

CHAPTER

1



INTRODUCTION TO STRATEGIC COST MANAGEMENT

CASE STUDY No. 1



WONDER LTD. manufactures a single product, ZEST. The following figures relate to ZEST for a one-year period:

Activity Level	50%	100%
Sales and production (units)	400	800
	(₹)	(₹)
Sales	8,00,000	16,00,000
Production costs:		
- Variable	3,20,000	6,40,000
- Fixed	1,60,000	1,60,000
Selling and distribution costs:		
- Variable	1,60,000	3,20,000
- Fixed	2,40,000	2,40,000

The normal level of activity for the year is 800 units. Fixed costs are incurred evenly throughout the year, and actual fixed costs are the same as budgeted. There were no stocks of ZEST at the beginning of the year.

In the first quarter, 220 units were produced and 160 units were sold.

Required:

- What would be the fixed production costs absorbed by ZEST if absorption costing is used?
- What would be the under/over-recovery of overheads during the period?
- What would be the profit using absorption costing?
- What would be the profit using marginal costing?

CASE STUDY No. 2

Practical Questions

- XYZ Ltd. has a production capacity of 2,00,000 units per year. Normal capacity utilisation is reckoned as 90%. Standard variable production costs are ₹11 per unit. The fixed costs are ₹3,60,000 per year. Variable selling costs are ₹3 per unit and fixed selling costs are ₹2,70,000 per year. The unit selling price is ₹20.

In the year just ended on 30th June, 20X4, the production was 1,60,000 units and sales were 1,50,000 units. The closing inventory on 30th June was 20,000 units. The actual variable production costs for the year were ₹ 35,000 higher than the standard.

- Calculate the profit for the year
 - by absorption costing method and

CHAPTER

2



MODERN BUSINESS ENVIRONMENT



(1) TOTAL QUALITY MANAGEMENT

(2) THROUGHOUT ACCOUNTING/
THEORY OF CONSTRAINT.

Cost of Quality (COQ)

=

Cost of Control
(Prevention Cost + Appraisal Cost)

+

Cost of Failure of Control
(Internal Failure Cost + External Failure Cost)

- In its simplest form, COQ can be calculated *in terms of effort* (hours/days).
- A better approach will be to calculate COQ *in terms of money* (converting the effort into money and adding any other tangible costs like test environment setup).
- The best approach will be to calculate COQ *as a percentage of total cost*. This allows for comparison of COQ across projects or companies.
- To ensure impartiality, an external person say the accountant must determine the Cost of Quality of a project/ product rather than a person who is a core member of the project/ product team (Say, someone from the Accounts Department).

CASE STUDY No. 3**Illustration**

A company produces and sells a single product. The cost data per unit for the year 2017 is predicted as below:

Direct Material	35
Direct Labour	25
Variable Overheads	15
Selling Price	90

The company has forecast that demand for the product during the year 2017 will be 28,000 units. However, to satisfy this level of demand, production quantity will be increased?

There are no opening stock and closing stock of the product.

The stock level of material remains unchanged throughout the period.

The following additional information regarding costs and revenue are given:

- 12.5% of the items delivered to customers will be rejected due to specification failure and will require free replacement. The cost of delivering the replacement item is ₹5 per unit.
- 20% of the items produced will be discovered faulty at the inspection stage before they are delivered to customers.
- 10% of the direct material will be scrapped due to damage while in storage.

Due to above, total quality costs for the year is expected to be ₹10,75,556.

The company is now considering the following proposal:

1. To introduce training programmes for the workers which, the management of the company believes, will reduce the level of faulty production to 10%. This training programme will cost ₹4,50,000 per annum.
2. To avail the services of quality control consultant at an annual charges of ₹50,000 which would reduce the percentage of faulty items delivered to customers to 9.5%.

Required

- (i) PREPARE a statement of expected quality costs the company would incur if it accepts the proposal. Costs are to be calculated using the four recognised quality costs heads.
- (ii) Would you RECOMMEND the proposal? Give financial and non-financial reasons.

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NO. 10000

STATEMENT SHOWING ANALYSIS OF T.Q.M

PRESENT
BEFORE - T.Q.M

EXTERNAL FAILURE

UNIT RETURN Good
DEL BY (Unit)
TO CUSTOMER

CUSTOMER

~~28000~~ ~~12.5~~ ~~28000~~

100 12.5 87.5

28000

$$\left(\frac{28000 \times 100}{87.5} \right)$$

$$= 32000$$

VERIFICATION

UNITS DEL 32000

LOS 12.5% (4000)

Good UNIT 28000

EXT-EAI-COST

DMat 35.00

DLab 25.00

VO. 15.00

DEL-COST 5.00

80.00

$$(4000 \text{ unit} \times 80) = 320000$$

PROPOSED

AFTER T.Q.M.

→ EXT-Failure.

UNITS RETURN
DEL BY
TO

CUSTOMER CUSTOMER Good unit

100 9.5 90.50

28000

$$\left(\frac{28000 \times 100}{90.5} \right)$$

$$= 30939$$

30939

2939 (9.5%)

28000

35.00

25.00

15.00

5.00

80.00

$$\times 2939 = 235120$$

2.3

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STATEMENT SHOWING INTERNAL FAILURE COST

GROSS PRODUCTION	LOSS DUE TO DEF	Good UNITS	GROSS PRODUCTION	LOSS DUE TO DEF	Good UNITS
100	20	80	100	10	90
$\frac{(32000 \times 100)}{80}$		32000	$\frac{(30939 \times 100)}{90}$		30939
= 40000 UNITS			= 34377		
GROSS PRODUCTION = 40000			34377 34377		
FAULTY UNITS = 8000			33939 (3438)		
GOOD UNITS = 32000			30939 30939		
<u>COST</u>					
DMAT	35		35		
DLAB	25		25		
V.O.	15		15		
	75		75		
X 8000			X 34377 3438		
= 600000			= 257850		

<u>STATEMENT SHOWING</u>	<u>MATERIAL SCRAPPED</u>
100	100
10	10
90	90
40000	30939
$\frac{(40000 \times 100)}{90}$	34377
= 44444.44	
$(44444.44 - 40000) = 4444.44$	= 34377 34397
$(4444.44 \times 35) = 155555$	$(\frac{34397 - 30939}{34377} \times 34377) = 3438$
	$(3438 \times 35) = 120330$
	133665

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STATEMENT SHOWING ANALYSIS OF ~~TQM~~
EXP- DUTY COST.

	CURRENT SITI ATION	PROPOSED SIT
PREV-COST	-	450000
APP-COST	-	50000
EXT-F-COST	320000	235120
INF-F-COST	755556	391538
	<u>395556</u>	<u>1126538</u>
	<u>2.5</u>	

CASE STUDY No. 4

A company manufactures a single product, which requires two components. The company purchases one of the components from two suppliers: X Limited and Y Limited. The price quoted by X Limited is Rs. 180 per hundred units of the component and it is found that on an average 3 per cent of the total receipt from this supplier is defective. The corresponding quotation from Y Limited is Rs. 174 per hundred units, but the defective would go up to 5 per cent. If the defectives are not detected, they are utilised in production causing a damage of Rs. 180 per 100 units of the component.

The company intends to introduce a system of inspection for the components on receipt. The inspection cost is estimated at Rs. 24 per 100 units of the component. Such an inspection will be able to detect only 90 per cent of the defective components received. No payment will be made for components found to be defective in inspection.

Required:

(i) Advise whether inspection at the point of receipt is justified?

(ii) Which of the two suppliers should be asked to supply?

(Assume total requirement is 10,000 units of the component).

CASE STUDY No. 5

Your company plans to operate department D at normal capacity next year producing one lakh units of product P. Assuming no defective works, these units can be manufactured in 2.5 lakhs labour hours at a cost of Re. 0.50 per hour. Factory overhead would amount to Rs. 1,50,000 of which Rs. 50,000 would be fixed. Every unit requires five units of materials can be purchased in two qualities; a high quality at Rs. 1.05 per unit or a lower quality at Re. 0.80 per unit.

Under expected conditions, using high quality materials, 10% of the work will be defective requiring complete replacement of the materials, additional labour costs and variable overhead. Scrap materials recovered from defective production could be sold at Re. 0.30 per unit of high quality material used.

As an alternative to this arrangement, the use of the lower quality material is being considered but this would require an extra operation to be performed on it. An additional machine and tooling would be needed at a cost of Rs. 3,000 per annum. The additional operation would take half an hour for each unit of product P produced, not taking defective work into account.

It is estimated that 20% of the work would be defective all of which would require complete replacement. Scrap material from the lower quality material could be sold for Rs. 5,000.

Present information to management indicating the more profitable course of action.

2.6



Thomson Ltd. makes and sells a single product; the unit specifications are as follows:

Direct Materials X	:	8 sq. metre at ₹ 40 per square metre
Machine Time	:	0.6 Running hours
Machine cost per gross hour	:	₹ 400
Selling price	:	₹ 1,000

CASE STUDY No. 6

Thomson Ltd. requires to fulfil orders for 5,000 product units per period. There are no stock of product units at the beginning or end of the period under review. The stock level of material X remains unchanged throughout the period.

Thomson Ltd. is planning to implement a Quality Management Programme (QMP). The following additional information regarding costs and revenues are given as of now and after implementation of Quality Management Programme.

Before the implementation of QMP	After the implementation of QMP
5% of incoming material from suppliers scrapped due to poor receipt and storage organisation.	Reduced to 3%.
4% of material X input to the machine process is wasted due to processing problems.	Reduced to 2.5%
Inspection and storage of Material X costs ₹ 1 per square metre purchased.	No change in the unit rate
Inspection during the production cycle, calibration checks on inspection equipment vendor rating and other checks cost ₹ 2,50,000 per period	Reduction of 40% of the existing cost.
Production Qty. is increased to allow for the downgrading of 12.5% of the production units at the final inspection stage. Down graded units are sold as seconds at a discount of 30% of the standard selling price.	Reduction to 7.5%
Production Quantity is increased to allow for return from customers (these are replaced free of charge) due to specification failure and account for 5% of units actually delivered to customer.	Reduction to 2.5%
Product liability and other claims by customers is estimated at 3% of sales revenue from standard product sale.	Reduction to 1%.
Machine idle time is 20% of Gross machine hrs used (i.e. running hour = 80% of gross/hrs.).	Reduction to 12.5%.
Sundry costs of Administration, Selling and Distribution total – ₹ 6,00,000 per period.	Reduction by 10% of the existing.
Prevention programme costs ₹ 2,00,000	Increase to ₹ 6,00,000.

The Total Quality Management Programme will have a reduction in Machine Run Time required per product unit to 0.5 hr.

2.7

cont →

- (a) Prepare summaries showing the calculation of (i) Total production units (pre inspection), (ii) Purchase of Materials X (square metres), (iii) Gross Machine Hours.
- (b) In each case, the figures are required for the situation both before and after the implementation of the Quality Management Programme so that orders for 5,000 product units can be fulfilled.

Prepare Profit and Loss Account for Thomson Ltd. for the period showing the profit earned both before and after the implementation of the Total Quality Programme.

2.8

CASE STUDY No. 7

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Value Added/ Non-Value Added Activities

2. Queensland Furniture (QF) manufactures high-quality wooden doors within the forests of Queensland since 1919. Management is having emphasize on creativity, engineering, innovation and experience to provide customers with the door they desire, whether it is a standard design or a one-of-a-kind custom door. The following information pertains to operations during Jan:

Processing time	9.0 hrs.*	Waiting time	6.0 hrs.*
Inspection time	1.5 hr.*	Move time	7.5 hrs.*
Units per batch	60 units		

(*) average time per batch

Required

Compute the following operational measures:

- Average non-value-added time per batch
- Average value added time per batch
- Manufacturing cycle efficiency
- Manufacturing cycle time

AVG NON-VALUE ADDED TIME PER BATCH

$$\begin{aligned}
 \text{INSPECTION TIME} &= 1.5 \text{ hr} \\
 \text{WAITING TIME} &= 6.00 \text{ hr} \\
 \text{MOVE TIME} &= 7.5 \text{ hr} \\
 &= 15.00 \text{ hr}
 \end{aligned}$$

AVG-VALUE ADDED TIME PER BATCH

$$\text{PROCESSING TIME} = 9 \text{ hrs}$$

MANUFACTURING CYCLE EFFICIENCY

PROCESSING TIME

$$\frac{\text{PROCESSING TIME}}{\text{PROCESSING TIME} + \text{INSPECTION TIME} + \text{WAITING TIME} + \text{MOVE TIME}}$$

$$\left(\frac{9}{9 + 1.5 + 6 + 7.5} \right) \times 100 = 37.5\%$$

$$\begin{aligned}
 \text{(IV) MAN- CYCLE TIME} \\
 \text{(TOTAL PRODUCTION TIME)} &= \left(\frac{24}{60} \right) = 0.40
 \end{aligned}$$

CHAPTER

3



LEAN SYSTEM AND INNOVATION



(1)

J.I.T

(2)

KAIZEN COSTING

1.6 JUST IN TIME

CASE STUDY No. 8

Question

X Video Company sells package of blank video tapes to its customer. It purchases video tapes from Y Tape Company @ Rs. 140 a packet. Y Tape Company pays all freight to X Video Company. No incoming inspection is necessary because Y tape Company has a superb reputation for delivery quality merchandise. Annual demand of X Video Co. is 13,000 packages. X Video Co. requires 15% annual return on investment. The purchase order lead time is two weeks. The purchase order is passed through Internet and it costs Rs. 2 per order. The relevant insurance, material handling etc. Rs. 3.10 per package per year. X Video Co. has to decide whether or not to shift JIT purchasing. Y tape Company agrees to deliver 100 packages of video tapes 130 times per year (5 times every two weeks) instead of existing delivery system 1,000 packages 13 times a year with additional amount of Rs. 0.02 per package. X Video Co. incurs no stockout under its current purchasing policy. It is estimated X Video Co. incurs stockout cost on 50 video tape packages under a JIT purchasing policy. In the event of a stockout X Video Co. has to rush order tape packages which costs Rs. 4 per package.

Comment whether X Video Company to implement JIT purchasing system.

Z Co. also supply video tapes. It agrees to supply Rs. 136 per packages under JIT delivery system. If video tape purchased from Z Co., relevant carrying cost would be Rs. 3 per package against Rs. 3.10 in case of purchasing from Y tape Co. However Z Co. doesn't enjoy so sterling reputation for quality. X Video Co. anticipates following negative aspects of purchasing tapes from Z Co.

- To incur additional inspection cost of 5 paisa per package.
- Average stockout of 360 tapes packages per year would occur, largely resulting from late deliveries. Z Co. cannot rush order at short notice, X Video Co. anticipates lost contribution margin per package of Rs. 8 from stockout.
- Customer would likely return 2% of all packages due to poor quality of the tape and to handle this return a additional cost of Rs.25 per package.

Comment whether X Video Co. places order to Z Co.

3.1

CASE-STUDY - 8a

Illustration

KP Ltd. (KPL) manufactures and sells one product called "KEIA". Managing Director is not happy with its current purchasing and production system. There has been considerable discussion at the corporate level as to use of 'Just in Time' system for "KEIA". As per the opinion of managing director of KPL Ltd. –

"Just-in-time system is a pull system, which responds to demand, in contrast to a push system, in which stocks act as buffers between the different elements of the system such as purchasing, production and sales. By using Just in Time system, it is possible to reduce carrying cost as well as other overheads".

KPL is dependent on contractual labour which has efficiency of 95%, for its production. The labour has to be paid for minimum of 4,000 hours per month to which they produce 3,800 standard hours.

For availing services of labour above 4,000 hours in a month, KPL has to pay overtime rate which is 45% premium to the normal hourly rate of ₹110 per hour. For avoiding this overtime payment, KPL in its current production and purchase plan utilizes full available normal working hours so that the higher inventory levels in the month of lower demand would be able to meet sales of month with higher demand level. KPL has determined that the cost of holding inventory is ₹70 per month for each standard hour of output that is held in inventory.

KPL has forecast the demand for its products for the first six months of year 2018 as follows:

Jan'18	3,150
Feb'18	3,760
Mar'18	4,060
Apr'18	3,350
May'18	3,650
Jun'18	4,830

Following other information is given:

- (i) All other production costs are either fixed or are not driven by labour hours worked.
- (ii) Production and sales occur evenly during each month and at present there is no stock at the end of Dec'17.
- (iii) The labour are to be paid for their minimum contracted hours in each month irrespective of any purchase and production system.

Required

As a chief accountant you are requested to COMMENT on managing director's view.

CASE
STUDY-89

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STATEMENT SHOWING 'INVENTORY' HOLDING COST
UNDER CURRENT SYSTEM

PARTICULARS	(HRS) JAN	(HRS) FEB	(HRS) MARCH	(HRS) APRIL	(HRS) MAY	(HRS) JUNE
<u>OPENING INVENTORY</u>	-	650	690	430	880	1030
(+) PRODUCTION	3800	3800	3800	3800	3800	3800
DEMAND	(3150)	(3760)	(4060)	(3350)	(3650)	(4830)
<u>CLOSING INVENTORY</u>	650	690	430	880	1030	-
Avg-INVENTORY	= 325	= 670	= 560	655	955	515
$\frac{(\text{OPENING} + \text{CLOSING})}{2}$	$\frac{0 + 650}{2}$	$\frac{650 + 690}{2}$	$\frac{690 + 430}{2}$	$\frac{430 + 880}{2}$	$\frac{880 + 1030}{2}$	$\frac{1030 + 0}{2}$

STATEMENT SHOWING INVENTORY HOLDING COST FOR SIX MONTHS

MONTH	Avg INVENTORY	X 70 =	TOTAL (Rs)
JAN	325	X 70	22750
FEB	670	X 70	46900
MARCH	560	X 70	39200
APRIL	655	X 70	45850
MAY	955	X 70	66850
JUNE	515	X 70	36050
			<u>257600</u>

2.2

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STATEMENT SHOWING RELEVANT OVERTIME COST AS PER J.I.T- SYSTEM.

PARTICULARS	JAN	FEB	MARCH	APRIL	MAY	JUNE
DEMAND (HRS)	3150	3760	4060	3350	3650	4830
PRODUCTION (J.I.T)	3150	3760	4060	3350	3650	4830
NORMAL STANDARD HRS	3800	3800	3800	3800	3800	3800
(AVAILABLE)			-260			=1030
SHORTAGE	-	-	(4060-3800)	-	-	(4830-3800)

STATEMENT SHOWING OVERTIME COST

OVERTIME HRS	GROSS-hm.
MARCH 260	$\left(\frac{260 \times 100}{95}\right) = 273.68$
	$\times 159.50$ $\left(\frac{110 + *49.50}{* (45/110)}\right)$
JUNE 1030	$\left(\frac{1030 \times 100}{95}\right) = 1084.21$
	$\times 159.50$

$$(273.68 \times 159.50) + (1084.21 \times 159.50) = \underline{216583}$$

STATEMENT SHOWING COMPARATIVE COST

COST	AS PER TRADITIONAL	AS PER J.I.T.
COST	257600	216583
SAVING AS PER J.I.T.		$(216583 - 257600)$ $= \underline{41017}$

17.11

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Comments

Though KPL is saving ₹41,017 by changing its production system to Just-in-time but it has to consider other factors as well before taking any final call which are as follows:-

- (i) KPL has to ensure that it receives materials from its suppliers on the exact date and at the exact time when they are needed. Credentials and reliability of supplier must be thoroughly checked.
- (ii) To remove any quality issues, the engineering staff must visit supplier's sites and examine their processes, not only to see if they can reliably ship high-quality parts but also to provide them with engineering assistance to bring them up to a higher standard of product.
- (iii) KPL should also aim to improve quality at its process and design levels with the purpose of achieving "Zero Defects" in the production process.
- (iv) KPL should also keep in mind the efficiency of its work force. KPL must ensure that labour's learning curve has reached at steady rate so that they are capable of performing a variety of operations at effective and efficient manner. The workforce must be completely retrained and focused on a wide range of activities.

3.5

CASE STUDY No... 10

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Kaizen Costing- Basic Concepts

2. XYZ Ltd. is planning to introduce Kaizen Costing approach in its manufacturing plant. State whether and why the following are *Valid or Not* in respect of Kaizen Costing.
- (i) VP (Finance) is of the view that company has to make a huge initial investment to bring a large scale modification in production process.
 - (ii) Head (Personnel) has made a point that introduction of Kaizen Costing does not eliminate the training requirement of employees.
 - (iii) General Manager (Manufacturing) firmly believes that only shop floor employees and workers' involvement is prerequisite of Kaizen Costing approach.
 - (iv) Manager (Operations) has concerns about creation of confusion among employees and workers regarding their roles and degradation in quality of production.
2. (i) **Invalid:** Kaizen Costing is the system of cost reduction procedures which involves making small and continuous improvements to the production processes rather than innovations or large-scale investment.
- (ii) **Valid:** The training of employees is very much a long-term and ongoing process in the Kaizen costing approach. Training enhances the abilities of employees.
- (iii) **Invalid:** Kaizen costing approach involves everyone from top management level to the shop floor employees. Every employee's active participation is a must requirement.
- (iv) **Invalid:** Though the aim of Kaizen Costing is to reduce the cost but at the same time it also aims to maintain the quality. Kaizen costing also aims to bring the clarity in roles and responsibilities for all employees.

3.6

CHAPTER

4



COST MANAGEMENT TECHNIQUES



- (1) COST CONTROL & COST REDUCTION
- (2) TARGET COSTING
- (3) LIFE - CYCLE COSTING
- (4) PARETO ANALYSIS

1.5 COSTING CONTROL AND COST REDUCTION

CASE STUDY No. 11
Question

Even Forward Ltd. is manufacturing and selling two products: Splash and Flash at selling price of Rs 3 and Rs. 4 respectively. The following sales strategy has been outlined for the year :—

- (i) Sales planned for year will be Rs. 7.20 lakhs in the case of Splash and Rs. 3.50 lakhs in the case of Flash.
- (ii) To meet competition, the selling price of Splash will be reduced by 20% and that of Flash by 12 ½ %.
- (iii) Break-even is planned at 60% of the total sale of each product.
- (iv) Profit for the year to be achieved is planned as Rs 69,120 in the case of Splash and Rs. 17,500 in the case of Flash. This would be possible by launching a cost reduction programme and reducing the present annual fixed expenses of Rs. 1,35,000 allocated as Rs. 1,08,000 to Splash and Rs. 27,000 to Flash.

You are required to present the proposal in financial terms giving clearly the following information:

Number of units to be sold of Splash and Flash to break-even as well as the total number of units of Splash and Flash to be sold during the year.

Reduction in fixed expenses product-wise that is envisaged by the Cost Reduction Programme.

4.1

9

1.3 TARGET COSTING

Question

Sterling Enterprises has prepared a draft budget for the next year as follows:

CASE STUDY No. 13

Quantity	10,000 units
Sales price per unit	30
Variable costs per unit: Direct Materials	8
Direct Labour	6
Variable overhead (2 hrs x Re. 0.50)	1
Contribution per unit	15
Budgeted Contribution	1,50,000
Budgeted Fixed costs	1,40,000
Budgeted Profit	10,000

The Board of Directors is dissatisfied with this budget, and asks a working party to come with an alternate budget with higher target profit figures. The working party reports back with the following suggestions that will lead to a budgeted profit of Rs. 25,000. The company should spend Rs. 28,500 on advertising, & to the target sales price up to Rs. 32 per unit. It is expected that the sales volume will also rise, in spite of the price rise, to 12,000 units. In order to achieve the extra production capacity, however, the work force must be able to reduce the time taken to make each unit of the product. It is proposed to offer a pay and productivity deal in which the wage rate per hour is increased to Rs. 4. The hourly rate for variable overhead will be unaffected. Ascertain the target labour time required to achieve the target profit.

14.2

(13)

IBM Ltd. Manufactures and sells computers peripherals to several retail outlets throughout the country. Amar is the manager of the printer division. Its two largest-selling printers are P1 & P2.

The manufacturing cost of each printer is calculated using IBM's activity based costing system. IBM has one direct manufacturing cost category (direct materials) and the following five indirect manufacturing cost pools.

Indirect manufacturing cost pool	Allocation Base	Allocation Rate (Rs.)
1. Materials handling	No. of parts	Rs. 1.20 per part
2. Assembly management hour of assembly time	Hours of assembly time	Rs. 40 per
3. Machine insertion of parts machine inserted part	No. of machine inserted parts.	Rs. 0.70 per
4. Manual insertion of parts manually inserted part	No. of manually inserted parts.	Rs. 2.10 per
5. Quality testing testing hour.	Hours of quality testing time	Rs. 25 per

Product characteristics of P1 and P2 are as follows:

Product	P1	P2
Direct materials costs	Rs. 407.50	Rs. 292.10
Number of parts	85	46
Hours of assembly time	3.2	1.9
Number of machine – inserted parts	48	31
Number of manually inserted parts	36	15
Hours of quality testing time	1.4	1.1

A foreign competitor has introduced products very similar to P1 and P2. Given their announced selling prices, to maintain the company's market share and profits. Amar estimated the P1 to have manufacturing cost of approximately Rs. 680 and P2 to have a manufacturing cost of approximately Rs. 390. he calls a meeting of product designers and manufacturing personnel at the printer division. They all agreed to have the Rs. 680 and Rs. 390 figures become target costs for designed version of P1 and P2 respectively. Product designers examine alternative ways of designing printer with comparable performance but lower costs. They come up with the following revised designs for P1 and P2 (termed P1 – REV and P2 – REV, respectively)

CASE STUDY No. 13

Particulars	P1 – REV	P2 – REV
Direct materials cost	Rs. 381.20	Rs. 263.10
Number of parts	71	39
Hours of assembly time	2.1	1.6
Number of machine – inserted parts	59	29
Number of manually – inserted parts	12	10
Hours of quality testing time	1.2	0.9

Require :-

- ◆ Compute the present costs of products P1 and P2 using ABC system.
- ◆ Compute the manufacturing costs of P1 – REV and P2 – REV. How do they compare with the Rs. 680 and Rs. 390 target costs?

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CASE STUDY No. 14 LIFE - CYCLE - COSTING

A company is considering the possibility manufacturing a particular component which at present is being bought from outside. The manufacture of the component would call for an investment of Rs. 7,50,000 in a new machine besides an additional investment of Rs. 50,000 in working capital. The life of the machine would be 10 year with a salvage value of Rs. 50,000. The estimated savings (before tax) would be Rs. 1,80,000 p.a. The income-tax rate is 50%. The company's required rate of return is 10%. Depreciation is considered on straight line system.

Should the company make this investment? Workings should form part of your answer. Note: The present value of Re. 1 at 10% discount rate is as follows:-

Year	1	2	3	4	5	6	7	8	9	10
P.V.	.91	.83	.75	.68	.62	.56	.51	.47	.42	.39

The present value (at 10% discount rate) of an annuity of Re. 1 payable each year for different year's is as follows :-

Year	1	2	3	4	5	6	7	8	9	10
P.V.	0.91	1.74	2.49	3.17	3.79	4.35	4.87	5.33	5.76	6.14

Ignore impact of income-tax for the system of depreciation followed.

