual Price

SP = Std. Price

SQ = Std. qty. for Actual Output

AQ = Actual qty.

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(2) **Labour Variance**

Labour Cost Variance = SH x SR - AH Paid x AR

- Labour Rate Variance → (SR - AR) AH Paid
- Labour Efficiency Variance → (SH - AH Worked) SR
- Idle Time Variance → Idle Hrs. x AR.

AR = Actual Rate per Labour Hr.
SR = Std. Rate per Labour Hr.
AH Paid = Actual Hrs. Paid
AH Worked = Actual Hrs. Worked
SH = Std. Hrs. Required for Actual Production
Idle Hrs = AH Paid - AH Worked.

Overhead Variance [इसमें AH Worked आता है]

(3) **Variable OH**

Variable Cost Variance = SH x SR - AH Worked x AR

- Variable Expenditure Variance → (SR - AR) AH Worked
- Variable Efficiency Variance → (SH - AH Worked) SR

AR = Actual Variable OH Rate p.u.
SR = Std. Variable OH Rate p.u.
SH, AH Worked = Same of labour

(4) Fixed OH Variance

Fixed Cost Variance = Recovered FO − Actual FO

↓

SH × SR
or
Actual Production × SC

FO Expenditure Variance
↓
Budgeted FO − Actual FO

FO Volume Variance
↓
Recovered FO − Budgeted FO

Where

SR = Standard Rate per hour of FO = $\frac{\text{Budgeted FO}}{\text{Budgeted Hrs.}}$

SC/RR = Std. cost per unit of FO = $\frac{\text{Budgeted FO}}{\text{Budgeted units of prod}^{n}}$

↓
Recovery Rate

SH = Same as labour f v o.

(5) Sales Variance

Based on Turnover

Based on Margin [Absorption costing / Conventional method]

Based on Contribution [Marginal costing / Relevant costing method]

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⇒ Based on Sales / Turnover

Sales Value Variance = ASQ × ASP − BSQ × BSP

Sales Price Variance → (ASP − BSP) ASQ

Sales Volume Variance → (ASQ − BSQ) × BSP

Sales Mix Variance → (ASQ − BSMQ) × BSP

Sales Quantity Variance → (BSMQ − BSQ) × BSP

Where,

BSP = Budgeted Selling Price p.u.

ASP = Actual Selling Price p.u.

BSQ = Budgeted sales Qty.

ASQ = Actual Sales Qty.

BSMQ = Total actual sales qty in budgeted qty. ratio

⇒ Based on Margin (Profit)

Sales Margin Variance = ASQ × AP − BSQ × BP

Sales Margin Price Variance → (AP − BP) ASQ

Sales Margin Volume Variance → (ASQ − BSQ) BP

Mix Variance → (ASQ − BSMQ) BP

Qty Variance → (BSMQ − BSQ) BP

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where, BP = Budgeted / Std. Profit p.u.
AP = Actual Profit p.u.
[Actual SP p.u - Budgeted total cost p.u.]

⇒ Based on Contribution

Sales Contribution Variance = ASQ × AC − BSQ × BC

Price Variance
(AC − BC) ASQ

Volume Variance
(ASQ − BSQ) BC

Mix Variance
(ASQ − BSMQ) BC

Qty Variance
(BSMQ − BSQ) BC

BC = Budgeted / Std. contribution p.u.
AC = Actual Contribution p.u.
[~~SP~~ Actual SP p.u. − Budgeted Variable cost p.u]

Sales Price variance = Sales Margin Price Variance = Sales contribution price variance.

⑥ Market Size & Market Share Variance

Sales CONTRIBUTION Volume Variance = Market Size Variance + Mkt. Share Variance

= (ASQ − BSQ) BC

= [Actual Sales Qty − Budgeted sales Qty) Budgeted contri. p.u.]

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= [Actual Mkt Share - Budgeted Market Share] × Budgeted Contribution p.u.

[Actual Mkt Share - Budgeted Mkt Share of Actual Market Size + Budgeted Market Share of Actual Market Size - Budgeted Market Share]

× Budgeted Contribution p.u.

[Actual Mkt Share - Budgeted Mkt Share of Actual Market Size] × BC

[Budgeted Mkt Share of Actual Mkt Size - Budgeted Mkt Share] BC

Market Share variance

↓

Operational / Controllable variance

↓

Sales Manager Responsible

Market Size variance

↓

Planning / Uncontrollable variance.

↓

No one is responsible.