Solve the above problem by Life Cycle Costing.

Question.CASE STUDY No. 15

Modern Enterprises Ltd. is considering the purchase of a new computer system for its Research and Development Division, which would cost Rs. 35 lakhs. The operation and maintenance costs (excluding depreciation) are expected to be Rs. 7 lakhs per annum. It is estimated that the useful life of the system would be 6 years, at the end of which the disposal value is expected to be Rs. 1 lakh

The tangible benefits expected from the system in the form of reduction in design and draughtsmanship costs would be Rs. 12 lakhs per annum. Besides, the disposal of used drawing office equipment and furniture, initially, is anticipated to net Rs. 9 lakhs.

Capital expenditure in research and development would attract 100% write-off for tax purposes. The gains arising from disposal of used assets may be considered tax-free. The company's effective tax rate is 50%.

The average cost of capital to the company is 12%. The present value factors at 12% discount rate are:

Year	PVF
1	0.892
2	0.79
3	0.711
4	0.63
5	0.56
6	0.50

After appropriate analysis of cash flows, please advise the company of the financial viability of the proposal.

Solve the above problem by Life Cycle Costing.

4.4

CASE STUDY No.16.....

Page No.			
Date			

①

 PARETO ANALYSIS

Pareto Analysis is a rule that recommends focus on the most important aspects of the decision making in order to simplify the process of decision making. It is based on the 80: 20 rule that was a phenomenon first observed by Vilfredo Pareto, a nineteenth century Italian economist. He noticed that 80% of the wealth of Milan was owned by 20% of its citizens. This phenomenon, or some kind of approximation of it say, (70: 30 etc.) can be observed in many different business situations. The management can use it in a number of different circumstances to direct management attention to the key control mechanism or planning aspects. It helps to clearly establish top priorities and to identify both profitable and unprofitable targets.

Usefulness of Pareto Analysis

It provides the mechanism to control and direct effort by fact, not by emotions. It helps to clearly establish top priorities and to identify both profitable and unprofitable targets. Pareto analysis is useful to:

- Prioritize problems, goals, and objectives to identify root causes.
- Select and define key quality improvement programs.
- Select key customer relations and service programs.
- Select key employee relations improvement programs.
- Select and define key performance improvement programs.
- Allocate physical, financial and human resources.

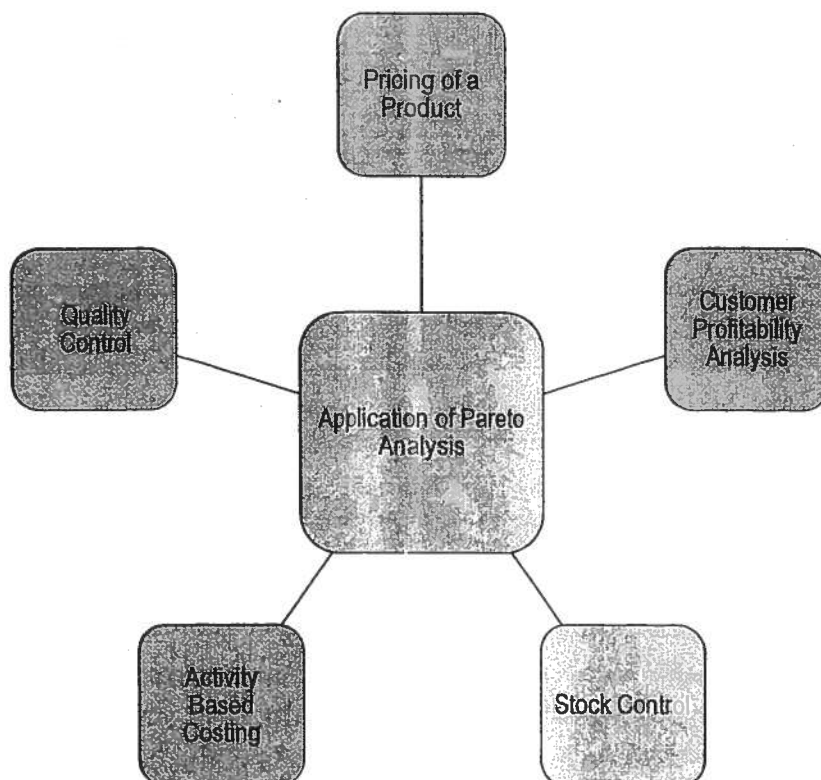
4.5

(2)

~~COST ACCOUNTING~~

Application of Pareto Analysis

Pareto analysis may be applicable in the presentation of Performance Indicators data through selection of representative process characteristics that truly determine or directly or indirectly influence or conform the desired quality or performance result or outcome. The Pareto Analysis is generally applicable to the following business situations:



Pricing of a Product

- In the case of a firm dealing with multi products, it would not be possible for it to analyse cost-profit-price-volume relationships for all of them. In practice, in case of such firm approximately 20% of products may account for about 80% of total sales revenue. Pareto Analysis is used for analysing the firm estimated sales revenues from various products and it might indicate that approximately 80% of its total sales revenue is earned from about 20% of its products.
- Such analysis helps the top management to delegate the pricing decision for approximately 80% of its products to the lower levels of management, thus freeing themselves to concentrate on the pricing decisions for products approximately 20% which are essential for the company's survival.

4.6

(3)

STRATEGIC COST MANAGEMENT AND PERFORMANCE EVALUATION

- Thus, a firm can adopt more sophisticated pricing methods for small proportion of products that jointly accounts for approximately 80% of total sales revenue. For the remaining 80% of the products which account for 20% of total sales revenue the firm may use cost based pricing method.

Customer Profitability Analysis

- Instead of analysing products, customers can be analysed for their relative profitability to the organisation.
- Again, it is often found that approximately 20% of customers generate 80% of the profit. There will always be some customers who are less profitable than others, just as some products are less profitable than others.
- Such an analysis is useful tool for evaluation of the portfolio of customer profile and decision making such as whether to continue serving a same customer group, what is the extent of promotion expenses to be incurred.

ABC Analysis- Stock Control

- Another application of Pareto analysis is in stock control where it may be found that only a few of the goods in stock make up most of the value. In practice, approximately 20% of the total quantity of stock may account for about 80% of its value. The outcome of such analysis is that by concentrating on small proportion of stock items that jointly accounts for 80% of the total value, a firm may well be able to control most of monetary investment in stocks.

Application in Activity Based Costing

- In Activity Based Costing it is often said that 20% of an organisation cost drivers are responsible for 80% of the total cost. By analysing, monitoring and controlling those cost drivers that cause most cost, a better control and understanding of overheads will be obtained.

Quality Control

- Pareto analysis seeks to discover from an analysis of defect report or customer complaints which "vital few" causes are responsible for most of the reported problems.
- Often, 80% of reported problems can usually be traced to 20% of the various underlying causes. By concentrating once efforts on rectifying the vital 20%, one can have the greatest immediate impact on product quality.
- The Pareto Analysis indicates how frequently each type of failure (defect) occurs. The purpose of the analysis is to direct management attention to the area where the best returns can be achieved by solving most of quality problems, perhaps just with a single action.

4.7

CASE STUDY No...17.....

Concept Illustration:

The following data of manufacture and sale is obtained from Veer Ltd for the 12 months ending 31st December.

Product	A	B	C	D	E	F	Total
Contribution (₹)	500	200	1,500	75	100	125	2,500

Prepare a Pareto Product Contribution Chart and Comment on the results.

Note: Re-arrange the products in **descending order** of Contribution, and find out the cumulative Contribution Percentage.

Product	Contribution (₹)	Cumulative Contribution (₹)	Cumulative Contribution (%)
C	1,500	1,500	60%
A	500	2,000	80%
B	200	2,200	88%
F	125	2,325	93%
E	100	2,425	97%
D	75	2,500	100%
Total	2,500		

Observation: On analysis it is found that 80% of the Total Contribution is earned by two Products C and A. Hence, these products should be carefully monitored and nurtured, through careful attention to branding and promotion. The other products should be investigated to see whether their Contribution can be improved through increased prices, reduced costs, increased sales volume, etc.

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Illustration

Generation 2050 Technologies Ltd. develops cutting-edge innovations that are powering the next revolution in mobility and has nine tablet smart phone models currently in the market whose previous year financial data is given below:

Model	Sales (₹ 000)	Profit-Volume (PV) Ratio
Tab - A001	5,100	3.53%
Tab - B002	3,000	23.00%
Tab - C003	2,100	14.29%
Tab - D004	1,800	14.17%
Tab - E005	1,050	41.43%
Tab - F006	750	26.00%
Tab - G007	450	26.67%
Tab - H008	225	6.67%
Tab - I009	75	60.00%

Required

- Using the financial data, carry out a Pareto ANALYSIS (80/20 rule) of Sales and Contribution.
- DISCUSS your findings with appropriate RECOMMENDATIONS.

4.9

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Date	

⑥

STATEMENT SHOWING PARETO ANALYSIS ANALYSIS OF SALES

MODEL	SALES('000)	% $\left(\frac{\text{SALES}}{\text{TOTAL SALES}} \right) \times 100$	CUMULATIVE TOTAL
(TAB)			
A-001	5100	$= 35.05\%$ $\left(\frac{5100 \times 100}{14550} \right)$	35.05%
B-002	3000	$= 20.62\%$ $\left(\frac{3000 \times 100}{14550} \right)$	55.67%
C-003	2100	$= 14.43\%$ $\left(\frac{2100 \times 100}{14550} \right)$	70.1%
D-004	1800	$= 12.37\%$ $\left(\frac{1800 \times 100}{14550} \right)$	82.47%
E-005	1050	$= 7.22\%$ $\left(\frac{1050 \times 100}{14550} \right)$	89.69%
F-006	750	$= 5.15\%$ $\left(\frac{750 \times 100}{14550} \right)$	94.84%
G-007	450	$= 3.09\%$ $\left(\frac{450 \times 100}{14550} \right)$	97.93%
H-008	225	$= 1.55\%$ $\left(\frac{225 \times 100}{14550} \right)$	99.48%
I-009	75	$= 0.52\%$ $\left(\frac{75 \times 100}{14550} \right)$	100%
	14550	100%	

4.10

STATEMENT SHOWING ANALYSIS OF CONTRIBUTION

MODEL (TAB)	(CONTRIBUTION = SALES X P.V. RATIO)	ROUNDING-OFF	
		000	RANK
A-001	$(5100 \times 3.53\%) =$	180	(6)
B-002	$(3000 \times 23\%) =$	690	(1)
C-003	$(2100 \times 14.29\%) =$	300	(3)
D-004	$(1800 \times 14.17\%) =$	255	(4)
E-005	$(1050 \times 41.43\%) =$	435	(2)
F-006	$(750 \times 26.00\%) =$	195	(5)
G-007	$(450 \times 26.67\%) =$	120	(7)
H-008	$(225 \times 6.67\%) =$	15	(9)
I-009	$(75 \times 60\%) =$	45	(8)
		<u>2235</u>	
	<u>9.11</u>	CONTINUE.....	

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Date	

CONTINUE ---

STATEMENT SHOWING CONTRIBUTION ANALYSIS

(PARETO)

CUMULA
TIVE

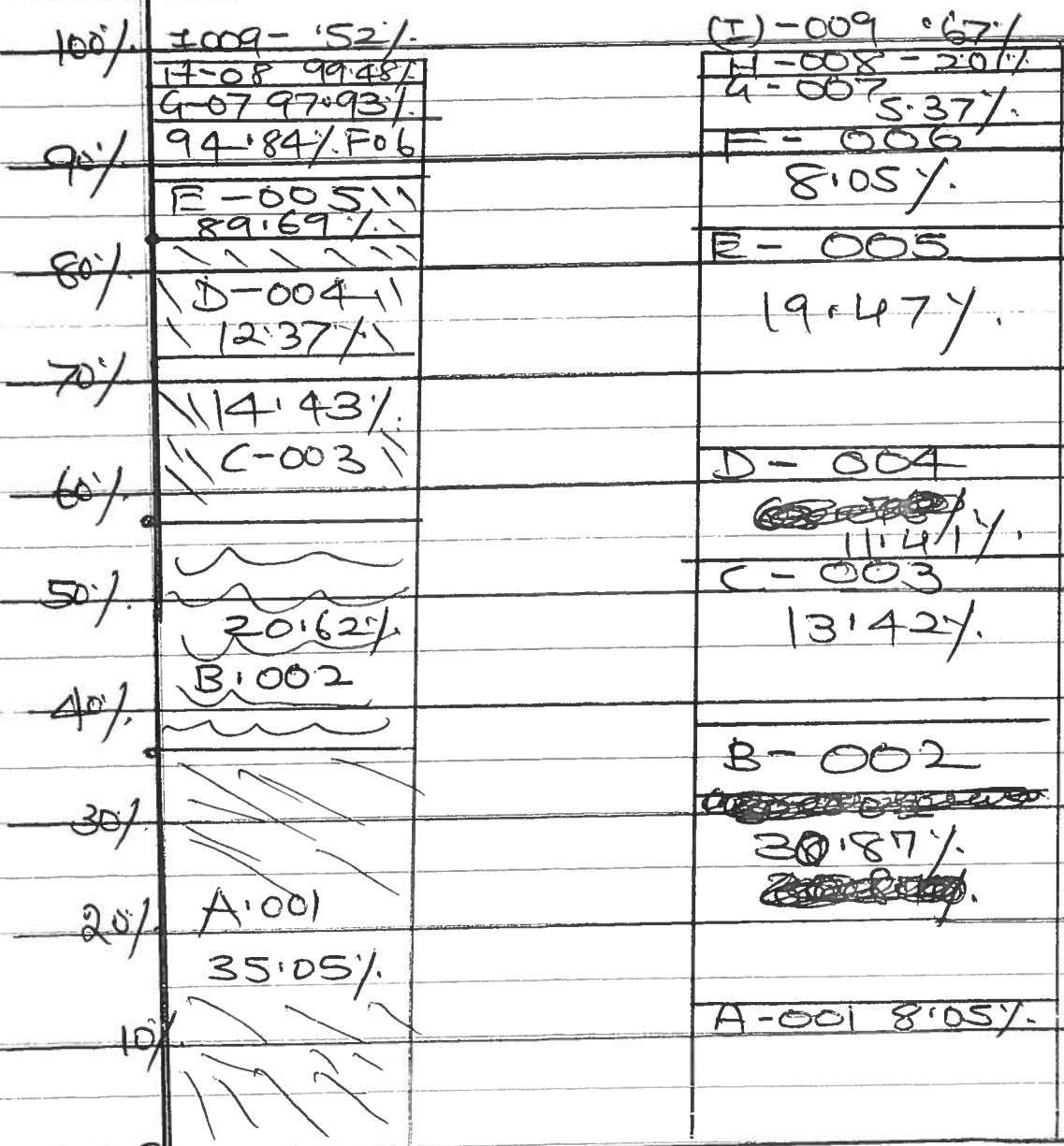
MODEL	MODEL	CONTRIBUTION ₹	(CONTRIBUTION TOTAL) X 100% (%)	
(1)	B-002	690	$\left(\frac{690}{2235} \times 100\right) = 30.87\%$	30.87%
(2)	E-005	435	$\left(\frac{435}{2235} \times 100\right) = 19.47\%$	50.44%
(3)	C-003	300	$\left(\frac{300}{2235} \times 100\right) = 13.42\%$	63.76%
(4)	D-004	255	$\left(\frac{255}{2235} \times 100\right) = 11.41\%$	75.17%
(5)	F-006	195	$\left(\frac{195}{2235} \times 100\right) = 8.73\%$	83.90%
(6)	A-001	180	$\left(\frac{180}{2235} \times 100\right) = 8.05\%$	91.95%
(7)	G-007	120	$\left(\frac{120}{2235} \times 100\right) = 5.36\%$	97.32%
(8)	I-009	45	$\left(\frac{45}{2235} \times 100\right) = 2.01\%$	99.33%
(9)	H-008	15	$\left(\frac{15}{2235} \times 100\right) = 0.67\%$	100%
		2235		
		4.12		

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8

CONTINUE - - - - -

DIAGRAM SHOWING SALES & CONTRIBUTION



SALES

CONTRIBUTION

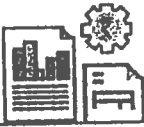
4.13

CHAPTER

5



**COST MANAGEMENT
FOR SPECIFIC SECTOR**



CASE STUDY No. 19

CASE STUDY No.

~~SPECIAL - SECTION~~

CASE STUDY No.

A Multinational company runs a Public Medical Health Center. For this purpose, it has hired a building at a rent of ₹ 10,000 per month with 5% of total taking. Health center has three types of wards for its patients namely. General ward, Cottage ward and Deluxe ward. State the rent to be charged to each bed-day for different type of ward on the basis of the following information;

- The number of beds of each type is General ward 100, Cottage ward 50, Deluxe ward 30.
- The rent of cottage ward bed is to be fixed at 2.5 times of the General ward bed and that of Deluxe ward bed as twice of the Cottage ward bed.
- The occupancy of each type of ward is as follows:
General ward 100%, Cottage ward 80% and Deluxe ward 60%. But, in General ward there were occasions when beds are full, extra beds were hired at a charges of ₹ 20 per bed. The total hire charges for the extra beds incurred for the whole year amount to ₹ 12,000.
- The Health center engaged a heart specialist from outside and on an average fees paid to him was ₹ 15,000 per trip. He makes three trips in the whole year.
- The other expenses for the year were as under:

(₹)	
Salary of Supervisors, Nurses, Ward Boys	4,25,000
Repairs and Maintenance	90,000
Salary of Doctors	13,50,000
Food Supplied to Patients	40,000
Laundry Charges for their Bed Linens	80,500
Medicines Supplied	74,000
Cost of Oxygen, X-Ray etc. (other than directly borne for treatment of Patients)	49,500
General Administration Charges	63,000

- Provide profit @ 20% on total taking.
- The Health center imposes 8% service tax on rent received
- 360 days may be taken in a year.

STUDY No. 19

424

5.1

 A manufacturing company runs its boiler on furnace oil obtained from X oil company and Y oil company whose depots are situated at a distance of 24 kms and 16 kms from the factory site.

Transportation of furnace oil is made by company's own tank lorries (two) of 8 ton capacity each. Onward trips are made only with full load and the lorries return empty. The filling time take an average of 40 minutes for X oil company and 30 minutes for Y oil company. The empty time in the factory is only 40 minutes for each. The average speed of lorries work out is 24 km per hour.

The varying operating charges average 80 paise per km covered and fixed charges gives an incidence of Rs. 7.50 per hour of operation.

Calculate the transportation cost per ton-km for each source of furnace oil.

CASE STUDY No. 20



S.2



BHG Toll Plaza Ltd built a 60 km. long highway and now operates a toll plaza to collect tolls from passing vehicles using the same. The company has invested ₹600 crore to build the road and has estimated that a total of 60 crore vehicles will be using the highway during the 10 years toll collection tenure. Toll Operating and Maintenance cost for the month of April 20X7 are as follows:

- o Collection Personnel (3 Shifts and 4 persons per shift) - ₹ 150 per day per person
- o Supervisor (2 Shifts and 1 person per shift) - ₹ 250 per day per person
- o Security Personnel (3 Shifts and 2 persons per shift) - ₹ 150 per day per person
- o Toll Booth Manager (2 Shifts and 1 person per shift) - ₹ 400 per day per person

(iii) Telephone – ₹ 40,000

(iv) Maintenance cost – ₹ 30 Lacs

(v) The company needs 25% profit over total cost to cover interest and other costs.

Required:

(i) Calculate cost per kilometer.

(ii) Calculate the toll rate per vehicle (assume there is only one type of vehicle).

COSTING OF TOLL ROADS

(ILL-10)

Q^{No}-29

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12.22

QUESTION 1) B.H.G. TOLL-PLAZA LTD

GIVEN → TOTAL KMS = 60
(ASSUME - ONLY ONE TYPE VEHICLE)

(A) APPORTIONMENT OF CAPITAL COST $\left(\frac{6000}{10} \times \frac{1}{12}\right)$ 500,00,000

(B) OPERATING COST

(I) SALARY OF COLLECTION PERSONNEL 54,000

(3 SHIFTS X 4 PERSON X 150 per day X 30 days)

(II) SUPERVISOR SALARY 15,000
 (2 SHIFTS X 1 PERSON X 250 X 30 days)

(III) SALARY OF SECURITY PERSONNEL 27,000
 (3 SHIFTS X 2 PERSONS X 150) X 30 days

(IV) TOLL BOOTH MANAGER 24,000
 (2 SHIFTS X 1 PERSON X 400 X 30 days)

(V) ELECTRICITY 80,000

(VI) TELEPHONE 40,000

(C) MAINT-COST

30,00,000

53,24,000

12-23

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Step No (2)

STATEMENT SHOWING CALCULATION OF COST PER KM

$$= \left(\frac{\text{TOTAL COST}}{\text{TOTAL KMS}} \right)$$

$$= \left(\frac{53240000}{60 \text{ kms}} \right) = 887333.333$$

Step No (3)

STATEMENT SHOWING TOLL RATE PER VEHICLE

	₹
TOTAL COST	532,40,000
PROFIT 25%	133,10,000
	<u>665,50,000</u>

$$\left(\frac{66550000}{5000000} \right) = 13.31$$

* NO OF VEHICLES USING HIGHWAY PER MONTH

$$\frac{\text{TOTAL ESTIMATED VEHICLES}}{10 \text{ years}} \times \frac{1 \text{ month}}{12 \text{ months}}$$

$$\left(\frac{6000}{10 \text{ years}} \times \frac{1 \text{ month}}{12 \text{ months}} \right) = 500000$$

COSTING FOR FINANCIAL INSTITUTIONS

12-24

Page No.

Date

ILL-11

P.

STATEMENT SHOWING COST-SHEET

(1)	DIRECT LABOUR COST	80000
(2)	OVER HEAD COST (25% X 12000)	3000
		<u>83000</u>

$$\text{COST-PER APPLICATION} = \left(\frac{83000}{100} \right) = 830$$

CASE STUDY No. 22

Q No - 10

ILLUSTRATION 11

The loan department of a bank performs several functions in addition to home loan application processing task. It is estimated that 25% of the overhead costs of loan department are applicable to the processing of home-loan application. The following information is given concerning the processing of a loan application:

Direct professional labor:

	(₹)
Loan processor monthly salary: (4 employees @ ₹ 20,000 each)	80,000
Loan department overhead costs (monthly)	
Chief loan officer's salary	5,000
Telephone expenses	750
Depreciation Building	2,800
Legal advice	2,400
Advertising	400
Miscellaneous	650
Total overhead costs	<u>12,000</u>

You are required to compute the cost of processing home loan application on the assumption that one hundred home loan applications are processed each month.

23

7-18

Q No - 28

Date _____

Following are the data pertaining to Infotech Pvt. Ltd, for the year 20X6-X7

The company executes a Project XYZ, the details of the same as are as follows:

Project duration – 6 months

One Project Leader and three Software Engineers were involved for the entire duration of the project, whereas Project Manager spends 2 months' efforts, during the execution of the project.

Travel expenses incurred for the project – ₹1,87,500

Two Laptops were purchased at a cost of ₹ 50,000 each, for use in the project and the life of the same is estimated to be 2 years

Prepare Project cost sheet

COSTING OF IT-ITES

Page No.

Date

EN-28

(ILL-9/12.23)

COSTING FOR I.T & ITES

INFOTECH-PVT-LTD

STATEMENT SHOWING PROJECT COST-SHEET

20X6-20X7

Rs

DURATION OF PROJECT - 6 MONTHS

(1) SALARY OF SOFTWARE-ENGINEERS 450000
($3 \times 25000 \times 6 \text{ months}$)

(2) SALARY OF PROJECT LEADER. 225000
(37500×6)

(3) SALARY OF PROJECT-MANAGER 100000
(50000×2)

TOTAL SALARY 775000

OVERHEADS ($50\% \times 775000$) = 387500

RECT-RATE = $\left(\frac{\text{OVERHEADS}}{\text{SALARY}} \right) = \left(\frac{1500000}{3000000} \times 100 \right)$

TRAVEL EXP

= 50%.

187500

DEP ON LAP TOP
(50000×2)

$\left(\frac{100000}{2 \text{ years}} \times 1.5 \text{ years} \right)$

25000

TOTAL PROJECT COST

1375000

* SALARY OF SOFTWARE ENGINEER/PER MONTH

PAR-ENGINEER

$\left(\frac{1500000}{12} \div 5 \right) = 25000$

SALARY OF PROJECT LEADER/PER MONTH PAR P.L

$\left(\frac{900000}{12} \div 2 \right) = 37500$

SALARY OF PROJECT MAN = 56000

CHAPTER

6



DECISION MAKING



LEARNING OUTCOMES

After studying this chapter, you will be able to:

- ☐ **Analyse** short-term decisions
- ☐ **Analyse** product mix decisions, including circumstances where linear programming methods are needed to identify 'optimal' solutions
- ☐ **Analyse** information to assess risk and its impact on short-term decisions
- ☐ **Discuss** the nature of risk and uncertainty and the attitudes to risk by decision makers
- ☐ **Evaluate** information to support project appraisal
- ☐ **Analyse** information for use in long-term decision making (including consideration of tax, inflation and other factors)
- ☐ **Compare and Contrast** alternative approaches proposed to address business challenges or opportunities for a given entity

Shut Down or Continue

CASE STUDY No. ~~23~~ 24

Paints Ltd. manufactures 2,00,000 tins of paint at normal capacity. It incurs the following manufacturing costs per unit:

Direct material.....	(₹)
Direct labour.....	7.80
Variable overhead.....	2.10
Fixed overhead.....	2.50
	<u>4.00</u>
Production cost / unit.....	16.40

Each unit is sold for ₹ 21, with an additional variable selling overhead incurred at ₹ 0.60 per unit.

During the next quarter, only 10,000 units can be produced and sold. Management plans to shut down the plant estimating that the fixed manufacturing cost can be reduced to ₹ 74,000 for the quarter.

When the plant is operating, the fixed overheads are incurred at a uniform rate throughout the year. Additional costs of plant shut down for the quarter are estimated at ₹ 14,000.

Required

- To advise whether it is more economical to shut down the plant during the quarter rather than operate the plant.
- Calculate the shut down point for the quarter in terms of numbering units.

CASE STUDY No. ~~24~~ 25

G Ltd. produces and sells 95,000 units of 'X' in a year at its 80% production capacity. The selling price of product is ₹ 8 per unit. The variable cost is 75% of sales price per unit. The fixed cost is ₹ 3,50,000. The company is continuously incurring losses and management plans to shut-down the plant. The fixed cost is expected to be reduced to ₹ 1,30,000. Additional costs of plant shut-down are expected at ₹ 15,000.

Should the plant be shut-down? What is the capacity level of production of shut-down point?

~~4.00~~

16.1

CASE STUDY No. 26

Shut Down or Continue

3. If AIG Limited operates its plant at normal capacity it produces 2,00,000 units from the plant 'C'. The unit cost of manufacturing at normal capacity is as under:

	₹
Direct material.....	65
Direct labour.....	30
Variable overhead.....	33
Fixed overhead.....	7
	135

Direct labour cost represents the compensation to highly-skilled workers, who are permanent employees of the company. The company cannot afford to lose them. One labour hour is required to complete one unit of the product.

The company sells its product for ₹ 200 per unit with variable selling expenses of ₹ 16 per unit. The company estimates that due to economic down turn, it will not be able to operate the plant at the normal capacity, at least during the next year. It is evaluating the feasibility of shutting down the plant temporarily for one year.

If it shuts down the plant, the fixed manufacturing overhead will be reduced to ₹ 1,25,000. The overhead costs are incurred at a uniform rate throughout the year. It is also estimated that the additional cost of shutting down will be ₹ 50,000 and the cost of re-opening will be ₹ 1,00,000.

Required

Calculate the minimum level of production at which it will be economically beneficial to continue to operate the plant next year if 50% of the labour hours can be utilized in another activity, which is expected to contribute at the rate of ₹ 40 per labour hour. The additional activity will relate to a job which will be off-loaded by a sister company only if the company decides to shut down the plant.

(Assume that the cost structure will remain unchanged next year. Ignore income tax and time value of money)

44

6.2

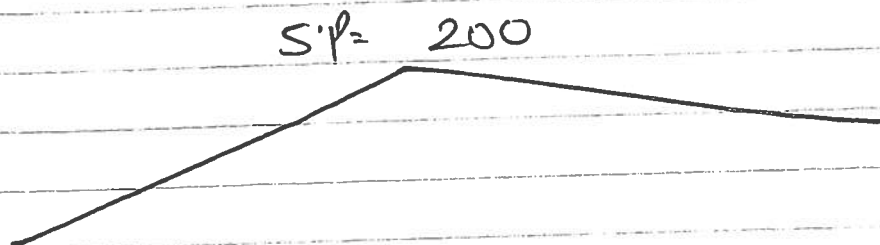
QNO-3

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GIVEN

$$\text{FIXED COST} = 1400000$$

$$(200000 \times 7)$$

V. COSTCONT-P.U.
86.00

$$D_{mat} = 65$$

$$D_{lab} = F$$

$$V.O = 33$$

$$S.O = 16$$

$$\underline{114}$$

FIXED COST IF CONTINUE

FIXED COST

1400000

LOSS OF CONTRIBUTION

$$(200000 \text{ units} \times 1 \text{ hr} \times 40\% \times 50\%)$$

4000000

5400000FIXED COST - IF SHUT DOWN

SHUT DOWN COST

$$= 50000$$

RE-OPENING COST

$$= 100000$$

SHUT DOWN FIXED COST

$$= 125000$$

275000

$$\text{SHUT DOWN POINT} = \left(\frac{5400000 - 275000}{86} \right) = 59593.0$$

$$= \underline{59594 \text{ UNITS}}$$

14-18

6.3

CASE STUDY No. 27

Question

Tiptop Textiles manufactures a wide range of fashion fabrics. The company is considering whether to add a further product the "Superb" to the range. A market research survey recently undertaken at a cost of Rs.50,000 suggests that demand for the "Superb" will last for only one year, during which 50,000 units could be sold at Rs.18 per unit. Production and sale of "Superb" would take place evenly throughout the years. The following information is available regarding the cost of manufacturing "Superb".

Raw Materials: Each "Superb" would require 3 types of raw material Posh, Flash and Splash. Quantities required, current stock levels and cost of each raw material are shown below. Posh is used regularly by the company and stocks are replaced as they are used. The current stock of Flash is the result of overbuying for an earlier contract. The material is not used regularly by Tiptop Textiles and any stock that was not used to manufacture "Superb" would be sold. The company does not carry a stock of Splash and the units required would be specially purchased.

Raw Material	Quantity required per unit of Superb (metres)	Current stock level (metres)	Costs per metre of raw material		
			Original cost	Current replacement cost	Current resale value
			Rs.	Rs.	Rs.
Posh	1.00	1,00,000	2.10	2.50	1.80
Flash	2.00	60,000	3.30	2.80	1.10
Splash	0.5	0	—	5.50	5.00

Labour: Production of each "Superb" would require a quarter of an hour of skilled labour and two hours of unskilled labour. Current wage rates are Rs.3 per hour for skilled labour and Rs.2 per hour for unskilled labour. In addition, one foreman would be required to devote all his working time for one year in supervision of the production of Superb. He is currently paid an annual salary of Rs.15,000. Tiptop Textiles is currently finding it very difficult to get skilled labour. The skilled workers needed to manufacture "Superb" would be transferred from another job on which they are earning a contribution surplus of Rs.1.50 per labour hour, comprising sales revenue of Rs.10.00 less skilled labour wages of Rs.3.00 and other variable costs of Rs.5.50. It would not be possible to employ additional skilled labour during the coming year. Because the company intends to expand in the future, it has decided not to terminate the services of any unskilled worker in the foreseeable future. The foreman is due to retire immediately on an annual pension of Rs.6,000 payable by the company. He has been prevailed upon to stay on for a further year and to defer his pension for one year in return for his annual salary.

Machinery: Two machines would be required to manufacture "Superb" MT 4 and MT 7. Details of each machine are as under:

		Start of the year Rs.	End of the year Rs.
MT 4	Replacement cost	80,000	65,000
	Resale value	60,000	47,000
MT 7	Replacement cost	13,000	9,000
	Resale value	11,000	8,000

Straight line depreciation has been charged on each machine for each year of its life. Tiptop Textiles owns a number of MT 4 machines, which are used regularly on various products. Each MT 4 is replaced as soon as it reaches the end of its useful life. MT 7 machines are no longer used and the one which would be used for "Superb" is the only one the company now has. If it was not used to produce "Superb", it would be sold immediately.

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Date	

Overheads: A predetermined rate of recovery for overhead is in operation and the fixed overheads are recovered fully from the regular production at Rs.3.50 per labour hour. Variable overhead costs for "Superb" are estimated at Rs.1.20 per unit produced.

For the decision-making, incremental costs based on relevant costs and opportunity costs are usually computed.

You are required to compute such a cost sheet for "Superb" with all details of materials, labour, overhead etc., substantiating the figures with necessary explanations.

ASE STUDY No. 28 **Question**

The Aylett and Co., Ltd has been offered a contract, if accepted would significantly increase next year's activity levels. The contract requires the production of 20,000 kg. of product X and specifies a contract price of Rs.100 per kg. The resources used in the production of each kg. of X include the following:

Resources per kg. of Product X		
Labour Grade 1		2 hours
Grade 2		6 hours
Materials A		2 units
B		1 litre

Grade 1 labour is highly skilled and although it is currently under utilised in the firm it is Aylett's policy to continue to pay grade 1 labour in full. Acceptance of the contract would reduce the Idletime of grade 1 labour. Idle time payments are treated as nonproduction overheads.

Grade 2 is unskilled labour with a high turnover and may be considered a variable cost.

The costs to Aylett of each type of labour are:

- Grade 1 Rs.4 per hour
- Grade 2 Rs.2 per hour

The materials required to fulfil the contract would be drawn from those materials already in stock. Materials A is widely used within the firm and any usage for this contract will necessitate replacement. Materials B was purchased to fulfill an expected order that was not received, if material B is not used for the contract, it will be sold. For accounting purposes FIFO is used. The various values and costs for A and B are:

	A Per Unit Rs.	B Per Litre Rs.
Book value	8	30
Replacement cost	10	32
Net realisable value	9	25

CASE STUDY No. 29

Page No.	
Date	

A single recovery rate for fixed factory overheads is used throughout the firm even though some fixed production overheads could be attributed to single products or Departments. The overhead is recovered per productive labour hour and initial estimates of next year's activity, which excludes the current contract, show fixed production overheads of Rs.6,00,000 and productive labour hours of 3,00,000. Acceptance of the contract would increase fixed production overheads by Rs.2,28,000. Variable production overheads are accurately estimated at Rs.3/- per productive hour.

Acceptance of the contract would be expected to encroach on the sale and production of another product, Y which is also made by Aylett Ltd. It is estimated that sales of Y, would then decrease by 5,000 units in the next year only. However this forecast reduction in sales of Y would enable attributable fixed factory overheads of Rs.58,000 to be avoided. Information on Y is as follows:

	Per unit
Sales price	Rs.70
Labour - Grade 2	4 hours
Materials -relevant variable costs	Rs.12

All activity undertaken by Aylett is job costed using full, absorption, costing in order to derive a profit figure for each contract. If the contract for X is accepted it will be treated as a separate job for routine costing purposes. The decision to accept or reject the contract will be taken in sufficient time to enable its estimated, effects to be incorporated in the next year's budgets and also in the calculations carried out to derive the overhead recovery rate to be used in the forthcoming year.

Required:

(a) Advise Aylett on the desirability of the contract

CASE STUDY No. 30

Question 1

An item of finished goods inventory that cost Rs.200 per unit to make is facing the danger of becoming obsolete. There are two following alternative ways of disposing it of:

Sell the stock to P for Rs.200; or to Q for Rs.216. Q's place is twice as far away as that of P though due to favourable transport conditions the delivery time will be the same. The cost accountant has prescribed the following cost estimates for delivery:

P - Petrol and oil Rs.10, wages Rs.12, share of licence, insurance and depreciation (based on mileage) Rs.14.

Q - Petrol and oil Rs.20, wages Rs.12, share of licence, insurance and depreciation Rs.28.

You are required to recommend whether the stock should be sold to P or Q.

CASE STUDY No. 31.....

Page No.			
Date			

A company had nearly completed a job relating to construction of a specialised equipment, when it discovered that the customer had gone out of business. At this stage, the position of the job was as under:

		(₹)
Original cost estimate		1,75,200
Costs incurred so far		1,48,500
Costs to be incurred		29,700
Progress payment received from original customer		1,00,000

After searches, a new customer for the equipment has been found. He is interested to take the equipment, if certain modifications are carried out. The new customer wanted the equipment in its original condition, but without its control device and with certain other modifications. The costs of these additions and modifications are estimated as under:

Direct Materials (at cost)	₹ 1,050
Direct Wages Dept.: A	15 men days
Dept.: B	25 men days
Variable Overheads	25% of Direct Wages in each Dept.
Delivery Costs	₹ 1,350

The following additional information is available:

- (1) The direct materials required for the modification are in stock and if not used for modification of this order, they will be used in another job in place of materials that will now cost Rs. 2,250.
- (2) Department A is working normally and hence any engagement of labour will have to be paid at the direct wage rate of Rs. 120 per man day.
- (3) Department B is extremely busy. Its direct wages rate is Rs. 100 per man day and it is currently yielding a contribution of Rs. 3.20 per rupee of direct wages.
- (4) Supervisory overtime payable for the modification is Rs. 1,050.
- (5) The cost of the control device that the new customer does not require is Rs. 13,500. If it is taken out, it can be used in another job in place of a different mechanism. The latter mechanism has otherwise to be bought for Rs. 10,500. The dismantling and removal of the control mechanism will take one man day in department A.
- (6) If the convention is not carried out, some of the materials in the original equipment can be used in another contract in place of materials that would have cost Rs. 12,000. It would have taken 2 man days of work in department A to make them suitable for this purpose. The remaining materials will realise Rs. 11,400 as scrap. The drawings, which are included as part of the job can be sold for Rs. 1,500.

You are required to calculate the minimum price, which the company can afford to quote for the new customer as stated above.

19

CASE STUDY No. 32Question /

From the undermentioned figures calculate :

- (I) P/V ratio and the total fixed expense;
 (II) Profit or loss arising from the sales of Rs. 12,000;
 (III) Sales required to earn a profit of Rs. 2,000;
 (IV) Sales required to break-even.

	Sales Rs.	Profit Rs.
First Period	14,433	385
Second Period	18,203	1,139

CASE STUDY No. 33

Anuradha Enterprises manufactures and sells black phenyl worth Rs. 20,000, white phenyl worth Rs. 25,000, scented phenyl worth Rs. 10,000 and naphthalene balls worth Rs. 5,000 every month. The firm's total fixed costs per month are Rs. 14,700. The variable costs are: on black phenyl 60%, on white phenyl 68%, on scented phenyl 80% and on naphthalene balls 40%.

The proprietress, Ms. Anuradha Shah, being basically a science graduate, wonders at what combined sales volume does she really start earning profit. Please help her in arriving at such a sales volume.

CASE STUDY No. 34Question

Zed Ltd. manufactures two products P and Q and sells them at Rs. 215 and Rs. 320 per unit respectively. The variable costs per unit are as under:

	Product - P (Rs.)	Product - Q (Rs.)
Raw Materials:		
Material - X	22.00	28.00
Material - Y	8.00	32.00
Direct Wages (Rs. 6 per labour hour):		
Department - A	36.00	54.00
Department - B	18.00	36.00
Department - C	54.00	-
Department - D	-	72.00
Variable Overheads	23.00	14.30

The company procures raw materials against import license. The company operates at single shift a day of 8 hours for 300 days in a year. The number of workmen engaged are 30, 16, 18 and 24 in departments A, B, C and D respectively.

Neither the workers are subject to transfer from one department to another nor any new recruitment is possible at present. Fixed costs are Rs. 12,000 per month.

You are required to find out the following :

- (a) The product-mix to yield maximum profit.
 (b) The most profitable product if only one product is to be manufactured. Whether the answer will differ if license to import raw materials is released only for Rs. 1,80,000?

16-6
4-3

The relevant data of X Ltd. for its three products A, B and C is as under :

	A	B	C
Direct Material (Rs./Unit)	260	300	250
Direct Labour (Rs./Unit)	130	270	260
Variable Overheads (Rs. Unit)	110	230	180
Selling Price (Rs./Unit)	860	1,040	930
Machine Hours Required (Per Unit)	12	6	3

The estimated fixed overheads at four different levels of 3,600; 6,000; 8,400; and 10,800 machine hours are Rs. 1,00,000; Rs. 1,50,000; Rs. 2,20,000 and Rs. 3,00,000 respectively.

The maximum demand of A, B and C in a cost period are 500; 300 and 1,800 units respectively.

You are required to find out (1) the most profitable product mix at each level and (2) the level of activity where the profit would be maximum.

Question

The total cost of a manufactured component is as under:

Prime cost Rs. 15 Fixed overhead Rs. 4

Variable overhead Rs. 7 Total cost Rs. 26

The same part is available in the market at Rs. 23. Should the firm make it or buy it?

Question

(a) Alcos Ltd., manufactures and sells four types of products under the brand names A, B, C and D. The sales mix in value comprises 33-1/3%, 41-2/3%, 16-2/3% and 8-1/3% of A, B, C and D respectively. The total budgeted sales (100%) are Rs. 60,000 per month.

Operating costs are :

Variable costs:

A	60% of selling price
B	68% of selling price
C	80% of selling price
D	40% of selling price

Fixed costs - Rs. 14,700 per month:

Calculate the break-even point for the products on an overall basis.

(b) It has been proposed to change the sales mix as follows, the total sales per month remaining Rs. 60,000.

A	25%
B	40%
C	30%
D	5%

Assuming that the proposal is implemented.

Calculate the new break-even point.

6.7

4.24

CASE STUDY No. 37

V.C. Ltd. makes and sells two products, P and Q. The budgeted selling price of P is ₹ 1,800 and that of Q is ₹ 2,160. Variable costs associated with producing and selling the P are ₹ 900, and with Q ₹ 1,800. Annual fixed production and selling costs of V.C. Ltd. are ₹ 88,000.

The company has two production/ sales options. The P and Q can be sold either in the ratio of two P to three Q or in the ratio of one P to two Q.

Required

What will be the optimal mix and why?

Handwritten signature

CASE STUDY No. 38

N.P. Ltd. produces two products P and Q. The draft budget for the next month is as under:

	P	Q
Budgeted Production and Sales (units)	40,000	80,000
Selling Price ₹ / unit	25	50
Total Costs ₹ / unit	20	40
Machine Hours / unit	2	1
Maximum Sales Potential (units)	60,000	1,00,000

The fixed expenses are estimated at ₹ 9,60,000 per month. The company absorbs fixed overheads on the basis of machine hours which are fully utilised by the budgeted production and cannot be further increased.

When the budget was discussed, the Managing Director stated that the product mix should be altered to yield optimum profit.

The Marketing Director suggested that he would introduce a new Product-C, each unit of which will take 1.5 machine hours. However, a processing vat involving a capital outlay of ₹ 2,00,000 is to be installed for processing Product -C. The additional fixed overheads relating to the processing vat was estimated at ₹ 60,000 per month. The variable cost of Product- C was estimated at ₹ 21 per Unit.

Required

- Calculate the profit as per draft budget for the next month.
- Revise the product mix based on data given for P and Q to yield optimum profit.
- The company decides to discontinue either Product- P or Q whichever is giving lower profit and proposes to substitute Product- C instead. Fix the selling price of product- C in such a way as to yield 15% return on additional capital employed besides maintaining the same overall profit as envisaged in (ii) above.

6.8

4.35

CASE STUDY

Future Ltd. manufactures product N using one unit each of three components named P, Q & R and sells it at ₹ 37.50 per unit. It has two divisions. In production division it produces all the types of components by using its full capacity of 42,000 machines hours. In assembly division the remaining job is performed by the workers manually before N is ready for sale:

Product N is manufactured in batches of 100 units and the data relating to the current production per batch are:

	Machine Hours	Variable Cost (₹)	Fixed Cost (₹)	Total Cost (₹)
Production Division:				
Component – P	15	375	150	525
Component – Q	25	450	175	625
Component – R	30	450	450	900
Assembly Division:				
Assembly---		800	325	1,125
		2,075	1,100	3,175

For the next year the company has estimated that its sale would go up by 50% more than the present sales and probably even by 75% if the production capacity is made available.

The machine capacity cannot be increased during the next year even though the workers in the assembly division can be increased as per requirement without any increase in fixed costs. To meet the increased demand, production can be taken up and processed in assembly division by procuring the components from the open market. The company has received the following price quotations for the purchase of components:

	P	Q	R
Price offered per component (₹)	5.55	7.00	8.40

Required

- Determine the production and profits being earned at present.
- Indicate which of the component (s) should be purchased and in what quantities at the two estimated levels of output viz. increase by 50% and 75% of existing production.
- Prepare a statement showing the company's profitability at both the estimated levels of output.

~~4.21~~

6.9

6.9

ASE STUDY No.

40

Agro caps Ltd., engaged in manufacturing agricultural machinery, is preparing its annual budget for the coming year. The company has a metal pressing capacity of 20,000 hours, which will be insufficient for manufacture of all requirements of components A, B, C and D.

The company has the following choices-

- Buy the components entirely from outside suppliers.
- Buy from outside suppliers and / or use a partial second shift.

The data for the current year are given below-

Standard Production Cost per unit-

	A (₹)	B (₹)	C (₹)	D (₹)
Requirement (in units)	2,000	3,500	1,500	2,800
Variable Cost				
Direct Materials	37	27	25	44
Direct Wages	10	8	22	40
Direct Expenses	10	20	10	60
Fixed Overhead	5	4	11	20
Total Production Cost	62	59	68	164

Direct expenses relate to the use of the metal presses which cost ₹ 10 per hour, to operate. Fixed overheads are absorbed as a percentage of direct wages.

Supply of all or any part of the total requirement can be obtained following prices, each delivered to the factory-

Component	(₹)
A.....	60
B.....	59
C.....	52
D.....	168

Second shift operations would increase direct wages by 25 percent over the normal shift and fixed overhead by ₹ 500 for each 1,000 (or part thereof) second shift hours worked.

Required

- Which component, and in what quantities should be manufactured in the 20,000 hours of press time available?
- Whether it would be profitable to make any of the balance of components required on a second shift basis instead of buying them from outside suppliers.

(20)

6.27

6.10

6. The profit for the year of Garena Ltd. works out to 12.5% of the capital employed and the relevant figures are as under:

BASE STUDY NO.

Sales.....	₹ 5,00,000
Direct Materials.....	₹ 2,50,000
Direct Labour.....	₹ 1,00,000
Variable Overheads.....	₹ 40,000
Capital Employed.....	₹ 4,00,000

41

The new Sales Manager who has joined the company recently estimates for next year a profit of about 23% on capital employed, provided the volume of sales is increased by 10% and simultaneously there is an increase in Selling Price of 4% and an overall cost reduction in all the elements of cost by 2%.

Required

Find out by computing in detail the cost and profit for next year, whether the proposal of Sales Manager can be adopted.

STATEMENT SHOWING ANALYSIS OF PROPOSAL

	PRESENT Rs	PROPOSED Rs
(A) SALES	500000	$500000 \times \frac{110}{100} \times \frac{104}{100}$ = 572000
(B) VARIABLE COST		
(1) DIRECT-MAT	(250000)	$(250000 \times \frac{110}{100} \times \frac{98}{100})$ (269500)
(2) DIRECT-LABOUR	(100000)	$(100000 \times \frac{110}{100} \times \frac{98}{100})$ (107800)
(3) V.O.	(40000)	$(40000 \times \frac{110}{100} \times \frac{98}{100})$ (43120)
(C) CONTRIBUTION	110000	151580
(D) = FIXED COST	(60000)	(58800)
		$(60000 \times \frac{98}{100})$
Profit/Loss	50000	92780

$\frac{92780}{400000} \times 100 = 23.195\%$

$\frac{92780}{400000} \times 100 = 23.195\%$

CHAPTER

6



DECISION MAKING



DECISION-MAKING - FN-DKC-FORMAT			
ICAF	PAGE-NO -MODULE	DKC S.N.	NAME OF CHAPTER AS PER DKC-LIVE BOOK
NEW-	SYLLABUS		
	6.4	1.2	A.B.C. COSTING
	6.6	3	CONDITION - C.V.P ANALYSIS
	6.7	7	SERVICE SECTOR COSTING
	6.13	7	SERVICE - SECTOR - COSTING
	6.16	3	C.V.P. LIMITING FACTOR
	6.20	2	RELEVANT - COSTING (COST-CONCEPT - DECISION-MAKING)
	6.22	1.8	SHUT DOWN POINT
	6.25	14	L.P.P. → (O.R)

6.4 → A-B-C

CASE STUDY NO.

Page No.

Date

ACTIVITY BASED C.V.P ANALYSIS**Illustration**

Catalyst Ltd. Makes a single product with the following details:

Selling Price (₹/unit)	10	
Direct Costs (₹/unit)	5	
Present number of setups per production period (before each production run, setup is done)	42	
Cost per set up (₹)	450	Decrease by ₹90
Production units per run	960	1,008
Engineering hours for production period	500	422
Cost per engineering hour (₹)	10	

The company has begun Activity Based Costing of fixed costs and has presently identified two cost drivers, viz. production runs and engineering hours. Of the total fixed costs presently at ₹ 96,000, after the above, ₹ 72,100 remains to be analyzed. There are changes as proposed above for the next production period for the same volume of output.

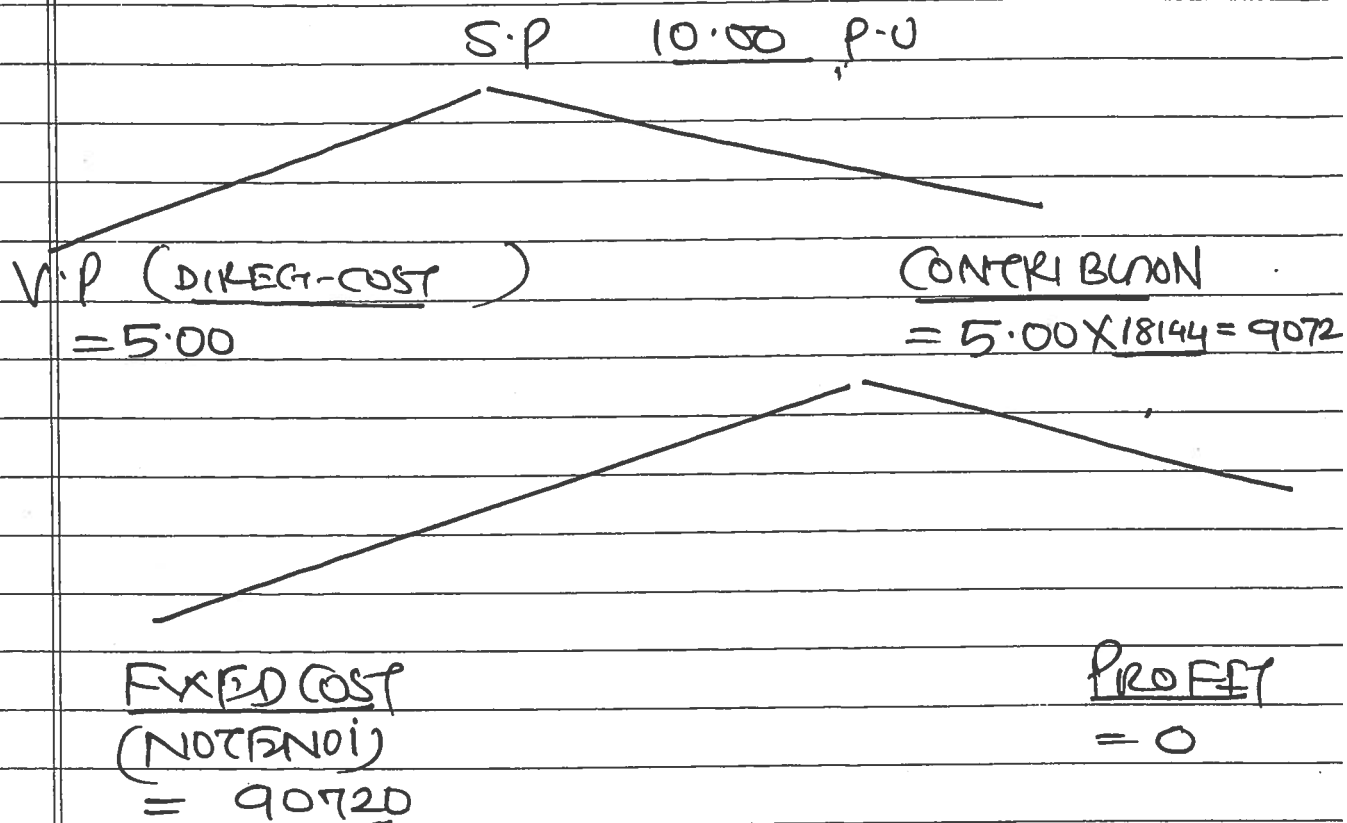
Required

- How many units and in how many production runs should Catalyst Ltd. produce in the changed scenario in order to break-even?
- Should Catalyst Ltd. continue to break up the remaining fixed costs into activity based costs? Why?

6.12

ANSNO (I) (I)

B.E.P ANALYSIS



NOTENO - (I)

FIXED COST

→

R.
72 100~~NO OF~~ SETUP-COST

→

14 400

~~PROBLEM~~

$$\text{NO OF SETUP} \times \text{PRODUCTION} = \text{UNIB}$$

$$42 \times 960 = 40320$$

$$\left(\frac{40320 \text{ UNIB}}{1008} \right) \times (450 - 90)$$

ENGLU-COST

$$\text{ENGLU m.} \times 10 = \text{ENGLUCOST}$$

$$422 \times 10 = 4220$$

TOTAL 90720

(II)

$$\text{PRODUCTION RUNS} = \left(\frac{18144}{1008} \right) = 18 \text{ NOS}$$

(B.E.P. UNITS $\frac{1}{\text{PRODUCTION UNIB PER RUN}}$)

6.6 ~~222~~ C.V.P

CASE STUDY No...

423

Date

Example

The selling price of a product for the next accounting period is ₹110, and the variable cost is estimated to be ₹70 per unit. The budgeted fixed costs for the period are ₹1,63,500. Estimated sales for the period are 5,000 units, and it is assumed that the probability distribution for the estimated sales quantity is normal with a standard deviation of 125 units. The selling price, variable cost and total fixed cost are assumed to be certain. What is the probability of profits being greater than ₹40,000?

EXPECTED PROFIT =

(EXPECTED SALES UNIT $\times$ CONTRIBUTION P.U. - FCOST)

$$\begin{aligned} (5000 \text{ UNIT}) \times 40 &= 200000 \\ \text{FCOST} &= (163500) \\ \hline &36500 \end{aligned}$$

STANDARD DEVIATION

STANDARD DEVIATION

OF SALES VOLUME $\times$

CONT. P.U.

$$125 \times 40 = 5000$$

$$Z = \frac{(40000 - 36500)}{5000}$$

$$Z = .70$$

$$\text{PROBABILITY} = .7580$$

(C-2-TABLE)

(1 - .7580) = .2420 IS THE
PROBABILITY THAT PROFIT WILL
BE LESS THAN ₹40,000. 16.14

6.7 → SERVICE SECTOR

Page No.	
Date	

CASE STUDY No. 44

Illustration

Expert Roadways Services Pvt. Ltd. is planning to run a fleet of 15 buses in Birpur City on a fixed route. Company has estimated a total of 2,51,85,000 passenger kilometers per annum. It is estimated buses to have 100% load factor. Buses are purchased at a price of ₹ 44,00,000 per unit whose scrape value at the end of 5 years life is ₹ 5,50,000. Seating capacity of a bus excluding a Driver's seat is 42. Each bus can give a mileage of 5 kmpl. Average cost of fuel is ₹ 66 per liter. Cost of Lubricants & Sundries per 1,000 km would be ₹ 3,300. Company will pay ₹ 27,500 per month to Driver and two attendants for each bus.

Other annual charges per bus: Insurance ₹ 55,000, Garage Charges ₹ 33,000, Repairs & Maintenance ₹ 55,000. Route Permit Charges upto 20,000 km is ₹ 5,500 and ₹ 2,200 for every additional 5,000 km or part thereof.

Required

- (i) CALCULATE a suggested fare per passenger/km taking into account markup on cost @20% to cover general overheads and sufficient profit.
- (ii) The Transport Sector of Birpur is highly regulated. The Government has fixed the fare @ ₹ 1.35 for next 2 years. COMMENT on the two year's profitability taking into consideration the inflation rate of 8%.

Note: Route permit charges is not subject to Inflation.

6.15

[6.7]

Page No.	
Date	

C.V.P. ANALYSIS IS SERVICE AND PROFIT ORG

STATEMENT SHOWING TOTAL KMS / TOTAL PASS KMS

GIVEN:

$$\text{TOTAL KMS PASSENGERS} = 251,85,000$$

$$\text{SEATING CAPACITY (EXCLUDING - DRIVER)} = (42-2) = 40$$

$$\text{NO OF BUSES} = 15$$

$$\text{PASSENGER KMS PER BUS} = \frac{(25185000)}{15} = 1679000$$

$$\text{KMS} = \frac{(1679000)}{40} = 41975$$

VERIFICATION

$$\text{KMS} \times \text{PASSENGERS} \times \text{NO OF BUSES} = \text{PASS KMS}$$

$$41975 \times 40 \times 15 = 25185000$$

[6.16]

SOLNO (2)

STATEMENT SHOWING TOTAL TAKINGS FOR THE YEAR

	Rs
(1) DEP $\left(\frac{4400000 - 550000}{5 \text{ years}} \right)$	= 770000
(2) FUEL COST $\left(\frac{41975 \times 66}{5 \text{ kms}} \right)$	= 554070
(3) COST OF LUBRICANTS $\left(\frac{41975 \text{ kms} \times 3300}{1000} \right)$	= 138517
(4) SALARY OF DRIVER & ATTENDANTS (27500×12)	= 330000
(5) OTHER ANNUAL CHARGES	= 55000
(6) GARAGE - CHARGES	= 33000
(7) REPAIRS & MAINT.	= 55000
(8) ROUTE - PERMIT - CHARGES	= 16500
Rs kms Rs kms	
5500 20000 2200 5000	
$(5500 + 2200 + 2200 + 2200 + 2200)$	
TOTAL COST	1952087
PROFIT/GAIN O'H (20% - 1952087.50)	390417
FIXED RATE @ 1.35	TOTAL-REVENUES 235250

SHEET (3) STATEMENT SHOWING ANALYSIS OF P.T.

	YEAR (I)	YEAR (II)
(1) DEF	770000	770000
(2) FUEL-COST	598395.60 (554070 X 108%)	646267.25 (598395.6 X 108%)
(3) COST OF LUBRICANTS	149598.90 (138517.5 X 1.08%)	161566.81 (149598.9 X 108%)
(4) SACARY OF DRIVER/ATT.	356400 (330000 X 108%)	384912
(5) OTHER ANNUAL CHA.	59400 (55000 X 108%)	64152 550 (59400 X 108%)
(6) GARAGE-CHARG	35640 (33000 X 108%)	38491.20 (35640 X 108%)
(7) Rep & MAINT	59400 (55000 X 108%)	64152 (59400 X 108%)
(8) ROUTE-PAL-CHARG	16500	16500
TOTAL COST	2045334.50	2146041.26
P.T.	221315.50	120608.74
REVENUES	2266550.50 (41975 KMS X 40 PPM X 1.35)	2266650 (120608.74 2146041.26 X 100)
$\left(\frac{P.T.}{\text{Revenue}} \times 100\right)$	$\left(\frac{221315.50}{2266650} \times 100\right)$	$\left(\frac{120608.74}{2266650} \times 100\right)$
	16.18	
	= 9.76%	5.32%

G.13 - SERVE SECTOR

CASE STUDY No. 45

Illustration

Recently, Ministry of Health and Family Welfare along with Drug Control Department have come hard on health care centres for charging exorbitant fees from their patients. Human Health Care Ltd. (HHCL), a leading integrated healthcare delivery provider company is feeling pinch of measures taken by authorities and facing margin pressures due to this. HHCL is operating in a competitive environment so; it's difficult to increase patient numbers also. Management Consultant of the company has come out with some plan for cost control and reduction.

HHCL provides treatment under package system where fees is charged irrespective of days a patient stays in the hospital. Consultant has estimated 2.50 patient days per patient. He wants to reduce it to 2 days. By doing this, consultant has targeted the general variable cost of ₹ 500 per patient day. Annually 15,000 patients visit to the hospital for treatment.

Medical Superintendent has some concerns with that of Consultant's plan. According to him, reducing the patient stay would be detrimental to the full recovery of patient. They would come again for admission thereby increasing current readmission rate from 3% to 5%; it means readmitting 300 additional patients per year. Company has to spend ₹ 25,00,000 more to accommodate this increase in readmission. But Consultant has found blessing in disguise in this. He said every readmission is treated as new admission so it would result in additional cash flow of ₹ 4,500 per patient in the form of admission fees.

Required

- CALCULATE the impact of Management Consultant's plan on profit of the company.
- Also COMMENT on result and other factors that should be kept in mind before taking any decision.

HUMAN HEALTH CARE LTD

STATEMENT SHOWING COST BENEFIT ANALYSIS

PARTICULARS	Rs
<u>COST- RELEVANT</u>	
INC- COST- DUE-TO- INC- IN READMISSION.	(2500000)
<u>BENEFIT</u>	
SAVING IN GENERAL VARIABLE COST DUE TO REDUCTION IN PATIENT DAYS (15000 PATIENTS X (2.5 - 2) X 500)	3750000
REVENUE FROM INCREASED READMISSION (300 Pat days X 4500)	1350000
<u>G.19</u> <u>INC- BENEFIT</u>	<u>2600000</u>

6-16 C.V.P ANALYSIS
LIMITING - FACTOR

Page No.

Illustration

CASE STUDY No.....

CASE STUDY No..... 46

Aditya Ltd. manufactures four products A-1, B-2, C-3 and D-4 in Gurgaon and one product F-1 in Faridabad. Aditya Ltd. operates under Just-in-time (JIT) principle and does not hold any inventory of either finished goods or raw materials.

Company has entered into an agreement with M Ltd. to supply 10,000 units per month of each product produced from Gurgaon unit at a contracted price. Aditya Ltd. is bound to supply these contracted units to M Ltd. without any fail. Following are the details related with non contracted units of Gurgaon unit.

(Amount in ₹)

Selling Price per unit	360.00	285.00	290.00	210.00
Direct Labour @ ₹ 45 per hour	112.50	67.50	135.00	67.50
Direct Material M-1 @ ₹ 50 per kg.	50.00	100.00	—	75.00
Direct Material M-2 @ ₹ 30 per litre.	90.00	45.00	60.00	—
Variable Overhead (varies with labour hrs)	12.50	7.50	15.00	7.50
Variable Overhead (varies with machine hrs)	9.00	12.00	9.00	15.00
Total Variable Cost	274.00	232.00	219.00	165.00
Machine Hours per unit	3 hours	4 hours	3 hours	5 hours
Maximum Demand per month (units)	90,000	95,000	80,000	75,000

The products manufactured in Gurgaon unit use direct material M-1 and M-2 but product F-1 produced in Faridabad unit is made by a distinct raw material Z. Material Z is purchased from the outside market at ₹ 200.00 per unit. One unit of F-1 requires one unit of material Z.

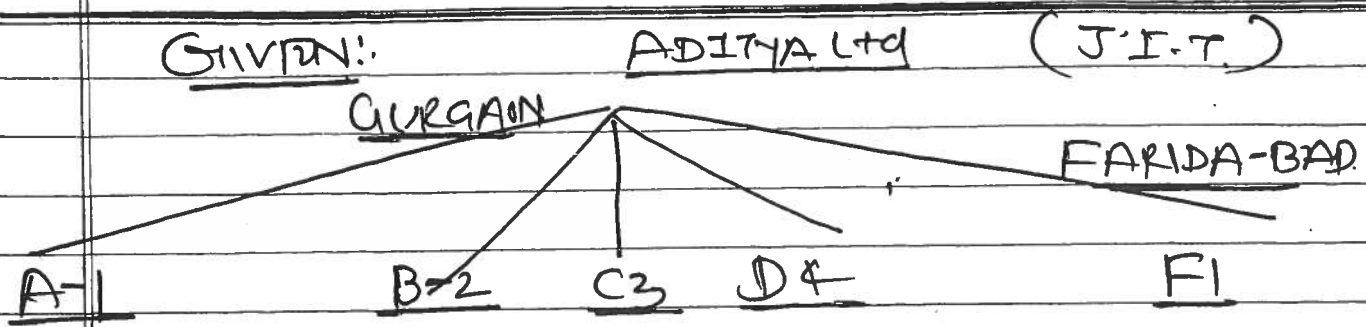
Material Z can also be manufactured at Gurgaon unit but for this 2 hours of direct labour, 3 hours of machine time and 2.5 litres of material M-2 will be required.

The Purchase manager has reported to the production manager that material M-1 and M-2 are in short supply in the market and only 6,50,000 Kg. of M-1 and 6,00,000 litre of M-2 can be purchased in a month.

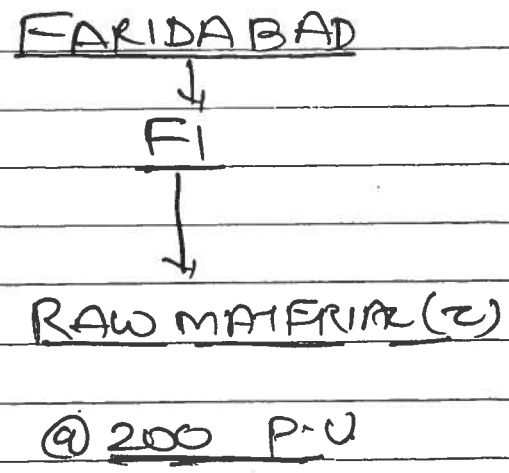
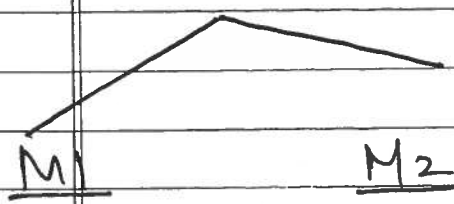
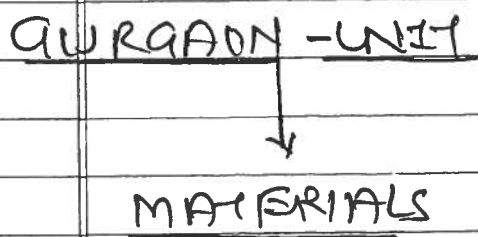
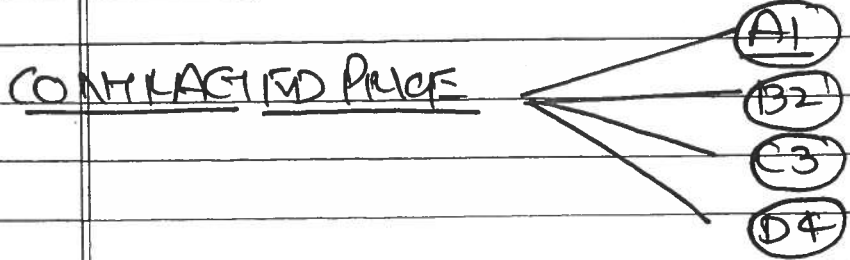
Required

- CALCULATE whether Aditya Ltd. should manufacture material Z in Gurgaon unit or continue to purchase it from the market and manufacture it in Faridabad unit.
- CALCULATE the optimum monthly usage of Gurgaon unit's available resources and make decision accordingly.
- CALCULATE the purchase price of material Z at which your decision in (i) can be sustained.

6.20

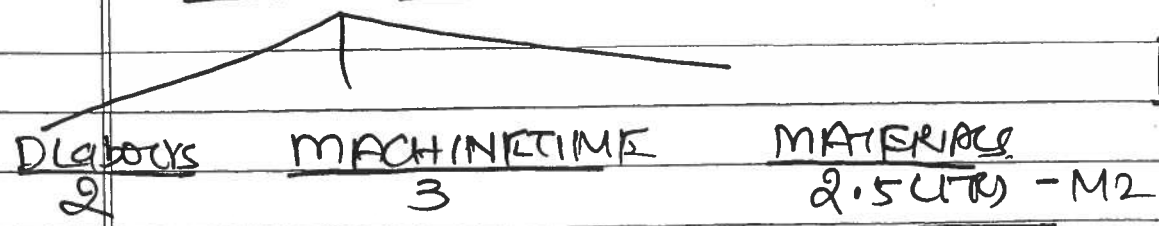


AGREEMENT - M Ltd - 10000 UNITS - GURGAON



INPUT OUTPUT
(2) 1 UNIT = 1 UNIT (F1)

OPTION-(2)
MATERIAL (2) [GURGAON-FACTORY]



6.21

MAXIMUM MATERIAL AVAILABLE

M1 → 650000 kg
M2 → 600000 kg

Page No.			
Date			

STATEMENT SHOWING COST OF MATERIALS IF MANUFACTURED IN GURGAON UNIT

	R.
DIRECT LABOUR (2 hrs x 45)	90.00

DIRECT MATERIAL - M2 (2.5 LTR x 30)	75.00
--	-------

V.O. (2 Labour hrs x 5)	= 10.00
-------------------------	---------

V.O. (3 MACHINE HRS x 3)	= 9.00
--------------------------	--------

	<u>184</u>
--	------------

OUT-SIDE PRICE	<u>200</u>
----------------	------------

THE PURCHASE COST OF MATERIALS FROM THE OUTSIDE MARKET IS RS 200/- WHICH IS MORE THAN THE COST TO MANUFACTURE IT IN GURGAON UNIT. HENCE IT WILL BE BENEFICIAL FOR THE ADIMA LTD TO MANUFACTURE MATERIALS IN GURGAON UNIT INSTEAD

6.22

Page No.

Date

ANSNO (ii)

STATEMENT SHOWING REQUIREMENT OF
DIRECT-MATERIAL M1-M2
FOR-CONTRACTED-UNITS

	A1	B2	C3	D4
UNITS TO BE SUPPLIED TO M-LTD	10000 UNITS	10000 "	10000 "	10000 "
}	(10000×1)	(10000×2)	—	(10000×1.5)
	DIRECT MATERIAL = 10000	= 20000		= 15000
M-1	$\left(\frac{50}{50} = 1 \text{ kg}\right)$	$\left(\frac{100}{50} = 2 \text{ kg}\right)$		$\left(\frac{75}{50} = 1.50\right)$
	(10000×3)	(10000×1.5)	(10000×2)	
DIRECT-MATERIAL = 30000	= 15000	= 20000		
M2 (LTR)	$\left(\frac{90}{30} = 3 \text{ LTR}\right)$	$\left(\frac{45}{30} = 1.5 \text{ LTR}\right)$	$\left(\frac{60}{30} = 2 \text{ LTR}\right)$	
}				
	FOR-NON-CONTRACTED UNITS			

<u>DEMANDS</u>	90000	95000	80000	75000
DIRECT-MATERIAL = 90000	190000	—	= 112500	
M1 (kg)	(90000×1)	(95000×2)	—	(75000×1.5)
DIRECT-MATERIAL = 270000	142500	160000	—	
M2	(90000×3)	(95000×1.5)	(80000×2)	—

G.23

Page No.			
Date			

STATEMENT SHOWING AVAILABILITY AND DEMAND COMPARISON

	DIRECT-MATERIAL M ₁ (Kg)	DIRECT-MATERIAL M ₂ LTRS.
<u>CONTRACTED UNITS</u>		
A ₁	10000	30000
B ₂	20000	15000
C ₃	—	20000
D ₄	15000	—
<u>NON-CONTRACTED</u>		
A ₁	90000	270000
B ₂	190000	142500
C ₃	—	160000
D ₄	112500	
	437500	637500
<u>AVAILABLE</u>	650000 Kg	600000 Kg
	<u>6.24</u>	<u>SHORTAGE</u> <u>LIMITING</u> <u>FACTOR</u> (M ₂)

Page No. Date

STATEMENT SHOWING CONTRIBUTION PER LTR - M2

	A1	B2	C3	D4	Z	
CONTRIBUTION (PER-UNIT)	360	285	290	210	210	
S.P (P.U)	(274)	(232)	(219)	(145)	(105)	PURCHASE PRICE
V.P (P.U)					200 (184)	VIP.
	86	53	71	45	45 16	SAVING
M2 →	÷ 3	÷ 1.5	÷ 2	÷	÷ 2.5	
	= 28.67	= 35.33	= 35.50	=	= 6.40	
	III	II	I		IV.	

STATEMENT SHOWING PRODUCTION PLAN

QTY-MATERIAL		
2-AVAILABLE PRODUCT		
600000 (kg)	900000 900000 X 2 C3 → = 1800000 kg	(600000 - 180000)
		(420000 - 152500)
	B2 → (105000 X 1.50) = 157500	(262500 - 262500)
	A1 → (87500 X 3)	0
	<u>6.25</u>	

Page No.			
Date			

(iii)

DECISION IN - REQUIREMENT (1) WILL BE CHANGED AS MATERIAL '2' CAN NOT BE MANUFACTURED IN GURGAON UNITS AS NOTED IN REQUIREMENT (ii) THE MINIMUM PURCHASE PRICE OF MATERIAL '2' AT WHICH DECISION TAKEN (i) ABOVE CAN BE SUSTAINED IS CALCULATED AS BELOW.

EXISTING PURCHASE PRICE 200

LOSS OF CONTRA 'A' (TIRAKI)

$$(28.67 - 6.40) \times 2.5 \text{ LAKH} = 55.68$$

$$\underline{\text{MINIMUM PRICE}} = \underline{255.68}$$

6.21

XL Polymers, located in Sahibabad Industrial Area, manufactures high quality industrial products. AT Industries has asked XL Polymers for a special job that must be completed within one week.

Raw material R_1 (highly toxic) will be needed to complete the AT Industries' special job. XL Polymers purchased the R_1 two weeks ago for ₹7,500 for a job 'A' that recently was completed. The R_1 currently in stock is the excess from that job and XL Polymers had been planning to dispose of it. XL Polymers estimates that it would cost them ₹1,250 to dispose of the R_1 . Current replacement cost of R_1 is ₹6,000.

Special job will require 250 hours of labour G_1 and 100 hours of labour G_2 . XL Polymers pays their G_1 and G_2 employees ₹630 and ₹336 respectively for 42 hours of work per week.

XL Polymers anticipates having excess capacity of 150 [G_1] and 200 [G_2] labour hours in the coming week. XL Polymers can also hire additional G_1 and G_2 labour on an hourly basis; these part-time employees are paid an hourly wage based on the wages paid to current employees.

Suppose that material and labour comprise XL Polymers's only costs for completing the special job.

Required

CALCULATE the 'Minimum Price' that XL Polymers should bid on this job?

STATEMENT SHOWING MINIMUM PRICE (AS PER RELEVANT COST)

PARTICULARS	Rs	REASONS
RAW MATERIAL - R_1 (SAVING IN DISPOSAL) COST	1250	NO-USE (OPPORTUNITY)
Labour G_1 HRS REQD 250 HRS Available 100 150 100 100	(1500)	EXCESS CAPACITY
HRLY RATE (630 ÷ 42 hrs) = 15 G_2	-	capacity Available
[627]	250	→

Rabi Ltd. is considering the discontinuance of Division C. The following information is given:

Sales (Maximum achievable)	41,40,000	5,17,500	46,57,500
Less: Variable cost	20,70,000	2,76,000	23,46,000
Contribution	20,70,000	2,41,500	23,11,500
Less: Specific avoidable fixed cost	14,49,000	4,14,000	18,63,000
Divisional Income	6,21,000	(1,72,500)	4,48,500

The rates of variable costs are 90% of the normal rates due to the current volume of operation.
There is adequate market demand.

For any lower volume of operation, the rates would go back to the normal rates.

Facilities released by discontinuing Division C cannot be used for any other purpose.

CASE STUDY No. 48

Required

COMMENT on the decision to discontinue Division C using relevant cost approach.

STATEMENT SHOWING ANALYSIS OF PROPOSAL

OPTION (I) IF-CONTINUE OPERATION

PT LOSS

(172500)

SAVING IN V-COST A&B

$$\left(\frac{2070000 \times 100}{90} \right) = 2300000$$

$$\text{PRESENT COST} = (2070000)$$

2300000

$$\text{SAVING} = 230000$$

$$\text{NET-PL} = 57500$$

$$\text{IF DISCONTINUE} = \text{PT LOSS} =$$

INC-IN-COST A&B

(230000)

L.28

6.25 → L.P.P

CASE STUDY No. 4

Date No.
Date**Illustration**

A company manufactures two products. Each product passes through two departments A and B before it becomes a finished product. The data for the year are as under:

Maximum Sales Potential (in units)	7,400	10,000
Product unit data:		
Selling Price p.u.	₹90	₹80
Machine hrs. p.u.		
Department A hrs. @ ₹40/ hr.	0.50	0.30
Department B hrs. @ ₹60/ hr.	0.40	0.45

Maximum Capacity of Department A is 3,400 hrs. and Department B is 3,640 hrs.

Maximum Quantity of Direct Materials available is 17,000 kgs. Each product requires 2 kg. of Direct Materials. The Purchase Price of direct materials is ₹ 5/ kg.

Required

- FIND optimum product mix.
- In view of the aforesaid production capacity constraints, the company has decided to produce only one of the two products during the year. Which of the two products should be produced and sold in the year to maximise profit? State the number of units of that product and relevant contribution.

6.29

FINAL C.A - COSTING

Page No.	
Date	

DECISION- MAKING

PAGE - 6.25 - NEW SYLLABUS MODULE

PRODUCTS	X	Y	
	P.U.	P.U	MAX
S.P	90.00	80.00	
DMAT	(10.00)	(10.00)	1700
MACHINE COST	(2X5)	(2X5)	
DEPT-A	(20)	(12)	340
	(1.50 X 40)	(1.30 X 40)	
DEPT-B	(24)	(27)	364
	(1.40 X 60)	(1.45 X 60)	
CONTR P.U.	36.00	31.00	
MAX-SALES	7400 UNITS	10000 UNITS	

STATEMENT SHOWING CALCULATION OF LIMITING FACTOR.

IF ONLY- ONE- PRODUCT IS TO BE MANF

PRODUCTS	X	Y
MAX-SALES	7400 UNITS	10000 UNITS
DEPT-A	$\left(\frac{3400}{1.50}\right)$	$\left(\frac{3400}{1.30}\right)$
	✓ = 6800 UNITS	= 11333.33 UNITS
DEPT-B	$\left(\frac{3640}{1.40}\right)$	$\left(\frac{3640}{1.45}\right)$
	= 9100 "	✓ = 8088.88
MATERIALS	$\left(\frac{17000}{2}\right)$	$\left(\frac{17000}{2}\right)$
	16.30	= 8500 UNITS

Page No.			
Date			

ANSNO (i)

$$\text{MAX-Z} = 36X_1 + 31X_2$$

s.t

$$2X_1 + 2X_2 \leq 17000$$

$$.50X_1 + .30X_2 \leq 3400$$

$$.40X_1 + .45X_2 \leq 3640$$

$$X_1 \leq 17000$$

$$X_2 \leq 10000$$

$$X_1, X_2 \geq 0$$

FURTHER WE CAN SOLVE BY

↓
GRAPHICAL↓
SIMPLEX.↓
BY KEY-FACTUR.ANSNO (ii)

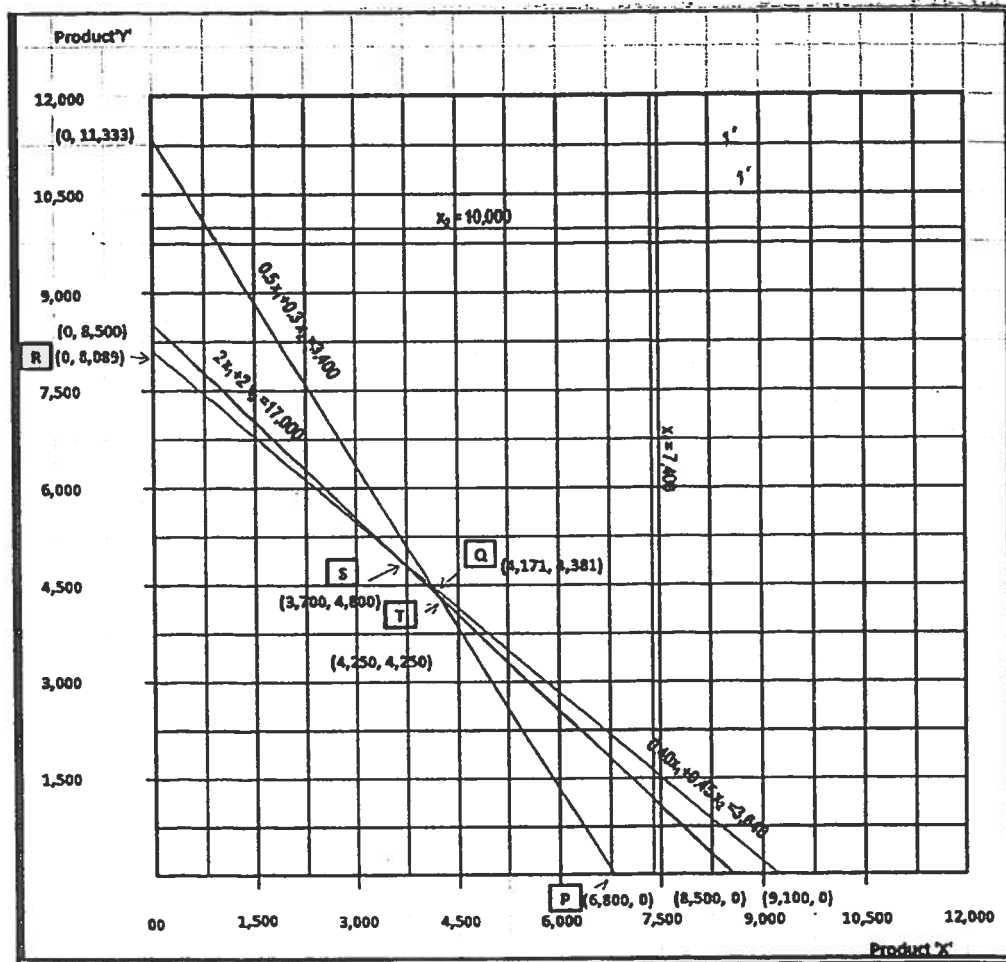
STATEMENT SHOWING MAXIMUM PROFIT IF
ONLY ONE PRODUCT IS MANUFACTURED

Product	Units (maximum)	CONTR. P.U.	MAX-CONTR
X	6800	36 =	244800
Y	8088	31 =	250728*

NOTE:- AS PER ICAI SOLUTION UNITS IS
ROUND OFF OFFY! UPTO 8089 WHICH
IS NOT- POSSIBLE BECAUSE 8089 UNITS

REGR (8089 X .45) = 3640.05 HRS BUT
DEPT B IS ONLY having 3640 HRS ~~SO~~
~~SOLUTION IS CORRECT~~ -

16.31.1



So, different combinations of product mix include,

P	6,800	0	2,44,800	IV
Q*	4,171	4,381	2,85,967	-
R	0	8,089	2,50,759	III
S	3,700	4,800	2,82,000	II
T	4,250	4,250	2,84,750	I

Note (*)

Combination Q (4,171, 4,381) is not possible as it is satisfying three conditions out of above four conditions. To produce combination Q (4,171, 4,381), requirement of the material will be 17,104 Kgs. (2 Kg × 4,171 units + 2 Kg × 4,381 units). However, material is available 17,000 Kgs. Accordingly, this combination is not possible.

VERIFICATION

$$2X_1 + 2X_2 = 17000$$

$$1.50X_1 + 1.30X_2 = 3400 \times 2$$

$$2X_1 + 1.20X_2 = 13600$$

$$2X_1 + (2 \times 4250) = 17000$$

$$2X_1 = 8500$$

16.32

$$1.80X_2 = 3400$$

$$X_2 = 4250$$

$$X_1 = 4250$$

CHAPTER

7



PRICING DECISION



CHAPTER

9



DIVISIONAL TRANSFER PRICING



Your company fixes the inter-divisional transfer prices for its products on the basis of cost, plus a return on investment in the division. The Budget for Division A for 1998-99 appears as under :

Investment in Division A		Rs.
Fixed Assets	5,00,000	
Current Assets	3,00,000	
Debtors	2,00,000	
Annual fixed cost of the division	8,00,000	
Variable cost per unit of product	10	
Budgeted volume	4,00,000 units per year	
Desired ROI	28%	

CASE STUDY No. 51

Determine the transfer price for Division A.

CASE STUDY No. 52

Problem

A company produces a single product 'Impex'.

For an annual sales of 40,000 units of Impex, fixed overhead is ₹ 5,50,000. The variable cost per unit is ₹ 60. Capital employed in fixed assets is ₹ 8,00,000 and in current assets is 50% of net sales (i.e. sales less discount). The company sells goods at 20% discount on the maximum retail price (M.R.P.), which is ₹ X per unit. The company wants to earn a return of 25% before tax on capital employed in fixed and current assets.

Required

Calculate the value of X.

CASE STUDY No. 53

An organisation manufactures a product, particulars of which are detailed below:

Annual Production (Units)	20,000
Cost per annum (₹)	
Material	50,000
Other variable cost	60,000
Fixed cost	40,000
Apportioned Investment (₹)	1,50,000

Required

Determine the unit selling price under two strategies mentioned below. Assume that the organisation's Tax rate is 40% —

9.2

CASE STUDY No. 50

Division A is a profit centre, which produces four products P, Q, R and S. Each product is sold in the external market also. Data for the period is as follows:

	P	Q	R	S
Market Price per unit (₹)	350	345	280	230
Variable Cost of Production per unit	330	310	180	185
Labour Hours Required per unit	3	4	2	3

Product S can be transferred to Division B but the maximum quantity that might be required for transfer is 2,000 units of S.

The maximum sales in the external market are:

P	3,000 units
Q	3,500 units
R	2,800 units
S	1,800 units

Division B can purchase the same product at a slightly cheaper price of ₹ 225 per unit instead of receiving transfers of product S from Division A.

What should be transfer price for each unit for 2,000 units of S, if the total labour hours available in Division A are:

- (i) 24,000 hours?
- (ii) 32,000 hours?

CASE STUDY No. 51

AB Cycles Ltd. has 2 divisions. A and B which manufacture bicycle. Division A produces bicycle frame and Division B assembles rest of the bicycle on the frame. There is a market for sub-assembly and the final product. Each division has been treated as a profit centre. The transfer price has been set at the long-run average market price. The following data are available to each division :

Estimated selling price of final product	Rs. 3,000 p.u.
Long run average market price of sub-assembly	Rs. 2,000 p.u.
Incremental cost of completing sub-assembly in division B	Rs. 1,500 p.u.
Incremental cost in Division A	Rs. 1,200 p.u.

Required :

- (i) If Division A's maximum capacity is 1,000 p.m. and sales to the intermediate are now 800 units, should 200 units be transferred to B on long-term average price basis.
- (ii) What would be the transfer price, if manager of Division B should be kept motivated.
- (iii) If outside market increases to 1,000 units, should Division A continue to transfer 200 units to Division B or sell entire production to outside market.

19.1

PRICING DECISIONS & TRANSFER PRICING

CASE STUDY No. 54

SV Ltd. manufactures a product which is obtained basically from a series of mixing operations. The finished product is packaged in the company-made glass bottles and packed in attractive cartons.

The company is organised into two independent divisions viz. one for the manufacture of the end-product and the other for the manufacture of glass bottles. The product manufacturing division can buy all the bottle requirements from the bottle manufacturing division.

The General Manager of the bottle manufacturing division has obtained the following quotations from the outside manufacturers for the supply of empty bottles.

No. of empty bottles	Total purchase value (Rs.)
8,00,000	14,00,000
12,00,000	20,00,000

A cost analysis of the bottle manufacturing division for the manufacture of empty bottles reveals the following production costs :

No. of empty bottles	Total cost (Rs.)
8,00,000	10,40,000
12,00,000	14,40,000

The production cost and sales value of the end product marketed by the product manufacturing division are as under :

Volume (Bottles of end product)	Total cost of end product (excluding cost of empty bottles)	Sales value (Packed in bottles)
	Rs.	Rs.
8,00,000	64,80,000	91,20,000
12,00,000	96,80,000	1,27,80,000

There has been considerable discussion at the corporate level as to the use of proper price for transfer of empty bottles from the bottle manufacturing division to product manufacturing division. This interest is heightened because a significant portion of the Divisional General Manager's salary is in incentive bonus based on profit centre results.

As the corporate management accountant responsible for defining the proper transfer prices for the supply of empty bottles by the bottle manufacturing division to the product manufacturing division, you are required to show for the two levels of volumes of 8,00,000 and 12,00,000 bottles, the profitability by using (i) market price and (ii) shared profit relative to the costs involved basis for the determination of transfer prices. The profitability position should be furnished separately for the two divisions and the company as a whole under each method. Discuss also the effect of these methods on the profitability of the two divisions.

9.3

A company has two Divisions, Division 'A' and Division 'B'. Division 'A' has a budget of selling 2,00,000 nos. of a particular component 'x' to fetch a return of 20% on the average assets employed. The following particulars of Division 'A' are also known:

Fixed Overhead	₹ 5 lakhs
Variable Cost	₹ 1 per unit
Average Assets:	
Sundry Debtors	₹ 2 lakhs
Inventories	₹ 5 lakhs
Plant & Equipments	₹ 5 lakhs

However, there is constraint in Marketing and only 1,50,000 units of the component 'x' can be directly sold to the Market at the proposed price.

It has been gathered that the balance 50,000 units of component 'x' can be taken up by Division 'B'. Division 'A' wants a price of ₹ 4 per unit of 'x' but Division 'B' is prepared to pay ₹ 2 per unit of 'x'.

Division 'A' has another option in hand, which is to produce only 1,50,000 units of component 'x'. This will reduce the holding of assets by ₹ 2 lakhs and fixed overhead by ₹ 25,000.

You are required to advise the most profitable course of action for Division 'A'.

~~Q.4~~

The two manufacturing divisions of a company are organized on profit centre basis. Division X is the only source of a component required by Division Y for their product 'P'. Each unit of P requires one unit of the said component. As the demand of the product is not steady, orders for increased quantities can be obtained by manipulating prices.

The manager of Division Y has given the following forecast:

Sales per Day (units)	Average Price per Unit of P (₹)
5,000	393.75
10,000	298.50
15,000	247.50
20,000	208.50
25,000	180.00
30,000	150.75

The manufacturing cost (excluding the cost of the component from Division X) of P in Division Y is ₹ 14,06,250 on first 5,000 units and ₹ 56.25 per unit in excess of 5,000 units.

Division X incurs a total cost of ₹ 5,62,500 per day for an output upto 5,000 components and the total costs will increase by ₹ 3,37,500 per day for every additional 5,000 components manufactured. The Manager of Division X has set the transfer price for the component at ₹ 90 per unit to optimize the performance of his Division.

Required:

- Prepare a divisional profitability statement at each level of output, for Division X and Y separately;
- Find out the profitability of the company as a whole at the output level where:
 - Division X's net profit is maximum;
 - Division Y's net profit is maximum.
- Find out at what level of output, the company will earn maximum profit, if the company is not organized on profit centre basis.

9.4

~~Q.4~~

ASE STUDY No. 55

ASE STUDY No. 56

A company is engaged in the manufacture of edible oil. It has three divisions as under:

- (i) Harvesting oil seeds and transportation thereof to the oil mill.
- (ii) Oil Mill, which processes oil seeds and manufactures edible oil.
- (iii) Marketing Division, which packs the edible oil in 2 kg. containers for sale at ₹ 150 each

ASE STUDY No. 57

The Oil Mill has a yield of 1,000 kgs of oil from 2,000 kg of oil seeds during a period. The Marketing Division has a yield of 500 cans of edible oil of 2 kg each from every 1,000 kg of oil. The net weight per can is 2 kgs of oil.

The cost data for each division for the period are as under:

Harvesting Division	
Variable cost per kg of oil seed	2.50
Fixed cost per kg of oil seed	5.00
Oil Mill Division	
Variable cost of processed edible oil	10.00 per kg
Fixed cost of processed edible oil	7.50 per kg
Marketing Division	
Variable cost per can of 2 kg of oil	3.75
Fixed cost per can of 2 kg of oil	8.75

The fixed costs are calculated on the basis of the estimated quantity of 2,000 kg of oil seeds harvested, 1,000 kg of processed oil and 500 cans of edible oil packed by the aforesaid divisions respectively during the period under review.

The other oil mills buy the oil seeds of same quality at ₹ 12.50 per kg in the market. The market price of edible oil processed by the oil mill, if sold without being packed in the marketing division is ₹ 62.50 per kg of oil.

Required:

- (i) Compute the overall profit of the company of harvesting 2,000 kg of oil seeds, processing it into edible oil and selling the same in 2 kg cans as estimated for the period under review.
- (ii) Compute the transfer prices that will be used for internal transfers from (1) Harvesting Division to Oil Mill Division and (2) from Oil Mill Division to Marketing Division under the following pricing methods:
 - (1) Shared contribution in relation to variable costs; and
 - (2) Market price.
- (iii) Which transfer pricing method will each divisional manager prefer to use?

9.5

Rayon Ltd. has two manufacturing departments organized into separate profit centres known as Textile unit and Process House. The Textile unit has a production capacity of 5 lacs metres cloth per month, but at present its sales is limited to 50% to outside market and 30% to process house.

The transfer price for the year 2014 was agreed at ₹ 6 per metre. This price has been fixed in line with the external wholesale trade price on 1st January, 2014. However, the price of yarn declined, which was the raw material of textile unit, with effect, that wholesale trade price reduced to ₹ 5.60 per metre with effect from 1st June, 2014. This price was however not made applicable to the sales made to the processing house of the company. The textile unit turned down the processing house request for revision of price.

The Process house refines the cloth and packs the output known as brand Rayon in bundles of 100 metres each. The selling price of the Rayon is ₹ 825 per bundle. The process house has a potential of selling a further quantity of 1,000 bundles of Rayon provided the overall prices is reduced to ₹ 725 per bundle. In that event it can buy the additional 1,00,000 metres of cloth from textile unit, whose capacity can be fully utilised. The outside market has no further scope.

The cost data relevant to the operations are:

	Textile unit (₹)	Process house (₹)
Raw material (per metre) on 1 st June, 2014	3.00	Transfer price
Variable cost	1.20 (per metre)	80 (per bundle)
Fixed cost (per month)	4,12,000	1,00,000

You are required to:

- (i) Prepare statement showing the estimated profitability for June, 2014 for Textile unit and Process house and company as a whole on the following basis:
 - (a) At 80% and 100% capacity utilisation of the Textile unit at the market price (external wholesale trade price on 1st January, 2014) and the transfer price to the Processing house of ₹ 6 per metre.
 - (b) At 80% capacity utilisation of the Textile unit at the market price of ₹ 5.60 per metre and the transfer price to the Processing house of ₹ 6 per metre.
 - (c) At 100% capacity utilisation of the Textile unit at the market price of ₹ 5.60 per metre and the transfer price to the Processing house of ₹ 5.60 per metre.
- (ii) Comment on the effect of the company's transfer pricing policy on the profitability of Processing house.

9.6

CASE STUDY No... 59...

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8. The cost of production and sales of 80,000 units per annum of product 'I' are:

Material	₹ 4,80,000	Labour	₹ 1,60,000
Variable Overhead	₹ 3,20,000	Fixed overhead	₹ 5,00,000

The fixed portion of capital employed is ₹12 lacs and the varying portion is 50% of sales turnover.

Required

Determine the selling price per unit to earn a return of 12% net on capital employed (net of Tax @ 40%).

STATEMENT SHOWING SELLING PRICE (P.U)

$$\text{Exp} = 16 (\text{800000}) \text{ Sales } x$$

COST

$$\begin{aligned} \text{Mat} &= 480000 \\ \text{Lab} &= 160000 \\ \text{V.O} &= 320000 \\ \text{FO} &= 500000 \\ \hline &1460000 \end{aligned}$$

PROFIT/RETURN

$$\left(\frac{12}{100} \times \frac{100}{60} \right) = 20\%$$

$$\begin{aligned} \text{Fcapital} \\ 1200000 \times 20\% \\ = 240000 \end{aligned}$$

$$\begin{aligned} \text{Wcap} \\ \frac{20}{100} (.50x) \\ = .10x \end{aligned}$$

$$x = 1460000 + 240000 + .10x$$

9.7

$$.90x = 1700000$$

$$x = 1888888.88 \div 80000 \text{ units} = 23.61$$

Profit Maximisation Model

CASE STUDY No. 60

9. APV Ltd. has developed a new product which is about to be launched into the market. The variable cost of selling the product is ₹ 17 per unit. The marketing department has

estimated that at a sale price of ₹ 25, annual demand would be 10,000 units. However, if the sale price is set above ₹ 25, sales demand would fall by 500 units for each ₹ 0.50 increase above ₹ 25. Similarly, if the price is below ₹ 25, demand would increase by 500 units for each ₹ 0.50 stepped reduction in price below ₹ 25.

Required

Determine the price which would maximise APV Ltd.'s profit in the next year.

STATEMENT SHOWING ANALYSIS OF CONTRIBUTION

SALES-PRICE	V.COST	CONT	VOLUME	TOTAL CONTRIBUTION
P.U	P.U	P.U	UNITS	
25.00	17.00	8.00	10000	80000
24.50	17.00	7.50	10500	78750
24.00	17.00	7.00	11000	77000
25.50	17.00	8.50	9500	80750
26.00	17.00	9.00	9000	81000
26.50	17.00	9.50	8500	80750
27.00	17.00	10.00	8000	80000
27.50	17.00	10.50	7500	78750
				9.8

CASE STUDY No. 61

Transfer Pricing

11. Maryanne Ltd. has two divisions Division A and Division B. Division A produces product Z, which it sells to external market and also to Division B. Divisions in the Maryanne Ltd. are treated as profit centres and divisions are given autonomy to set transfer prices and to choose their supplier. Performance of each division measured on the basis of target profit given for each period.

Division A can produce 1,00,000 units of product Z at full capacity. Demand for product Z in the external market is for 70,000 units only at selling price of ₹ 2,500 per unit. To produce product Z Division A incurs ₹ 1,600 as variable cost per unit and total fixed overhead of ₹ 4,00,00,000. Division A has employed ₹ 12,00,00,000 as working capital, working capital is financed by cash credit facility provided by its lender bank @ 11.50% p.a. Division A has been given a profit target of ₹ 2,50,00,000 for the year.

Division B has found two other suppliers R Ltd and S Ltd. who are agreed to supply product Z.

Division B has requested a quotation for 40,000 units of product Z from Division A.

Required

- (i) CALCULATE the transfer price per unit of product Z that Division A should quote in order to meet target profit for the year.
- (ii) CALCULATE the two prices Division A would have to quote to Division B, if it became Maryanne Ltd. policy to quote transfer prices based on opportunity costs.

9.9

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STATEMENT SHOWING TRANSFER PRICE PER UNIT OF 'Z'

	<u>R.</u>
TARGET PROFIT	250,00,000
INT ON W. CAPITAL (1200 00 000 X 11.5%)	138,00,000
REQD PT	<u>388 00 000</u>
FIXED COST	400 00 000
TARGET CONT	<u>788 00 000</u>

TARGET-CONTRIBUTION

788 00 000

EXTERNAL

$$\begin{aligned}
 T.P/S.P &= 2500 \\
 V.P &= (1600) \\
 &= 900 \\
 &\times 60000 \text{ UNITS} \\
 &= 540,00,000
 \end{aligned}$$

CONTRIBUTION

$$\begin{aligned}
 \text{REQD INTERNAL SALES} \\
 248,00,000 \\
 \div 40000 \text{ UNITS} \\
 = 620 \text{ P.U.}
 \end{aligned}$$

ANSNO(i) PRODUCT 'Z' B

STATEMENT SHOWING T.P = (VCOST + CONT)

$$(1600 + 620) = \underline{2220}$$

ANSNO(ii)

OUTSIDE SALES
70000

OUTSIDE SALE
60000

COST

CUT AND TRANSFER B

OPPCOST = 2500/-
FOR 10000 UNITS

FOR BALANCE
30000 UNITS
VCOST = 1600

9.16

CHAPTER 7

PRICING DECISION



CHAPTER 9

DIVISIONAL TRANSFER PRICING



17.152

PRICING DECISION

CASE STUDY NO. 62

Date

NEW SYLLABUS - FINAL - C.A.



PROFIT MAXIMIZATION MODEL

Pricing model is a mathematical model which uses economic theory of pricing.

- (i) As per economic theory of pricing, Profit is Maximum at a level of output where Marginal Revenue (MR) is equal to Marginal Cost (MC) i.e.

$$\text{Marginal Revenue (MR)} = \text{Marginal Cost (MC)}$$

This model determines the level of production up to which production can be continued.

- (ii) The Basic Price equation, which is used to determine the Price where Profit is Maximum.
The equation is written as:

$$P = a - bQ$$

9.11

PROFIT- MAXIMIZATION MODELPage No. Date EXAMPLE 7.5

$$\text{GIVEN} = P = a - bQ$$

P = PRICE

(a) = PRICE AT WHICH DEMAND IS ZERO

Q = QTY - DEMANDED

b = SLOPE OF DEMAND CURVE $\left(\frac{\text{CHANGE IN PRICE}}{\text{CHANGE IN QTY}} \right)$ Assuming = Steady Price P.U AT - P' | MARGINAL COST
QTY - DEMANDED = Q = 220000

$$\text{PROFIT-AT} \Rightarrow P = a - bQ$$

$$P = 510000 - \left(\frac{5000}{2} \right) Q$$

$$\text{REVENUE} = Q \times (510000 - 2500 \times Q)$$

$$= 510000Q - 2500Q^2$$

$$\text{MARGINAL REVENUE} = a - 2bQ$$

$$= 510000 - 2 \times \left(\frac{5000}{2} \right) \times Q$$

$$= 510000 - 5000Q$$

$$\text{MARGINAL COST} = 220000$$

$$\text{MARGINAL REVENUE} = (MR) = P = a - 2bQ$$

9.12

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PROFIT IS MAXIMUM WHERE MARGINAL REVENUE (MR) EQUAL TO MARGINAL COST (MC)

$$510000 - 5000Q = 220,000$$

$$Q = 58 \text{ UNITS}$$

~~PROFIT IS MAXIMUM~~

$$P = 510,000 - \left(\frac{5000}{2}\right) \times Q$$

$$= 510,000 - (2500 \times 58)$$

$$= \underline{365000}$$

IF THE SELLING PRICE OF 365000
THE PROFIT WILL BE MAXIMUM.

4/13

(DKC)

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CHAPTER 7

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PRICING DECISION (NEW SY (BUS))

Page
7.12

Illustration 1

The budgeted cost data of a product manufactured by Ayudhya Ltd. is furnished as below:

Budgeted units to be produced.....	2,00,000
Variable cost (₹).....	32 per unit
Fixed cost (₹).....	16 lacs

It is proposed to adopt cost plus pricing approach with a mark-up of 25% on full budgeted cost basis.
However, research by the marketing department indicates that demand of the product in the market is price sensitive. The likely market responses are as follows:

Selling price per unit	₹ 45	₹ 48	₹ 50	₹ 56	₹ 60
Annual demand (units)	1,68,000	1,52,000	1,40,000	1,28,000	1,08,000

Required

ANALYSE the above situation and DETERMINE the best course of action.

NOTE NO (1) - (GIVEN)

EXP- PRODUCTION QTY = 200000 UNITS

V. COST (200000 X 32) = 6400000
F. COST 1600000

BUD COST 8000000

BUD PROFIT 2000000

(8000000 X 25 / 100) BUD- PROFIT 10000000

BUD S.P (P.U) = 200000 UNITS
= 50.00

9.14

Determination of the Best Course of Action

- (i) Taking the above calculation and analysis into account, the company should produce and sell 1,28,000 units at ₹ 56. At this price company will not only be able to achieve its desired mark up of 25% on the total cost but can earn maximum contribution as compared to other even higher selling price.
- (ii) If the company wants to uphold its proposed pricing approach with the budgeted quantity, it should try to reduce its variable cost per unit for example by asking its supplier to provide a quantity discount on the materials purchased.

STATEMENT SHOWING PROFIT AT DIFFERENT DEMAND & PRICE LEVEL

	QTY (UNITS)	168000	152000	140000	128000	108000
	S.P	X 44	X 48	X 50	X 56	X 60
(A) SALES		= 7392000	= 7296000	= 7000000	= 7168000	= 6480000
(B) V.COST		(5376000)	(4864000)	(4480000)	(4096000)	(3456000)
		(168000 X 32)	(152000 X 32)	(140000 X 32)	(128000 X 32)	(108000 X 32)
(A-B) = C CONTRIBUTION		2016000	2432000	2520000	3072000	3024000
(D) FIXED COST		(1600000)	(1600000)	(1600000)	(1600000)	(1600000)
C-D = PROFIT		416000	832000	920000	1472000	1424000

$$(\%) \text{ PROFIT ON COST} = \left(\frac{\text{PROFIT}}{\text{TOTAL COST}} \times 100 \right)$$

$$168000 \text{ UNITS} \quad \left(\frac{416000}{5376000 + 1600000} \right) \times 100 = 5.96$$

$$152000 \text{ UNITS} \quad \left(\frac{832000}{4864000 + 1600000} \right) \times 100 = 12.87$$

$$140000 \text{ UNITS} \quad \left(\frac{920000}{4480000 + 1600000} \right) \times 100 = 15.13\%$$

$$128000 \text{ UNITS} \quad \left(\frac{1472000}{4096000 + 1600000} \right) \times 100 = 25.84\%$$

$$108000 \text{ UNITS} \quad \left(\frac{1424000}{3456000 + 1600000} \right) \times 100 = 28.16\%$$

9.5

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STATEMENT SHOWING COMPARATIVE FORMULA OF LEARNING CURVE AS PER P.M / DKC.

AS PER P.M	AS PER DKC
$y = ax^b$	HRS PER BATCH = $\log K + \left(\frac{\log L.C. ratio}{\log 2} \right) \times \log (x)$
P.M	DKC
$y =$ CUMULATIVE TIME PER PART FOR 'X'	(SAME)
$a =$ TIME REQD FIRST PART	(K) (SAME) TIME REQD FIRST PART
x CUMULATIVE NUMBER OF PARTS	(SAME) (X) CUMULATIVE NUMBER OF PARTS
(b) LEARNING COEFFICIENT = $\left(\frac{\log R}{\log 2} \right)$	DKC - WRITE DIRECTLY $\left(\frac{\log L.C. ratio}{\log 2} \right)$

ITS BOTH ARE SAME - USE ANY ONE

$$= \log K + \left(\frac{\log L.C. ratio}{\log 2} \right) \times \log (x)$$

[9.16]

DKC

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PRICING DECISION (NEW-SYLLABUS)Illustration 2 (7.13)

Bosch Ltd. has developed a special product. Details are as follows: The product will have a life cycle of 5,000 units. It is estimated that market can absorb first 4,500 units at ₹ 64 per unit and then the product will enter the "decline" stage of its life cycle.

The company estimates the following cost structure:

Direct Labour..... ₹ 6 per hour

Other variable costs..... ₹ 19 per unit

Fixed costs will be ₹ 40,000 over the life cycle of the product. The 'labour rate' and both of these costs will not change throughout the product's life cycle.

The first batch of 100 units will take 1,000 labour hours to produce. There will be an 80% learning curve that will continue until 2,500 units have been produced. Batches after this level will each take the same amount of time as the 25th batch. The batch size will always be 100 units.

||

Required

CALCULATE average selling price of the final 500 units that will allow the company to earn a total profit of ₹ 80,000 from the product if average time for 24 batches is 359.40 hours.

(Note: Learning coefficient is -0.322 for learning rate of 80%).

The values of Logs have been given for calculation purpose:

$\log 2 = 0.30103$; $\log 3 = 0.47712$; $\log 5 = 0.69897$; $\text{antilog of } 2.534678 = 342.51$; $\text{antilog of } 2.549863 = 354.70$; $\text{antilog of } 2.555572 = 359.40$; $\text{antilog of } 2.567698 = 369.57$

GIVENINITIAL BATCHLTR PER BATCHLEARNING
CURVE RATIO
80%

100

1000

9.17

AS PER DKC FORMAT AVG TIME PER BATCH
FOR THE FIRST 25 BATCHES

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$$\text{HRS PER BATCH} = \log K + \left(\frac{\log \cdot 80}{\log 2} \right) \times \log(x)$$

$$= \log 1000 + \left(\frac{\log \cdot 80}{\log 2} \right) \times \log(25)$$

(LEARNING COEFFICIENT)

$$= 3.000 + \left(\frac{-1 + 1.9031}{0.3010} \right) \times (1.3979)$$

$$= 2.5499 \quad (\text{ANTICOG})$$

35040

7

354.7

HRS

OPTION(2) AS PER ICAF SOLUTION AS PER DKC

$$Y = a x^b$$

Y = AVG TIME PER BATCH.

HRS PER BATCH

a = TIME REQD FOR FIRST BATCH

$\log K$

x = CUMULATIVE BATCHES

$\log(x)$

b = LEARNING COEFFICIENT

$$\left(\frac{\log L \cdot \text{Ratio}}{\log 2} \right)$$

9.18

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= .322

$$y = \log 1000 \times (25)$$

$$y = \log 1000 - (.322) \times \log (5 \times 5)$$

$$y = \log 1000 - (.322) \times (2 \times \log 5)$$

$$y = 3.0000 - (.3222) \times (\cancel{2 \times \log 5}) (2 \times .68997)$$

$$y = 2.54986332 \quad (\text{ANTILOG.})$$

$$y = 354.70$$

$$\text{TOTAL TIME 25TH BATCHES} = 8867.50$$

$$(354.70 \times 25)$$

$$\text{TOTAL TIME 24 BATCHES} = 8625.60$$

$$(359.40 \times 24)$$

241.90

9.20

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STATEMENT SHOWING SELLING PRICE OF THE FINAL 500 UNITS.

	₹
DIRECT- Labour COST	89490
HR FOR 25TH = 8867.50	
HR FOR 25TH = 6047.50	
(241.90 X 25)	
14915 X 6	
OTHER -V-COST (5000 X 19)	95000
FIXED COST	40000
TOTAL LIFE CYCLE COST	224,490
DES- PROFIT	80500
	304,490
SALRY (4500 X 64)	(288000)
SALRY UPLIFT (DECLINE)	16490
	÷ 500
Avg S.P (P.U)	= 32.98
	<u>19.21</u>

CASE STUDY No. 65

9.3

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Example

Division A produces goods at a cost of ₹10 p.u. and transfers the goods to Division B which has additional costs of ₹5 p.u. Division B sells externally at ₹16 p.u. The company has a policy of setting transfer prices at cost + 20%.

Calculate:

- Profit of each division and the overall profit the company made.
- Write a brief analysis of the results.

Solution

- Division Wise Profitability Statement: Summarizing the information from the question, the division wise profitability statement will be as below:

STATEMENT SHOWING ANALYSIS OF PROFITS

DIVISION 'A'	
TRANSFER PRICE	12
$[10 + (20\% \times 10)]$	
COST	(10)
(A) PROFITS	<u>2</u>

DIVISION - B	
SALES	16.00
COST OF DIVISION 'A'	(5)
TRANSFER PRICE - A	(12)
(B) PROFITS	(1)
A + B = COMPANY PROFITS	<u>1</u>

9.22

CASE STUDY No.....

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NEW SYLLABUS - DIVISIONAL TRANSFER PRICINGPAGE NO - 9.6(CONCEPT)SHARED PROFIT RELATIVE TO COST
BASED TRANSFER PRICEEXAMPLE :- MARKET PRICE AND
SHARED CONTRIBUTION METHOD[SAME QND PN - DKC - LIVE BOOK - 133]

Example

9.6CASE STUDY No... 26...

Market Price and Shared Contribution Method

A manufacturer of cornflakes has two divisions, one producing the cornflakes and another packaging division that manufactures cartons. The production division purchases all the cartons from the packaging division. Cost of cartons from outside vendors would be:

Number of cartons	Price
5,000	77,000
8,000	95,000

Production cost incurred by the packaging division for similar volume of cartons:

Unit	Cost
5,000	75,000
8,000	80,000

The production and sale of the final product, cornflakes are as below:

Number of cartons	Production Cost	Sales Value
5,000	120,000	200,000
8,000	180,000	300,000

An appropriate transfer pricing policy is being framed. As the corporate management accountant, Calculate-

- The transfer pricing based on (1) shared profit relative to cost method and (2) market method. Show the profitability of each division under both methods.
- Discuss the effect of both methods on the profitability of the divisions.

9.23

9.60

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STATEMENT SHOWING ANALYSIS OF P.L. LOSS

IF T.P. =	SHARED PROFIT RELATIVE TO COST		MKT-PRICE METHOD	
NOS →	5000	8000	5000	8000
PACKING-DIVISION				
TRANSFER PRICE	76923	92308	77000	95000
PRODUCTION COST	(75000)	(80000)	(75000)	(80000)
	1923	213308	2000	15000
CORN-FLAKES				
SALES	200000	300000	200000	300000
TOTAL-COST	(120000)	(180000)	(120000)	(180000)
T.P.	(76923)	(92308)	(77000)	(95000)
	3077	27692	3000	25000
TOTAL COMPANY P.L.	5000	207692 40000	5000	40000

STATEMENT SHOWING CALCULATION OF T.P. =
RELATIVE COST. 5000 8000

SALES	200000	300000	
COST- PACKING	(75000)	(80000)	
COST- CORN-F	(120000)	(180000)	
PROFIT	5000	40000	
	↓	↓	↓
75000 !	200000	80000 !	180000
1923	3077	12308	27692
T.P. 76923	123077	92308	207692

9.24

CASE STUDY No...6.7.....

9.16

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Example

A company has a division A producing three products called X, Y, Z. Each product can be sold in the open market in the following manner.

Maximum external sales are X 800 units, Y 500 units, Z 300 units. All figures in ₹

Particulars	X	Y	Z
Selling Price per unit	96	92	80
Variable Cost of Production in Division A	33	24	28
Labour Hours Required per unit in Division A	6	8	4

Product Y can be transferred to Division B, but the maximum quantity that might be required for transfer is 300 units of Y.

Division B could buy similar product in the open market at a price of ₹45 p.u.

- (i) What should be the transfer price per unit for 300 units of Y, if the total labor hours available with Division A are:
- (a) 13,000 hours (b) 8,000 hours and (c) 12,000 hours.
- (ii) Indicate the transfer pricing range that can promote goal congruence.

9.25

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TRANSFER PRICING DECISION DIFFERENT

CIRCUMSTANCES

EXAMPLE — SAME DKC-BOOK- 136, 139
PAGE- 9.16

STATEMENT SHOWING CONT-P-U/ P-H/ RANK.

	X	Y	Z
S.P(P-U)	96	92	80
V.P(U)	(33)	(24)	(28)
CONT(P-U)	63	68	52
HB P-U.	$\div 6$	$\div 8$	$\div 4$
CONT-P-H	10.50	8.50	13
RANK	II	III	I

ANS-(a)

STATEMENT SHOWING PRODUCTION RANK FOR
MAXIMUM PROFIT

HRS AVAILABLE	PRODUT.	UNITS X P-U = TOTAL	BALANCE HRS.
13000	Z	300 X 4 = 1200	11800
	X	800 X 6 = 4800	7000
	Y	500 X 8 = 4000	3000

STATEMENT SHOWING HRS REQD FOR -

300- UNITS Y

$$Y = (300 \times 8)$$

2400

STATEMENT SHOWING TP P-U Y

IF. = MINIMUM VARIABLE COST = 24.00

[9.26]

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ANSWER b)

STATEMENT SHOWING PRODUCTION PLAN FOR
MAXIMUM P.L.

HRS AVAILABLE	hrs Product UNIT X P.U = TOTAL	BALANCE
8000	Z $300 \times 4 = 1200$	$(8000 - 1200)$
	X $800 \times 6 = 4800$	$(6800 - 4800)$
	Y $250 \times 8 = 2000$	$(2000 - 2000)$

STATEMENT SHOWING HR REQD FOR
300 UNIT of 'y'

y (300×8)	2400
Cut - 'y' (minimum cont. - full hr)	(2000)
	400
Cut - 'x' $66.67 \text{ UNITS} \times 6$	400
Sq = <u>67</u>	

STATEMENT SHOWING T.P (P.U) 'y'
OPP-COST

'y' = $(\frac{250}{2000} \times 68) =$	2000 17000
'x' = $(66.67 \times 63) =$	4200
MAN-COST 'y' (300×24)	= 7200
	28400

÷ 300

$$\underline{\text{T.P (P.U)}} = \underline{94.67}$$

SINCE DIVISION B CAN SOURCE AT-45 IT
BE CHEAPER TO PURCHASE THE

19.27

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ANSWERSSTATEMENT SHOWING PRODUCTION PLAN FOR MAX-PL

HRS AVAILABLE	PRODUCTS	UNIT X	HM P.U. TOTAL	BALANCE
12000	Z	300 X 4 =	1200	(12000 - 1200)
	X	800 X 6 =	4800	(10800 - 4800)
	Y	500 X 8 =	4000	(6000 - 4000)
				= 2000

STATEMENT SHOWING T.P. (P.V) 'Y'STATEMENT SHOWING HRS REQD. FOR

$$300 \text{ UNIT 'Y'} = (300 \times 8) = 2400$$

$$\text{BALANCE - HRS} = (2000)$$

400

$$\text{CUT DOWN 'Y'} (50 \times 8)$$

$$\text{OPP-COST 'Y'} (50 \times 68) = \text{Rs. } 3400$$

$$\text{MAN-COST 'Y'} (300 \times 24) = \underline{7200}$$

$$10600$$

$$\div 300$$

$$\text{T.P. (P.V)} = \underline{35.33}$$

CHAPTER

8



**PERFORMANCE
MEASUREMENT AND
EVALUATION**



CASE STUDY No... 68...

Action Plan Manufacturers normally produce 8,000 units of their product in a month, in their Machine Shop. For the month of January, they had planned for a production of 10,000 units. Owing to a sudden cancellation of a contract in the middle of January, they could only produce 6,000 units in January.

Indirect manufacturing costs are carefully planned and monitored in the Machine Shop and the Foreman of the shop is paid a 10% of the savings as bonus when in any month the indirect manufacturing cost incurred is less than the budgeted provision.

The Foreman has put in a claim that he should be paid a bonus of Rs. 88.50 for the month of January. The Works Manager wonders how any one can claim a bonus when the Company has lost a sizeable contract. The relevant figures are as under :

Indirect manufacturing costs	Expenses for a normal month	Planned for January	Actual in January
	Rs.	Rs.	Rs.
Salary of foreman	1,000	1,000	1,000
Indirect labour	720	900	600
Indirect material	800	1,000	700
Repairs and maintenance	600	650	600
Power	800	875	740
Tools consumed	320	400	300
Rates and taxes	150	150	150
Depreciation	800	800	800
Insurance	<u>100</u>	<u>100</u>	<u>100</u>
<u>5,290</u>	<u>5,875</u>	<u>4,990</u>	

Do you agree with the Works Manager? Is the Foreman entitled to any bonus for the performance in January? Substantiate your answer with facts and figures.

8.10

10. Star Telecom Ltd. is a leading cellular service provider having a global presence. It aims to be the most innovative and trusted telecom company in the world. To achieve this aim, it is constantly working on its overall functioning. It is trying to adopt best management practices in the world. Following are some information related to the company's performance for a particular period:

Particulars	Current Year	Base Year	Target
Operating Ratio	60%	54%	Reduce it to 50%
Average Revenue per user	₹ 225	₹ 210	Increase it to ₹250
Unresolved Consumer Complaints	27,500	25,000	Reduce it by 20%
Customer Relationship Centres	280	200	Take the total to 250
Employee Coverage under Training Programme	10%	8%	At least 15%

Evaluate the performance of the company using Balance Scorecard approach.

10. The balanced scorecard is a method which displays organisation's performance into four dimensions namely financial, customer, internal and innovation. The four dimensions acknowledge the interest of shareholders, customers and employees taking into account of both long-term and short-term goals. The detailed analysis of performance of the company using Balance Scorecard approach as follows:

- (i) **Financial Perspective:** Operating ratio and average revenue will be covered in this prospective.

Company is unable to achieve its target of reducing operating ratio to 50% instead it has increased to 60%. Company is required to take appropriate steps to control and manage its operating expenses. Average revenue per user has increased from ₹ 210 to ₹ 225 but remains short of targeted ₹ 250. This is also one of the reasons

of swelled operating ratio. Company can boost up its average revenue per user either by increasing the price of its services or by providing more paid value added services.

- (ii) **Customer Perspective:** Service complaints will be covered under this perspective. The company had set a target of reducing unresolved complaints by 20% instead unresolved complaints have risen by 10% $[(27,500-25,000)/(25,000) \times 100]$. It shows dissatisfaction is increasing among the consumers which would adversely impact the consumer's general perception about the company and company may lose its consumers in long run.

- (iii) **Internal Business Perspective:** Establishing customer relationship centres will be covered under this perspective. Company has established 80 relationship centres in the current period exceeding its target of 50 (250-200) to cater to the needs of existing consumers as well as soliciting new consumers. This shows the seriousness of the company towards the consumer satisfaction and would help them in the long run.

- (iv) **Learning and Growth Perspective:** Employee training programmes are covered under this perspective.

Company had set a target to cover at least 15% employee under its training programmes but covered only 10%. This could hurt capabilities of the employees which are needed for long term growth of the organisation necessary to achieve the objectives set in the previous three perspectives. People or the Indraprastha resource of the company is one of the three principle sources where organisational learning and growth comes.

10



STRATEGIC ANALYSIS OF OPERATING INCOME



CASE STUDY No. 69.....

PAPER – 5: ADVANCED MANAGEMENT ACCOUNTING
QUESTIONS

Activity Based Costing

1. Bank of NZ operated for years under the assumption that profitability can be increased by increasing Rupee volumes. But that has not been the case. Cost analysis has revealed the following:

Activity	Activity Cost (₹)	Activity Driver	Activity Capacity
Providing ATM Service	1,00,000	No. of Transactions	2,00,000
Computer Processing	10,00,000	No. of Transactions	25,00,000
Issuing Statements	8,00,000	No. of Statements	5,00,000
Customer Inquiries	3,60,000	Telephone Minutes	6,00,000

The following annual information on three products was also made available:

Activity Driver	Checking Accounts	Personal Loans	Gold Visa
Units of Product	30,000	5,000	10,000
ATM Transactions	1,80,000	0	20,000
Computer Transactions	20,00,000	2,00,000	3,00,000
Number of Statements	3,00,000	50,000	1,50,000
Telephone Minutes	3,50,000	90,000	1,60,000

Required

- (i) Calculate rates for each activity.
(ii) Using the rates computed in requirement (i), calculate the cost of each product.

10.1

ACTIVITY		COST DRIVER USED	COST DRIVER RATE (ACTIVITY COST / COST DRIVER)
(1)	PROVIDING A.T.M SERVICE	NO-OF-A.T.M TRANSACTION	$\left(\frac{100000}{250000}\right)$ = 1.50
(2)	COMPUTER PROCESSING	NO OF COMP TRANSACTION	$\left(\frac{1000000}{250000}\right)$ = 4.0
(3)	ISSUEING STATEMENTS	NO OF STATEMENTS	$\left(\frac{800000}{500000}\right)$ = 1.60
(4)	CUSTOMER INQ.	TELEPHONE MINUTES	$\left(\frac{360000}{600000}\right)$ = 0.60

STATEMENT SHOWING COST OF PRODUCTS		CHECKING ACCOUNTS	PERSONAL LOANS	GOLD VISA
(1) PROVIDING ATM SERVICE	= 90000 (80000 X 1.50)	=	=	= 10000 (20000 X 0.50)
(2) COMPUTER PROCESSING	800000 (200000 X 4.0)	80000 (200000 X 0.40)		120000 (300000 X 0.40)
(3) ISSUING STATEMENTS	480000 (300000 X 1.60)	80000 (50000 X 1.60)		240000 (150000 X 1.60)
CUSTOMER INQ	210000 (350000 X 0.60)	54000 (90000 X 0.60)		96000 (160000 X 0.60)
TOTAL	1580000	214000		466000
÷ UNITS	÷ 30000	÷ 5000		÷ 10000

CASE STUDY No. 70

A company produces four products viz. P, Q, R and S. The data relating to production activity are as under :-

Product	Quantity of Production	Materials cost/unit Rs.	Direct Labour hours/unit	Machine hours/unit	Direct Labour Cost /unit Rs.
P	1,000	10	1	0.50	6
Q	10,000	10	1	0.50	6
R	1,200	32	4	2.00	4
S	14,000	34	3	3.00	18

Production overhead are as under :-

	Rs.
1) Overhead applicable to machine oriented activity	1,49,700
2) Overhead relating to ordering materials	7,680
3) Set up costs	17,400
4) Administration overheads for spare parts	34,380
5) Material handling costs	30,294

The following further information have been compiled :-

Product	Number of Set up	Number of materials orders	Number of times materials handled	Number of spare parts
P	3	3	6	6
Q	18	12	30	15
R	5	3	9	3
S	24	12	36	12

Required :

- Select a suitable cost driver for each item of overhead expense and calculate the cost per unit of cost driver.
- Using the concept of Activity Based Costing, compute the factory cost per unit of each product.

(21/02/20)

71

G-2020 Ltd. is a manufacturer of a range of goods. The cost structure of its different products is as follows:

Particulars	Product A	Product B	Product C	
Direct Materials	50	40	40	₹/u
Direct Labour @ ₹ 10/ hour	30	40	50	₹/u
Production Overheads	30	40	50	₹/u
Total Cost	110	120	140	₹/u
Quantity Produced	10,000	20,000	30,000	Units

G-2020 Ltd. was absorbing overheads on the basis of direct labour hours. A newly appointed management accountant has suggested that the company should introduce ABC system and has identified cost drivers and cost pools as follows:

Activity Cost Pool	Cost Driver	Associated Cost
Stores-Receiving	Purchase Requisitions	2,96,000
Inspection	Number of Production Runs	8,94,000
Dispatch	Orders Executed	2,10,000
Machine Setup	Number of Setups	12,00,000

The following information is also supplied:

Details	Product A	Product B	Product C
No. of Setups	360	390	450
No. of Orders Executed	180	270	300
No. of Production Runs	750	1,050	1,200
No. of Purchase Requisitions	300	450	500

Required

Calculate activity based production cost of all the three products.

10.4

5

CASE STUDY No.....72.....

Chapter - 10

COST SHEET, PROFITABILITY ANALYSIS & REPORTING

A manufacturing organisation has four different customers A, B, C and D. A single product is sold to them at different prices because of trade discount offered. Data is given for cost per unit of business activity. You are required to prepare customer profitability statement.

Information on four customers

Customers	A	B	C	D
No. of units sold	60,000	80,000	1,00,000	70,000
Selling price net of discount	25p	23p	21p	22p
No. of sales visits	2	4	6	3
No. of purchase orders	30	20	40	20
No. of deliveries	10	15	25	14
Kilometres per journey	20	30	10	50
No. of rush deliveries	—	—	1	2

Cost of each activity:-

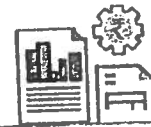
- | | |
|-------------------------|---------------------|
| 1) Sales visit | 210 per visit. |
| 2) Order placing | Rs.60 per order |
| 3) Product Handling | Rs.0.10 per item |
| 4) Normal delivery cost | Rs. 2 per kilometer |
| 5) Rushed delivery cost | Rs.200 per delivery |

10.5

11



BUDGETARY CONTROL



A factory which expects to operate 7,000 hours, i.e., at 70% level of activity, furnishes details of expenses as under :

Variable expenses	Rs. 1,260
Semi-variable expenses	Rs. 1,200
Fixed expenses	Rs. 1,800

The semi-variable expenses go up by 10% between 85% and 95% activity and by 20% above 95% activity. Construct a flexible budget for 80, 90 and 100 per cent activities.

CASE STUDY No.....72

CASE STUDY No.....73

A single product company estimated its sales for the next year quarterwise as under :

Quarter	Sales (Units)
I	30,000
II	37,500
III	41,250
IV	45,000

The opening stock of finished goods is 10,000 units and the company expects to maintain the closing stock of finished goods at 16,250 units at the end of the year. The production pattern in each quarter is based on 80% of the sales of the current quarter and 20% of the sales of the next quarter.

The opening stock of raw materials in the beginning of the year is 10,000 kg. and the closing stock at the end of the year is required to be maintained at 5,000 kg. Each unit of finished output requires 2 kg. of raw materials.

The company proposes to purchase the entire annual requirement of raw materials in the first three quarters in the proportion and at the prices given below :

Quarter	Purchase of raw materials % to total annual requirement in quantity	Price per kg.
I	30%	2
II	50%	3
III	20%	4

You are required to present the following for the next year, quarterwise :

- (i) Production budget (In units)
- (ii) Raw material consumption budget (in quantity)
- (iii) Raw material purchase budget (In quantity and value).
- (iv) Priced stores ledger card of the raw material using First In First out method.

CASE STUDY No...74....

13. Following information are extracted from monthly budgets of JIT Ltd.

Required

Find out missing figures.

[illegible]

12



STANDARD COSTING



~~Q. No. 75~~

Product	Budgeted Quantity Units	Actual quantity units	Budgeted sale price per unit Rs.	Actual sale price per unit Rs.	Standard cost per unit Rs.
	240	400	50	45	30
	160	200	25	20	15

CASE STUDY No. 75

CASE STUDY No. 76

To obtain an output of 100 units of product X, 800 kgs of material is required at a budgeted price of Rs. 5 per kg. During the month, the actual output was 500 units. The actual material consumption was 4,400 kgs @ Rs. 5.30 per kg. You are required to calculate various material cost variances.

CASE STUDY No. 77

~~Q. No. 78~~
Question

The standard and actual figures of a firm are as under:

Standard time for the job	1,000 hours
Standard rate per hour	Re. 0.50
Actual time taken hours	1200
Actual wages paid	Rs. 360

Compute the variances
If abnormal Ideal time is
100 hours

~~Q. No. 79~~
Question

CASE STUDY No.

To produce 100 units of a product, 3 types of workers are required as per following standards:

- 180 hours of skilled labour @ Rs. 5 per hour
- 120 hours of semi-skilled labour @ Rs. 3 per hour
- 300 hours of unskilled labour @ Rs. 2 per hour

Part A

During September 2005 following were the details of labour hours recorded for the output of 1600 units.

- 3000 hours of skilled labour @ Rs. 5.20 per hour
- 2000 hours of semi-skilled labour @ Rs. 2.50 per hour
- 5000 hours of unskilled labour @ Rs. 1.80 per hour

11.3

~~Q. No. 80~~

~~ENCL 50~~

CASE STUDY No. 78

M Star Ltd uses standard costing system in manufacturing of its single product 'MGO'. The standard cost per unit of 'MGO' is as follows.

	₹
Direct Material – 2 metres @ ₹5 per metre	12.00
Direct Labour – 1 hour @ ₹4.40 per hour	4.40
Variable Overhead – 1 hour @ ₹3 per hour	3.00
	19.40

During July, 2013, 6,000 units of M were procured and the related data are as under:

Direct material acquired – 19,000 metres @ 5.70 per metre.

Material consumed 12,670 meters.

Direct labour - ? hours @ ₹? per hour ₹ 27,950

Variable overheads incurred ₹ 20,475

The variable overhead efficiency variance is ₹ 1,500 adverse. Variable overheads are based on direct labour hours. There was no stock of raw – material in the beginning.

You are required to compute the missing figures and work out all the relevant variances.

~~ENCL 51~~

CASE STUDY No. 79

XYZ Ltd. has furnished you the following for the month of August:

	Budget	Actual
Output (units)	30,000	32,500
Hours	30,000	33,000
Fixed overhead Rs.	45,000	50,000
Working days	25	26

Calculate the fixed overhead variances.

11.4

~~35~~

Date

~~Q2020~~

CASE STUDY No. 81

Young Chin Limited uses standard and marginal costing system. It provides the following details for the year 2012-13 relating to its production, cost and sales:

	Budgeted	Actual
Sales units	24,000	25,600
Sales value (₹)	6,000	6,784
Materials (₹)	960	1,080
Labour (₹)	1,440	1,664
Variable overheads (₹)	2,400	2,592

The sales budget is based on the expectation of the company's estimate of market share of 12%. The entire industry's sales of the same product for the year 2012-13 is 2,40,000 units. Further details are as follows:

	Standard (₹)	Actual (₹)
Material price per kg.	8.00	7.50
Labour rate per hour	6.00	6.40

You are required to:

- Prepare a statement reconciling the budgeted contribution with actual contribution on the basis of important material variances, labour variances, variable overhead variances and sales variances.
- Compute market size variance and market share variance also.

SAME - DKC QNO - 203

116

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CASE STUDY No. 8DQ QNO-150

The budget output of a single product manufacturing company for 2013-14 was 5,000 units. The financial results in respect of the actual output of 4,800 units achieved during the year were as under:-

Direct Material	₹
Direct Wages	29,700
Variable Overheads	44,700
Fixed Overheads	72,750
Profit	39,000
Sales	36,600
	2,22,750

The standard direct wage rate is ₹ 4.50 per hour and the standard variable overhead rate is ₹ 7.50 per hour.

The cost accounts recorded the following variances for the year:-

Variances	Favourable	Adverse
Material Price	—	300
Material Usage	—	600
Wage Rate	750	—
Labour Efficiency	—	2,250
Variable Overhead Expense	3,000	—
Variable Overhead Efficiency	—	3,750
Fixed Overhead Expense	—	1,500
Selling Price	6,750	—

Required to:-

- Prepare a statement showing the original budget.
- Prepare the standard product cost sheet per unit.
- Prepare a statement showing the reconciliation of originally budgeted profit and the actual profit.

SAME - AS - DKC - QNO - 206

8D

11.5

The following is the Operating Statement of a company for April 2013:

Budgeted Profit		1,00,000	
		Favourable	Adverse
		(₹)	(₹)
Sales	Volume	---	4,000
	Price	9,600	---
Direct Material	Price	---	4,960
	Usage	---	6,400
Direct Labour	Rate	---	3,600
	Efficiency	3,600	---
Fixed Overheads	Efficiency	2,400	---
	Capacity	---	4,000
	Expense	1,400	---
Actual Profit			5,960 (A)
			94,040

Additional information is as under:

Budget for the year

1,20,000 units

Budgeted fixed overheads

₹ 4,80,000 per annum

Standard cost of one unit of product is:

Direct Materials

5 Kg. @ ₹ 4 per Kg.

Direct Labour

2 hours @ ₹ 3 per hour

Fixed overheads are absorbed on direct labour hour basis.

Profit

25% on sales

You are required to prepare the Annual Financial Profit / Loss Statement for April, 2013 in the following format:

Account	Qty / Hour	Rate / Price	Actual Value
		(₹)	(₹)
Sales	---	---	---
Direct Materials	---	---	---
Direct Labour	---	---	---
Fixed Overheads	---	---	---
Total Costs	---	---	---
Profit	---	---	---

CAMP - DKC - Q NO - 184

117

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Sanon Products Ltd. produces and sells a single product. Standard cost card per unit of the product is as follows:-

Standard Cost Card	
Direct Material, A 10 kg @ ₹ 5 per kg	50.00
B 5 kg @ ₹ 6 per kg	30.00
Direct Wages, 5 hours @ ₹ 5 per hour	25.00
Variable Production Overheads, 5 hours @ 12 per hour	60.00
Fixed Production Overheads	25.00
Total Standard Cost	190.00
Standard Gross Profit	35.00
Standard Selling Price	225.00

A fixed production overhead has been absorbed on the expected annual output of 25,200 units produced evenly throughout the year. During the month of December, 2013, the following were the actual results for an actual production of 2,000 units:

Actual Results for December 2013	
Sales, 2,000 units @ ₹ 225	4,50,000
Direct Materials, A 18,900 kg	99,225
B 10,750 kg	61,275
Direct Wages, 10,500 hours (actually worked 10,300 hours)	50,400
Variable Production Overheads	1,15,000
Fixed Production Overheads	56,600
Gross Profit	67,500

The material price variance is extracted at the time of receipt of materials. Material purchase were a 20,000 kg. @ ₹ 5.25 per kg; B 11,500 kg @ ₹ 5.70 per kg.

Required:

- Calculate all Variances.
- Prepare a reconciliation statement showing Standard Gross Profit, Variances and Actual Gross Profit.
- Explain the reason for the difference in Actual Gross Profit given in the question and calculated in (ii) above.

71.8

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CHAPTER

12



STANDARD COSTING



LEARNING OUTCOMES

After studying this chapter, you will be able to:

- ☐ **Calculate** advanced variances
- ☐ **Interpret** Variances
- ☐ **Identify and Explain** the relationship of the Variances
- ☐ **Apply** Standard Costing Methods including the Reconciliation of Budgeted and Actual Profit Margins
- ☐ **Explain** the wider issues involved in changing mix e.g. Cost, Quality, and Performance Measurement issues
- ☐ **Analyse and Evaluate** Past Performance using the results of variance analysis
- ☐ **Use** Variance Analysis to assess how Future Performance of an organisation can be improved

Natural Spices manufactures and distributes high-quality spices to gourmet food shops and top quality restaurants. Gourmet and high-end restaurants pride themselves on using the freshest, highest-quality ingredients.

Natural Spices has set up five state of the art plants for meeting the ever- growing demand. The firm procures raw material directly from the centers of produce to maintain uniform taste and quality. The raw material is first cleaned, dried and tested with the help of special machines. It is then carefully grounded into the finished product passing through various stages and packaged at the firm's ultraclean factory before being dispatched to customers.

The following variances pertain to last week of operations, arose as a consequence of management's decision to lower prices to increase volume.

Sales Volume Variance	18,000 (F)
Sales Price Variance	14,000 (A)
Purchase Price Variance	10,000 (F)
Labour Efficiency Variance	11,200 (F)
Fixed Cost Expenditure Variance	4,400 (F)

CASE STUDY No. **83**

Required

- (i) Identify the 'Critical Success Factors' for Natural Spices.
- (ii) Evaluate the management's decision with the 'Overall Corporate Strategy' and 'Critical Success Factors'.

Solution

- (i) Gourmet and high-end restaurants recognises Natural Spices on the basis of its *high quality* of spices. Therefore, quality is most critical success factor of Natural Spices. There are other factors which cannot be ignore such as price, delivery options, attractive packing etc. But all are secondary to the quality.

- (ii) Deliberate action of cutting price to increase sales volume indicates that firm is intending to expand its market to retail market and street shops which is price sensitive.

Purchase Price Variance is clearly indicating that firm has purchased raw material at lower price which may be due to buying of lower quality of material. Similarly, positive *Efficiency Variance* is indicating cost cutting and stretching resources.

It appears that firm is intending to expand its market to retail market and street shops by not only reducing the price but also compromising its quality which is opposing its current strategy of *high quality*.

Management should monitor the trends of variances on regular basis and take appropriate action in case of evidence of permanent decline in quality. Here, customer feedback is also very important.

12.1

Illustration

N & S Co. (NSC) is a multiple product manufacturer. NSC produces the unit and all overheads are associated with the delivery of units to its customers.

Overheads (₹)	4,000	3,900
Output (units)	2,000	2,100
Customer Deliveries (no.'s)	20	19

Required

CALCULATE Efficiency Variance and Expenditure Variance by adopting ABC approach.

F.O.

BUDGET

ACTUAL

UNITS	R.R	Exp	UNIT	Exp
<u>2000</u>	<u>2</u>	<u>4000</u>	2000 <u>2100</u>	<u>3900</u>
DELIVERY	R.R	Exp	DELIVERY	Exp
<u>20</u>	<u>200</u>	<u>4000</u>	<u>19</u>	<u>3900</u>

F.O. A/c

TO BANK	3900	BY REC'D	4200
		(2100 X 2)	
TO Y/L	300		

F.O. Cost VAR
(4200 - 3900) = 300 (F)

F.O. Exp VAR
(4000 - 3900) = 100 (F)

F.O. Volume
(2000 - 2100) X 2
= 200 (A) (F)

F.O. Cap VAR
(20 - 19) X 200
= 200 (A)

F.O. Eff VAR
2000 - 20
2100 - 21
(21 - 19) X 200 = 400 (F)

T12.3

= 200 (A)

T12.2

(21 - 19) X 200 = 400 (F)

STANDARD COSTING

12.7

CASE STUDY No..85.....

Illustration

City International Co. is a multiproduct firm and operates standard costing and budgetary control system. During the month of June firm launched a new product. An extract from performance report prepared by Sr. Accountant is as follows:

Output	30 units	25 units
Direct Labour Hours	180.74 hrs.	118.08 hrs.
Direct Labour Cost	₹1,19,288	₹79,704

Sr. Accountant prepared performance report for new product on certain assumptions but later on he realized that this new product has similarities with other existing product of the company. Accordingly, the rate of learning should be 80% and that the learning would cease after 15 units. Other budget assumptions for the new product remain valid.

The original budget figures are based on the assumption that the labour has learning rate of 90% and learning will cease after 20 units, and thereafter the time per unit will be the same as the time of the final unit during the learning period, i.e. the 20th unit. The time taken for 1st unit is 10 hours.

Required

Show the variances that reconcile the actual labour figures with revised budgeted figures in as much detail as possible.

Note:

The learning index values for a 90% and a 80% learning curve are -0.152 and -0.322 respectively.
[log 2 = 0.3010, log 3 = 0.47712, log 5 = 0.69897, log 7 = 0.8451, antilog of 0.6213 = 4.181, antilog of 0.63096 = 4.275]

Solution**Working Note**

The usual learning curve model is

$$y = ax^b$$

Where

y = Average time per unit for x units

a = Time required for first unit

x = Cumulative number of units produced

b = Learning coefficient

12.4

W.N.1

Time required for first 15 units based on revised learning curve of 80% (when the time required for the first unit is 10 hours)

$$y = 10 \times (15)^{-0.322}$$

$$\log y = \log 10 - 0.322 \times \log 15$$

$$\log y = \log 10 - 0.322 \times \log (5 \times 3)$$

$$\log y = \log 10 - 0.322 \times [\log 5 + \log 3]$$

$$\log y = 1 - 0.322 \times [0.69897 + 0.47712]$$

$$\log y = 0.6213$$

$$y = \text{antilog of } 0.6213$$

$$y = 4.181 \text{ hours}$$

$$\text{Total time for 15 units} = 15 \text{ units} \times 4.181 \text{ hours}$$

$$= 62.72 \text{ hours}$$

Time required for first 14 units based on revised learning curve of 80% (when the time required for the first unit is 10 hours)

$$y = 10 \times (14)^{-0.322}$$

$$\log y = \log 10 - 0.322 \times \log 14$$

$$\log y = \log 10 - 0.322 \times \log (2 \times 7)$$

$$\log y = \log 10 - 0.322 \times [\log 2 + \log 7]$$

$$\log y = 1 - 0.322 \times [0.3010 + 0.8451]$$

$$\log y = 0.63096$$

$$y = \text{antilog of } 0.63096$$

$$y = 4.275 \text{ hrs}$$

$$\text{Total time for 14 units} = 14 \text{ units} \times 4.275 \text{ hrs}$$

$$= 59.85 \text{ hrs}$$

Time required for 25 units based on revised learning curve of 80% (when the time required for the first unit is 10 hours)

$$\text{Total time for first 15 units} = 62.72 \text{ hrs}$$

$$\text{Total time for next 10 units} = 28.70 \text{ hrs } [(62.72 - 59.85) \text{ hours} \times 10 \text{ units}]$$

$$\text{Total time for 25 units} = 62.72 \text{ hrs} + 28.70 \text{ hrs}$$

$$= 91.42 \text{ hrs}$$

12.5

STANDARD COSTING

12.9

W.N.2

Computation of Standard and Actual Rate

Standard Rate	=	$\frac{₹1,19,288}{180.74 \text{ hrs.}}$
	=	₹ 660.00 per hr.
Actual Rate	=	$\frac{₹79,704}{118.08 \text{ hrs.}}$
	=	₹ 675.00 per hr.

W.N.3

Computation of Variances

Labour Rate Variance	=	Actual Hrs × (Std. Rate – Actual Rate)
	=	118.08 hrs × (₹660.00 – ₹675.00)
	=	₹1,771.20 (A)
Labour Efficiency Variance	=	Std. Rate × (Std. Hrs – Actual Hrs)
	=	₹660 × (91.42 hrs – 118.08 hrs)
	=	₹17,595.60 (A)

Statement of Reconciliation (Actual Figures Vs Budgeted Figures)

Actual Cost	79,704.00
Less: Labour Rate Variance (Adverse)	1,771.20
Less: Labour Efficiency Variance (Adverse)	17,595.60
Budgeted Labour Cost (Revised)*	60,337.20

Budgeted Labour Cost (Revised)*

$$\begin{aligned}
 &= \text{Std. Hrs.} \times \text{Std. Rate} \\
 &= 91.42 \text{ hrs.} \times ₹660 \\
 &= ₹ 60,337.20
 \end{aligned}$$

Relevant Cost Approach to Variance Analysis

Traditional approach to variance analysis is to compute variances based on total actual cost for production inputs and total standard cost applied to the production output. This is ambiguous, when inputs are limited. Failure to use limited inputs properly leads not only to increased acquisition cost but also to a lost contribution. Therefore, it is necessary to consider the lost contribution in variance analysis. When this approach is used, price or expenditure variances are not affected.

12.6

Page No.			
Date			

INITIAL BATCH
1 UNITS

HRS PER-BATCH
10 HRS

L.C. Ratio
80%

IF PRODUCTION = 15 UNITS

$$\text{HRS PER-BATCH} = \log K + \left(\frac{\log L.C. \text{Ratio}}{2} \right) \times \log (X)$$

$$= \log 10 + \left(\frac{\log 0.80}{\log 2} \right) \times (\log 15)$$

$$= 1.0000 + \left(\frac{-1 + 0.9031}{0.3010} \right) \times (1.1761)$$

12.7

4178 = 0.6213 [ANTILOG] = ~~4178~~ ~~4178~~

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Date			

[ILL- / 12.70]

IF PRODUCTION = 14 UNITS

$$= \log 10 + \left(\frac{\log 0.80}{\log 2} \right) \times (\log 14)$$

$$= 1.0000 + \left(\frac{-1 + .9031}{0.3010} \right) \times (1.1461)$$

$$= .6310 \quad (\text{ANTILOG})$$

4.276

$$\begin{aligned} \text{TOTAL HRS - READ} &= (4.276 \times 14 \text{ UNITS}) \\ &= 59.86 \text{ hrs} \end{aligned}$$

TIME-READ FOR 25 UNITS BASED ON
REVISED CURVE OF 80%.

$$\begin{aligned} \text{TOTAL TIME 15 UNITS} &= 62.72 \\ \text{TOTAL TIME 14 " } &= (59.86) \\ &2.86 \end{aligned}$$

$$\begin{aligned} 15 \text{ UNITS} &= 62.72 \text{ hrs.} \\ 10 \text{ UNITS} &= \\ (10 \times 2.86) &28.60 \text{ " } \\ &91.32 \text{ " } \end{aligned}$$

Labour VARIANCE - ACTUAL PRODUCTION = 25 UNITS

HR	Rate	Amnt	HR	Rate	Amnt
91.32	1800	60271.20	118.08	675	79704
12.87	660				

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Date			

⑦

LABOUR COST VARIANCE.

$$(60271.20 - 79704) = 19432.80 \text{ (A)}$$

Lab Eff Var

$$(11.32 - 118.08) 660$$

$$17661.6 \text{ (A)}$$

Lab Rate Var

$$(660 - 675) \times 118.08$$

$$= 1771.2 \text{ (A)}$$

STATEMENT SHOWING RECONCILIATION

STANDARD COST

60271.20

Lab Eff Var.

17661.60

Lab Rate Var

1771.20

79704

DKC

12.9

Page No.			
Date			

CASE STUDY No. 86.....

Illustration

Osaka Manufacturing Co. (OMC) is a leading consumer goods company. The budgeted and actual data of OMC for the year 2016-17 are as follows-

Particulars	Budget	Actual	Variance
Sales / Production (units)	2,00,000	1,65,000	(35,000)
Sales (₹)	21,00,000	16,92,900	(4,07,100)
Less: Variable Costs (₹)	12,66,000	10,74,150	1,91,850
Less: Fixed Costs (₹)	3,15,000	3,30,000	(15,000)
Profit	5,19,000	2,88,750	(2,30,250)

The budgeted data shown in the table is based on the assumption that total market size would be 4,00,000 units but it turned out to be 3,75,000 units.

Required

PREPARE a statement showing reconciliation of budget profit to actual profit through marginal costing approach for the year 2016-17 in as much detail as possible.

SOLUTION) STATEMENT SHOWING COST SHEET

	200000 UNITS	
	TOTAL	P-U.
SALES	2100000	10.50
V. COST	(1266000)	(6.33)
CONTRIBUTION	834000	4.17
FIXED COST	(315000)	1.575
Profit	519000	2.595

12.10

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⑨

Scop No (2) STATEMENT SHOWING PELLO

	R.
SALES	1692900
V-COST	(1074150)
CONTRIBUTION	618750
FIXED COST	(330000)
PELU.	288750

Scop No (3)STATEMENT SHOWING RECONCILIATION

	R.
PROFIT- AS- PER- COST- SHEET	519000
DUE TO - V.O. EFF VAR	-
V.O. EXP/RAU VAR	(29700)
DUE TO SALES - MARGIN RAU	(39600)
SALES MARGING SHAREVAR	(93825)
SALES MARGING SILEVAR	(51125)
DUE TO F.O. VAR	(15000)
PE AS PER P. COST A/C	288750

12.11

Slp No (4)

ANALYSIS OF VARIANCE

STANDARD

ACTUAL

UNITS	Rate	Amt	UNITS	Rate	Amt
165000	6.33 =	1044450	165000	6.51 =	1074150
	$\frac{(1266000)}{200000}$				

$$\text{V.O. COST VAR} \\ (1044450 - 1074150) = 29700 (A)$$

V.O. EFF VAR

V.O. EXPRA VAR

$$(165000 - 165000) \times 6.33 \\ = 0$$

$$(6.33 - 6.51) \times 165000 \\ = 29700 (A)$$

Sale Margin VARIANCE

UNITS	Rate	Amt	UNITS	Rate	Amt
200000	4.17	834000	165000	* 3.93	648450

$$* \text{ACTUAL SP (P.U)} = 10.26$$

$$\frac{(1692900)}{165000} \text{ BUDGET (6.33)} \\ \text{CONT } 3.93$$

$$\text{Sale Margin VAR} (834000 - 648450) \\ = 185550 (A)$$

Sale Margin Volume VAR

Sale Margin Rate VAR

$$(200000 - 165000) \times 4.17$$

$$(4.17 - 3.93) \times 165000$$

$$119.12 = 145950 (A)$$

$$= 39600 (A)$$

Page No.			
Date			

Sales margin Volume Var

145950 (A)

Sales Margin

MRK - SHARE VARIANCE

Sales-Margin

MRK - SIZE VAR

$$\left(\frac{200000 \times 375000}{400000} \right)$$

$$(400000 - 375000) \times 50\% \times 4.17$$

$$= 52125 (A)$$

$$= (187500 - 165000) \times 4.17$$

$$= 93825 (A)$$

F.O. COST VARIANCE

$$(315000 - 330000) = 15000 (A)$$

Illustration

Queensland Chemicals (QC) manufactures high-quality chemicals C-1, C-2 and C-3. Extracts from the budget for last year are given below:

Sales Quantity (kg)	1,000	3,250	750
Average Selling Price	17,600	2,560	22,400
Direct Material (C ₂ H ₆ O) Cost	8,000	1,280	9,600
Direct Labour Cost	3,200	480	4,800
Variable Overhead Cost	320	48	480

The budgeted direct labour cost per hour was ₹160.

Actual results for last year were as follows:

Sales Quantity (units)	900	3,875	975
Average Selling Price	19,200	2,480	20,000
Direct Material(C ₂ H ₆ O) Cost	8,800	1,200	10,400
Direct Labour Cost	3,600	480	4,800
Variable Overhead Cost	480	64	640

The actual direct labour cost per hour was ₹150. Actual variable overhead cost per direct labour hour was ₹20. QC follows just in time system for purchasing and production and does not hold any inventory.

ed

PRET the Sales Mix Variance and Sales Quantity variance in terms of contribution.

Solution

Variance Interpretation

The sales quantity variance and the sales mix variance describe how the sales volume contribution variance has been affected by a change in the *total quantity of sales* and a *change in the relative mix of products sold*.

From the figures arrived for the sales quantity contribution variance, we can observe that the increase in total quantity sold would have gained an additional contribution of ₹2,124,600, if the actual sales volume had been in the budgeted sales proportion.

The sales mix contribution variance shows that the variation in the sales mix resulted in a curtailment in profit by ₹570,600. The change in the sales mix has resulted in a relatively higher proportion of sales of C-2 which is the chemical that earns the lowest contribution and a lower proportion of C-1 which earn a contribution significantly higher. The relative increase in the sale of C-3 however, which has the highest unit contribution, has partially offset the switch in mix to C-2.

Step No (1) COST-SHEET

STATEMENT SHOWING COST SHEET

	C1	C2	C3
S.P	17600	2560	22400
V.P. V.O.	(320)	(48)	(480)
DM	(8000)	(1280)	(9600)
DL	(3200)	(480)	(4800)
CONT CONT	6080	752	7520
UNITS	1000	3250	750

Step No (2)

PLU & AC

S.P.	19200	2480	20500
DM at	(8800)	(1200)	(10400)
DL at	(3600)	(480)	(4800)
V.O:	(480)	(64)	(640)
	6320	736	4160

SALLES VARIANCE - MARGIN

	Producers/Unit	Rate	Amtr	Unit	Rate	Amtr
C1	1000	6080	= 6080000	900 X	7680	= 6912000
C2	3250	752	= 2444000	3875 X	672	= 2604000
C3	750	7520	= 5640000	975 X	5120	= 4992000
	<u>5000</u>		<u>14164000</u>	<u>5750</u>		<u>14508000</u>

Actual Pt PPL UNIT

(Actual S.P Pt)

C1	19200	-	(17600 - 680) =	7680
C2	2480	-	(2560 - 752) =	672
C3	20000	-	(22400 - 7520) =	5120

12.14

SALES MARGIN VARIANCE

$$(14164000 - 14508000) = 344000 (F)$$

Sales Margin Volume Var

Sales Margin Rate Var

$$C_1 (1000 - 900) \times 6080 =$$

$$(6080 - 7680) \times 900$$

$$C_2 (3250 - 3875) \times 752 =$$

$$(752 - 672) \times 3875$$

$$C_3 (750 - 975) \times 7520 =$$

$$(7520 - 5120) \times 975$$

$$C_1 = 608000 (F)$$

$$= 1440000 (F)$$

$$C_2 = 470000 (F)$$

$$= 310000 (F)$$

$$C_3 = 1692000 (F)$$

$$= 2340000 (A)$$

$$\underline{1554000 (F)}$$

$$\underline{1210000 (A)}$$

Sales Margin Subvolume

Sales Margin Mix

$$(5000 - 5750) \times \frac{14160000}{5000}$$

$$C_1 \left(\frac{1000}{5000} \times 5750 \right)$$

$$= 2124000 (F)$$

$$= (1150 - 900) \times 6080$$

$$= 1520000 (A)$$

$$C_2 = \left(\frac{3250}{5000} \times 5750 \right)$$

$$(3737.5 - 3875) \times 752$$

$$= 103400 (F)$$

$$C_3 = \left(\frac{750}{5000} \times 5750 \right)$$

$$= 2750 \times 7520 = 846000 (F)$$

112.15

Standard Costing – Profit Reconciliation

14. ANZ Ltd. has provided the following summarized results for two years:

USE STUDY No... 88

	Year ended (₹ in lacs)	
	31-03-2016	31-3-2017
Sales	3,000	3,277.50
Material	2,000	2,357.50
Variable overheads	500	525.00
Fixed overheads	300	367.50
Profit	200	27.50

During the year ended 31-3-2017 sale price has increased by 15% whereas material and overhead prices have increased by 15% and 5% respectively.

Required

- Analyse the variances of revenue and each element of cost over the year in order to bring out the reasons for the change in profit.
- Present a profit reconciliation statement starting from profits in 2015-16 showing the factors responsible for the change in profits in 2016-17.

Note – Consider 'Contribution Variances' for solving this question.

STATEMENT SHOWING ANALYSIS OF VARIANCE

	31-3-16	31-3-17	TOTAL INC/DEF	DUE TO PRICE	DUE TO QUANTITY	DUE TO MIX
SALES	3000	3277.50	277.50	427.50	(150)	-
V-COST						
Mat	(2000)	(2357.50)	(357.50)	(307.50)	100	(150)
V.O	(500)	(525)	(25)	(25)	25	(25)
CONST	500	395	(105)	95	(25)	(175)
FCOST	(300)	(367.50)	(67.50)	(67.50)	-	-
Profit	200	27.50	(172.50)	27.50	(25)	(175)

12.11

OTHER (25) (25) = 25

$$\boxed{18.17} \quad \left(\frac{500}{2500} \times 150 \right)$$

DUE TO VOLUME

$$= 500 \quad \left(\frac{525 \times 100}{105} \right) \quad 25 \quad 525 \quad (25)$$

100 5 105 525

DUE TO PRICE

V.O - VARIANCE

$$\left(\frac{2000}{3000} \times 150 \right) \quad \text{DUE TO OTHERS}$$

100

= 2050 307.50 2357.50

$$\left(\frac{15}{2357.50 \times 100} \right) \quad 100 \quad 15 \quad 115$$

2357.50

MATERIAL PRICE VARIANCE

$$277.50 \quad (307.50)$$

$$\text{DUE TO VOLUME} \quad (3000 - 2850) = (150)$$

= 2850 427.50 327.50

$$\left(\frac{15}{327.50 \times 100} \right) \quad 100 \quad 15 \quad 115$$

327.50 = 427.50

PRICE	%	DUE TO STORES	STORES - PRICE - VARIANCE
100	15	115	

CASE STUDY No.....

L.P.P.

Chapter 14. Linear Programming Problem

~~Q-287~~ **CS-89**
Q-287. A tonic feed for cattle is to be prepared using two types of grain X_1 and X_2 . Each unit of grain X_1 weights 4 gms, and contain 2 gms of protein. Each unit of grain X_2 weights 5 gms. and contains 1 gm. of protein. The feed is to weight at most 40 gms. and must contain at least 10 gms. of protein. If the grain X_1 cost 30 paise a unit and that X_2 costs 10 paise a unit, determine by graphical method the amount of two types of grain to be used in the preparation of the feed to minimize the cost yet meeting the requirements. Formulate LP model for this problem.

~~Q-288~~ **CS-90**
Q-288. A manufacturer makes two products P_1 and P_2 using two machinery M_1 and M_2 . Product P_1 requires 2 hours on machine and 6 hours on machine M_2 . Product P_2 requires 5 hours on machine M_1 and no time on machine M_2 . There are 16 hours of time per day available on machine M_1 and 30 hours on M_2 . Profit margin from P_1 and P_2 is Rs. 2 and Rs. 10 per unit respectively. Formulate LP model for this problem.

~~Q-289~~ **CS-91**
Q-289. A firm manufactures two products A and B on which profits earned per unit are RS. 3 and Rs. 4 respectively. Each product is processed on two machines, M_1 and M_2 . The product A requires one minute of processing time on M_1 and two minutes on M_2 while B requires one minute on M_1 and one minute on M_2 . Machine M_1 is available for use for not more than 7 hours 30 minutes, while M_2 is available for 10 hours during any working day. Formulate LP model for this problem.

~~Q-290~~ **CS-92**
Q-290. A company produces two products X and Y, each of which requires processing in three machines. The first machine can be used at most 70 hours; the second machine at most 40 hours; and the third machine at most 90 hours. The product X requires 2 hours on machine 1, 1 hour on machine 2, and 1 hour on machine 3; the product Y requires 1 hour each on machines 1 and 2, and 3 hours on the third machine. The profit is Rs. 50 per unit of X and Rs. 30 per unit of Y. Formulate LP model for this problem.

Linear Programming

CS-93
~~Q. 18.~~ 2002 - Nov [6] (c) A company manufactures two products namely A and B. The contribution per kg of output is Rs. 240 and Rs. 140 respectively for products A and B. The total fixed costs amount to Rs. 1,200 per week

The production of two products is restricted by limited supplies of three items of raw materials namely P, Q and R. The quantities of P, Q and R which are necessary to produce single units of the products A and B together with the total stock of materials available each week are given below:

	Product A	Product B	Total Quantity available per week kg
Raw material P	16	20	160
Q	10	25	150
R	4	0	32

Using the graphical approach of Linear Programming (LP), calculate the maximum Profit per week. (8 marks) [S. A. 19]

Ans:- Maximum Profit is Rs. 944

----- Space to write important points for revision -----

317 CS-94
~~Q. 19.~~ 2003 - Nov [5] (b) A manufacture produces two products D₁ and D₂ using two machines R₁ and R₂. Products D₁ requires 2 hours on machine R₁ and 6 hours on machine R₂. Product D₂ utilises 5 hours of machine R₁ only. Total hours available per day on machine R₁ is 16 and R₂ is 30. Profit margin from D₁ and D₂ is Rs. 2 and Rs. 10 per unit respectively. Using simplex method find out the daily production mix to optimis profit. (8 marks) [S.A. 17]

Ans:- 32

----- Space to write important points for revision -----

318 CS-95
~~Q. 20.~~ 2004 - May [5] (c) The budgeted data relating to two products manufactured by a company for a month are as under:

	Product A	Product B
Selling price	300	200
Variable manufacturing costs	160	60
Sales commission	60	40

Each unit of product incurs costs in the company's two departments P and Q. The total capacity available for the month under review is budgeted to be 1,400 hours in department P and 2,000 hours in department Q. The capacity costs amount to Rs. 14,000 and Rs. 20,000 respectively per month for P and Q irrespective of the level of usage made of it. The number of hours required in each of these departments to complete one unit of output is as under:

	A	B
Department P	2	4
Department Q	5	4

The maximum output which the company can sell in the month is restricted to 400 units of either of the products.

You are required to formulate the Linear Programming (LP) model and solve it graphically to determine the optimal product mix and profit. (8 marks) [S.A. 22]

Ans:- (i) Optimal Profit Rs. 7,000

----- Space to write important points for revision -----

CASE STUDY No.....

Learning Curve

Chapter 12. LEARNING CURVE THEORY

Question ~~274~~ ~~35~~ CS-96

A company has 10 direct workers, who work for 25 days a month of 8 hours per day. The estimated down times 25% of the total available time. The company received an order for a new product. The first unit of the new product requires 40 direct labour hours to manufacture the product. The company expects 80% (index is -0.322) learning curve for this type of work. The company uses standard absorption costing and the cost data are as under:

Direct materials	Rs. 60 per unit
Direct labour	Rs. 6 per direct labour hour
Variable overheads	Rs. 5 per direct labour hour
Fixed overheads	Rs. 7,500 per month.

(i) Calculate the cost per unit of the first order of 30 units.

(ii) If the company receives a repeat order for 20 units, what price will be quoted to yield a profit of 25% on selling price?

Question ~~202~~ ~~31~~ CS-97

An electronics firm which has developed a new type of fire-alarm system has been asked to quote for a prospective contract. The customer requires separate price quotations for each of the following possible orders:

Order	Number of fire-alarm systems
First	100
Second	60
Third	40

Learning Curve

The firm estimates the following cost per unit for the first order:

Direct materials - Rs. 500

Direct Labour -

Deptt. A (Highly automatic) 20 hours at Rs. 10 per hour.

Deptt. B (Skilled labour) 40 hours at Rs. 15 per hour.

Variable overheads 20% of direct labour

Fixed overheads absorbed:

Deptt. A Rs. 8 per hour

Deptt. B Rs. 5 per hour

Determine a price per unit for each of the three orders, assuming the firm uses a mark up of 25% on total costs and allows for an 80% learning curve.

Extract from 80% Learning curve table:

X	1.0	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
Y(%)	100.0	91.7	89.5	87.6	86.1	84.4	83.0	81.5	80.0

x represents the cumulative total volume produced to date expressed as a multiple of the initial order.

Y is the learning curve factor, for a given X value, expressed as a percentage of the cost of the initial order.

Learning Curve

Question ~~275~~ ~~30~~ CS-100

CYZ Co., has observed that a 90% learning curve ratio applies to all labour related costs each time a new model enters production. It is anticipated that 320 units will be manufactured during 1999. Direct labour cost for the first lot of 10 units amounts to 1,000 hours at Rs. 8 per hour. Variable overhead cost is assigned to products at the rate of Rs. 2 per direct labour hour. You are required to determine :

- i) Total labour and labour related costs to manufacture 320 units of output
- ii) Average cost of (a) the first 40 units produced (b) the first 80 units, (c) the first 100 units. -
- iii) Incremental cost of (a) units 41 – 80 and (b) units 101 – 200.

Learning Curve

Question ~~278~~ ~~279~~ 98

XYZ & Co. has given the following data:

80% Average — Time Curve

Cumulative Units (X)	Average Hours	Total-Hours	Marginal Hours
1	100	100	100
2	80	160	60
3	?	?	?
4	64	256	?

Required : Fill in the blanks.

Question ~~274~~ ~~275~~ C-599

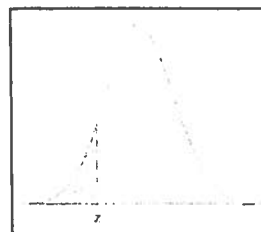
A customer has asked your company to prepare a bid on supplying 800 units of a new product. Production will be in batches of 100 units. You estimate that costs for the first batch of 100 units will average Rs. 100 a unit. You also expect that a 90% learning curve will apply to the cumulative labour cost on this contract.

Required :

- Prepare an estimate of the labour costs of fulfilling this contract.
- Estimate the Incremental labour cost of extending the production run to produce an additional 800 units.
- Estimate the incremental labour cost of extending the production run from 800 units to 900 units.

APPENDIX

Standard Normal Cumulative Probability Table

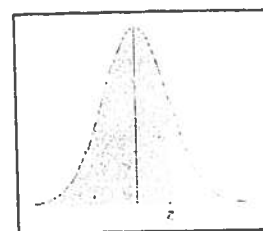


Cumulative probabilities for NEGATIVE z-values are shown in the following table:

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
-3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
-3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
-3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
-3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
-2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
-2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
-2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
-2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
-2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
-2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
-2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
-2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
-2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
-2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
-1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
-1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
-1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
-1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
-1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
-1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

A.2 Advanced Management Accounting

Standard Normal Cumulative Probability Table



Cumulative probabilities for POSITIVE z-values are shown in the following table:

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

LOGARITHMS

TABLE I

N	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
10	0000	0043	0086	0128	0170	0212	0253	0294	0334	0374	5	9	13	17	21	26	30	34	38
11	0414	0453	0492	0531	0569	0607	0645	0682	0719	0755	4	8	12	16	20	24	28	32	36
12	0792	0828	0864	0899	0934	0969	1004	1038	1072	1106	3	7	11	14	18	21	25	28	32
13	1139	1173	1206	1239	1271	1303	1335	1367	1399	1430	3	6	10	13	16	19	23	26	29
14	1461	1492	1523	1553	1584	1614	1644	1673	1703	1732	3	6	9	12	15	19	22	25	28
15	1761	1790	1818	1847	1875	1903	1931	1959	1987	2014	3	6	8	11	14	17	20	23	26
16	2041	2068	2095	2122	2148	2175	2201	2227	2253	2279	3	6	8	11	14	16	19	22	24
17	2304	2330	2355	2380	2405	2430	2455	2480	2504	2529	3	5	8	10	13	15	18	20	23
18	2553	2577	2601	2625	2648	2672	2695	2718	2742	2765	2	5	7	9	12	14	17	19	21
19	2788	2810	2833	2856	2878	2900	2923	2945	2967	2989	2	4	7	9	11	13	16	18	20
20	3010	3032	3054	3075	3096	3118	3139	3160	3181	3201	2	4	6	8	11	13	15	17	19
21	3222	3243	3263	3284	3304	3324	3345	3365	3385	3404	2	4	6	8	10	12	14	16	18
22	3424	3444	3464	3483	3502	3522	3541	3560	3579	3598	2	4	6	8	10	12	14	15	17
23	3617	3636	3655	3674	3692	3711	3729	3747	3765	3784	2	4	6	7	9	11	12	14	16
24	3802	3820	3838	3856	3874	3892	3909	3927	3945	3962	2	4	5	7	9	11	12	14	15
25	3979	3997	4014	4031	4048	4065	4082	4099	4116	4133	2	3	5	7	9	10	11	13	15
26	4150	4166	4183	4200	4216	4232	4249	4265	4281	4298	2	3	5	6	8	9	11	13	14
27	4314	4330	4346	4362	4378	4393	4409	4425	4440	4456	2	3	5	6	8	9	11	12	14
28	4472	4487	4502	4518	4533	4548	4564	4579	4594	4609	2	3	5	6	7	9	10	12	13
29	4624	4639	4654	4669	4683	4698	4713	4728	4742	4757	1	3	4	6	7	9	10	11	13
30	4771	4786	4800	4814	4829	4843	4857	4871	4886	4900	1	3	4	6	7	9	10	11	13
31	4914	4928	4942	4955	4969	4983	4997	5011	5024	5038	1	3	4	6	7	8	10	11	12
32	5051	5065	5079	5092	5105	5119	5132	5145	5159	5172	1	3	4	5	7	8	9	11	12
33	5185	5198	5211	5224	5237	5250	5263	5276	5289	5302	1	3	4	5	6	8	9	10	12
34	5315	5328	5340	5353	5366	5378	5391	5403	5416	5428	1	3	4	5	6	8	9	10	11
35	5441	5453	5465	5478	5490	5502	5514	5527	5539	5551	1	2	4	5	6	7	9	10	11
36	5563	5575	5587	5599	5611	5623	5635	5647	5658	5670	1	2	4	5	6	7	8	10	11
37	5682	5694	5705	5717	5729	5740	5752	5763	5775	5786	1	2	3	5	6	7	8	9	10
38	5798	5809	5821	5832	5843	5855	5866	5877	5888	5899	1	2	3	4	5	7	8	9	10
39	5911	5922	5933	5944	5955	5966	5977	5988	5999	6010	1	2	3	4	5	6	8	9	10
40	6021	6031	6042	6053	6064	6075	6085	6096	6107	6117	1	2	3	4	5	6	7	8	9
41	6128	6138	6149	6160	6170	6180	6191	6201	6212	6222	1	2	3	4	5	6	7	8	9
42	6232	6243	6253	6263	6274	6284	6294	6304	6314	6325	1	2	3	4	5	6	7	8	9
43	6335	6345	6355	6365	6375	6385	6395	6405	6415	6425	1	2	3	4	5	6	7	8	9
44	6435	6444	6454	6464	6474	6484	6493	6503	6513	6522	1	2	3	4	5	6	7	8	9
45	6532	6542	6551	6561	6571	6580	6590	6599	6609	6618	1	2	3	4	5	6	7	8	9
46	6628	6637	6646	6656	6665	6675	6684	6693	6702	6712	1	2	3	4	5	6	7	7	8
47	6721	6730	6739	6749	6758	6767	6776	6785	6794	6803	1	2	3	4	5	5	6	7	8
48	6812	6821	6830	6839	6848	6857	6866	6875	6884	6893	1	2	3	4	4	5	6	7	8
49	6902	6911	6920	6928	6937	6946	6955	6964	6972	6981	1	2	3	4	4	5	6	7	8

A.4 Advanced Management Accounting

LOGARITHMS

TABLE 1 (Continued)

N	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
50	6990	6998	7007	7016	7024	7033	7042	7050	7059	7067	1	2	3	4	5	6	7	8	9
51	7076	7084	7093	7101	7110	7118	7126	7135	7143	7152	1	2	3	4	5	6	7	8	9
52	7160	7168	7177	7185	7193	7202	7210	7218	7226	7235	1	2	2	3	4	5	6	7	7
53	7243	7251	7259	7267	7275	7284	7292	7300	7308	7316	1	2	2	3	4	5	6	6	7
54	7324	7332	7340	7348	7356	7364	7372	7380	7388	7396	1	2	2	3	4	5	6	6	7
55	7404	7412	7419	7427	7435	7443	7451	7459	7466	7474	1	2	2	3	4	5	5	6	7
56	7482	7490	7497	7505	7513	7520	7528	7536	7543	7551	1	2	2	3	4	5	5	6	7
57	7559	7566	7574	7582	7589	7597	7604	7612	7619	7627	1	2	2	3	4	5	5	6	7
58	7634	7642	7649	7657	7664	7672	7679	7686	7694	7701	1	1	2	3	4	4	5	6	7
59	7709	7716	7723	7731	7738	7745	7752	7760	7767	7774	1	1	2	3	4	4	5	6	7
60	7782	7789	7796	7803	7810	7818	7825	7832	7839	7846	1	1	2	3	4	4	5	6	6
61	7853	7860	7868	7875	7882	7889	7896	7903	7910	7917	1	1	2	3	4	4	5	6	6
62	7924	7931	7938	7945	7952	7959	7966	7973	7980	7987	1	1	2	3	4	4	5	6	6
63	7993	8000	8007	8014	8021	8028	8035	8041	8048	8055	1	1	2	3	4	4	5	5	6
64	8062	8069	8075	8082	8089	8096	8102	8109	8116	8122	1	1	2	3	4	4	5	5	6
65	8129	8136	8142	8149	8156	8162	8169	8176	8182	8189	1	1	2	3	4	4	5	5	6
66	8195	8202	8209	8215	8222	8228	8235	8241	8248	8254	1	1	2	3	4	4	5	5	6
67	8261	8267	8274	8280	8287	8293	8299	8306	8312	8319	1	1	2	3	4	4	5	5	6
68	8325	8331	8338	8344	8351	8357	8363	8370	8376	8382	1	1	2	3	4	4	5	5	6
69	8388	8395	8401	8407	8414	8420	8426	8432	8439	8445	1	1	2	2	3	4	4	5	6
70	8451	8457	8463	8470	8476	8482	8488	8494	8500	8506	1	1	2	2	3	4	4	5	6
71	8513	8519	8525	8531	8537	8543	8549	8555	8561	8567	1	1	2	2	3	4	4	5	5
72	8574	8579	8585	8591	8597	8603	8609	8615	8621	8627	1	1	2	2	3	4	4	5	5
73	8633	8639	8645	8651	8657	8663	8669	8675	8681	8686	1	1	2	2	3	4	4	5	5
74	8692	8698	8704	8710	8716	8722	8727	8733	8739	8745	1	1	2	2	3	4	4	5	5
75	8751	8756	8762	8768	8774	8779	8785	8791	8797	8802	1	1	2	2	3	3	4	5	5
76	8808	8814	8820	8825	8831	8837	8842	8848	8854	8859	1	1	2	2	3	3	4	5	5
77	8865	8871	8876	8882	8887	8893	8899	8904	8910	8915	1	1	2	2	3	3	4	4	5
78	8921	8927	8932	8938	8943	8949	8954	8960	8965	8971	1	1	2	2	3	3	4	4	5
79	8976	8982	8987	8993	8998	9004	9009	9015	9020	9025	1	1	2	2	3	3	4	4	5
80	9031	9036	9042	9047	9053	9058	9063	9069	9074	9079	1	1	2	2	3	3	4	4	5
81	9085	9090	9096	9101	9106	9112	9117	9122	9128	9133	1	1	2	2	3	3	4	4	5
82	9138	9143	9149	9154	9159	9165	9170	9175	9180	9186	1	1	2	2	3	3	4	4	5
83	9191	9196	9201	9206	9212	9217	9222	9227	9232	9238	1	1	2	2	3	3	4	4	5
84	9243	9248	9253	9258	9263	9269	9274	9279	9284	9289	1	1	2	2	3	3	4	4	5
85	9294	9299	9304	9309	9315	9320	9325	9330	9335	9340	1	1	2	2	3	3	4	4	5
86	9345	9350	9355	9360	9365	9370	9375	9380	9385	9390	1	1	2	2	3	3	4	4	5
87	9395	9400	9405	9410	9415	9420	9425	9430	9435	9440	0	1	1	2	2	3	3	4	4
88	9445	9450	9455	9460	9465	9469	9474	9479	9484	9489	0	1	1	2	2	3	3	4	4
89	9494	9499	9504	9509	9513	9518	9523	9528	9533	9538	0	1	1	2	2	3	3	4	4
90	9542	9547	9552	9557	9562	9566	9571	9576	9581	9586	0	1	1	2	2	3	3	4	4
91	9590	9595	9600	9605	9609	9614	9619	9624	9628	9633	0	1	1	2	2	3	3	4	4
92	9638	9643	9647	9652	9657	9661	9666	9671	9675	9680	0	1	1	2	2	3	3	4	4
93	9685	9689	9694	9699	9703	9708	9713	9717	9722	9727	0	1	1	2	2	3	3	4	4
94	9731	9736	9741	9745	9750	9754	9759	9763	9768	9773	0	1	1	2	2	3	3	4	4
95	9777	9782	9786	9791	9795	9800	9805	9809	9814	9818	0	1	1	2	2	3	3	4	4
96	9823	9827	9832	9836	9841	9845	9850	9854	9859	9863	0	1	1	2	2	3	3	4	4
97	9868	9872	9877	9881	9886	9890	9894	9899	9903	9908	0	1	1	2	2	3	3	4	4
98	9912	9917	9921	9926	9930	9934	9939	9943	9948	9952	0	1	1	2	2	3	3	4	4
99	9956	9961	9965	9969	9974	9978	9983	9987	9992	9996	0	1	1	2	2	3	3	4	4

ANTILOGARITHMS

TABLE II

N	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
00	1000	1002	1005	1007	1009	1012	1014	1016	1019	1021	0	0	1	1	1	1	2	2	2
.01	1023	1026	1028	1030	1033	1035	1038	1040	1042	1045	0	0	1	1	1	1	2	2	2
.02	1047	1050	1052	1054	1057	1059	1062	1064	1067	1069	0	0	1	1	1	1	2	2	2
.03	1072	1074	1076	1079	1081	1084	1086	1089	1091	1094	0	0	1	1	1	2	2	2	2
.04	1096	1099	1102	1104	1107	1109	1112	1114	1117	1119	0	1	1	1	1	2	2	2	2
.05	1122	1125	1127	1130	1132	1135	1138	1140	1143	1146	0	1	1	1	1	2	2	2	2
.06	1148	1151	1153	1156	1159	1161	1164	1167	1169	1172	0	1	1	1	1	2	2	2	2
.07	1175	1178	1180	1183	1186	1189	1191	1194	1197	1199	0	1	1	1	1	2	2	2	3
.08	1202	1205	1208	1211	1213	1216	1219	1222	1225	1227	0	1	1	1	1	2	2	2	3
.09	1230	1233	1236	1239	1242	1245	1247	1250	1253	1256	0	1	1	1	1	2	2	2	3
.10	1259	1262	1265	1268	1271	1274	1276	1279	1282	1285	0	1	1	1	1	2	2	2	3
.11	1288	1291	1294	1297	1300	1303	1306	1309	1312	1315	0	1	1	1	1	2	2	2	3
.12	1318	1321	1324	1327	1330	1334	1337	1340	1343	1346	0	1	1	1	1	2	2	2	3
.13	1349	1352	1355	1358	1361	1365	1368	1371	1374	1377	0	1	1	1	1	2	2	2	3
.14	1380	1384	1387	1390	1393	1396	1400	1403	1406	1409	0	1	1	1	1	2	2	2	3
.15	1413	1416	1419	1422	1426	1429	1432	1435	1439	1442	0	1	1	1	1	2	2	2	3
.16	1445	1449	1452	1455	1459	1462	1466	1469	1472	1476	0	1	1	1	1	2	2	2	3
.17	1479	1483	1486	1489	1493	1496	1500	1503	1507	1510	0	1	1	1	1	2	2	2	3
.18	1514	1517	1521	1524	1528	1531	1535	1538	1542	1545	0	1	1	1	1	2	2	2	3
.19	1549	1552	1556	1560	1563	1567	1570	1574	1578	1581	0	1	1	1	1	2	2	2	3
.20	1585	1589	1592	1596	1600	1603	1607	1611	1614	1618	0	1	1	1	1	2	2	2	3
.21	1622	1626	1629	1633	1637	1641	1644	1648	1652	1656	0	1	1	1	1	2	2	2	3
.22	1660	1663	1667	1671	1675	1679	1683	1687	1690	1694	0	1	1	1	1	2	2	2	3
.23	1698	1702	1706	1710	1714	1718	1722	1726	1730	1734	0	1	1	1	1	2	2	2	3
.24	1738	1742	1746	1750	1754	1758	1762	1766	1770	1774	0	1	1	1	1	2	2	2	3
.25	1778	1782	1786	1791	1795	1799	1803	1807	1811	1816	0	1	1	1	1	2	2	2	3
.26	1820	1824	1828	1832	1837	1841	1845	1849	1854	1858	0	1	1	1	1	2	2	2	3
.27	1862	1866	1871	1875	1879	1884	1888	1892	1897	1901	0	1	1	1	1	2	2	2	3
.28	1905	1910	1914	1919	1923	1928	1932	1936	1941	1945	0	1	1	1	1	2	2	2	3
.29	1950	1954	1959	1963	1968	1972	1977	1982	1986	1991	0	1	1	1	1	2	2	2	3
.30	1995	2000	2004	2009	2014	2018	2023	2028	2032	2037	0	1	1	1	1	2	2	2	3
.31	2042	2046	2051	2056	2061	2065	2070	2075	2080	2084	0	1	1	1	1	2	2	2	3
.32	2089	2094	2099	2104	2109	2113	2118	2123	2128	2133	0	1	1	1	1	2	2	2	3
.33	2138	2143	2148	2153	2158	2163	2168	2173	2178	2183	0	1	1	1	1	2	2	2	3
.34	2188	2193	2198	2203	2208	2213	2218	2223	2228	2234	1	1	2	2	2	3	3	4	4
.35	2239	2244	2249	2254	2259	2265	2270	2275	2280	2286	1	1	2	2	2	3	3	4	4
.36	2291	2296	2301	2307	2312	2317	2323	2328	2333	2339	1	1	2	2	2	3	3	4	4
.37	2344	2350	2355	2360	2366	2371	2377	2382	2388	2393	1	1	2	2	2	3	3	4	4
.38	2399	2404	2410	2415	2421	2427	2432	2438	2443	2449	1	1	2	2	2	3	3	4	4
.39	2455	2460	2466	2472	2477	2483	2489	2495	2500	2506	1	1	2	2	2	3	3	4	4
.40	2512	2518	2523	2529	2535	2541	2547	2553	2560	2564	1	1	2	2	2	3	3	4	4
.41	2570	2576	2582	2588	2594	2600	2606	2612	2618	2624	1	1	2	2	2	3	3	4	4
.42	2630	2636	2642	2649	2655	2661	2667	2673	2679	2685	1	1	2	2	2	3	3	4	4
.43	2692	2698	2704	2710	2716	2723	2729	2735	2742	2748	1	1	2	2	2	3	3	4	4
.44	2754	2761	2767	2773	2780	2786	2793	2799	2805	2812	1	1	2	2	2	3	3	4	4
.45	2818	2825	2831	2838	2844	2851	2858	2864	2871	2877	1	1	2	2	2	3	3	4	4
.46	2884	2891	2897	2904	2911	2917	2924	2931	2938	2944	1	1	2	2	2	3	3	4	4
.47	2951	2958	2965	2972	2979	2985	2992	2999	3006	3013	1	1	2	2	2	3	3	4	4
.48	3020	3027	3034	3041	3048	3055	3062	3069	3076	3083	1	1	2	2	2	3	3	4	4
.49	3090	3097	3105	3112	3119	3126	3133	3141	3148	3155	1	1	2	2	2	3	3	4	4

A.6 Advanced Management Accounting

ANTILOGARITHMS

TABLE II (Continued)

N	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
.50	3162	3170	3177	3184	3192	3199	3206	3214	3221	3228	1	1	2	3	4	4	5	6	7
.51	3236	3243	3251	3258	3266	3273	3281	3289	3296	3304	1	2	2	3	4	5	5	6	7
.52	3311	3319	3327	3334	3342	3350	3357	3365	3373	3381	1	2	2	3	4	5	5	6	7
.53	3388	3396	3404	3412	3420	3428	3436	3443	3451	3459	1	2	2	3	4	5	6	6	7
.54	3467	3475	3483	3491	3499	3508	3516	3524	3532	3540	1	2	2	3	4	5	6	6	7
.55	3548	3556	3565	3573	3581	3589	3597	3606	3614	3622	1	2	2	3	4	5	6	7	7
.56	3631	3639	3648	3656	3664	3673	3681	3690	3698	3707	1	2	3	3	4	5	6	7	8
.57	3715	3724	3733	3741	3750	3758	3767	3776	3784	3793	1	2	3	3	4	5	6	7	8
.58	3802	3811	3819	3828	3837	3846	3855	3864	3873	3882	1	2	3	4	4	5	6	7	8
.59	3890	3899	3908	3917	3926	3936	3945	3954	3963	3972	1	2	3	4	5	5	6	7	8
.60	3981	3990	3999	4009	4018	4027	4036	4046	4055	4064	1	2	3	4	5	6	6	7	8
.61	4074	4083	4093	4102	4111	4121	4130	4140	4150	4159	1	2	3	4	5	6	7	8	9
.62	4169	4178	4188	4198	4207	4217	4227	4236	4246	4256	1	2	3	4	5	6	7	8	9
.63	4266	4276	4285	4295	4305	4315	4325	4335	4345	4355	1	2	3	4	5	6	7	8	9
.64	4365	4375	4385	4395	4406	4416	4426	4436	4446	4457	1	2	3	4	5	6	7	8	9
.65	4467	4477	4487	4498	4508	4519	4529	4539	4550	4560	1	2	3	4	5	6	7	8	9
.66	4571	4581	4592	4603	4613	4624	4634	4645	4656	4667	1	2	3	4	5	6	7	9	10
.67	4677	4688	4699	4710	4721	4732	4742	4753	4764	4775	1	2	3	4	5	7	8	9	10
.68	4786	4797	4808	4819	4831	4842	4853	4864	4875	4887	1	2	3	4	6	7	8	9	10
.69	4898	4909	4920	4932	4943	4955	4966	4977	4989	5000	1	2	3	5	6	7	8	9	10
.70	5012	5023	5035	5047	5058	5070	5082	5093	5105	5117	1	2	4	5	6	7	8	9	11
.71	5129	5140	5152	5164	5176	5188	5200	5212	5224	5236	1	2	4	5	6	7	8	10	11
.72	5248	5260	5272	5284	5297	5309	5321	5333	5346	5358	1	2	4	5	6	7	9	10	11
.73	5370	5383	5395	5408	5420	5433	5445	5458	5470	5483	1	3	4	5	6	8	9	10	11
.74	5495	5508	5521	5534	5546	5559	5572	5585	5598	5610	1	3	4	5	6	8	9	10	12
.75	5623	5636	5649	5662	5675	5689	5702	5715	5728	5741	1	3	4	5	7	8	9	10	12
.76	5754	5768	5781	5794	5808	5821	5834	5848	5861	5875	1	3	4	5	7	8	9	11	12
.77	5888	5902	5916	5929	5943	5957	5970	5984	5998	6012	1	3	4	5	7	8	10	11	12
.78	6026	6039	6053	6067	6081	6095	6109	6124	6138	6152	1	3	4	6	7	8	10	11	13
.79	6166	6180	6194	6209	6223	6237	6252	6266	6281	6295	1	3	4	6	7	9	10	11	13
.80	6310	6324	6339	6353	6368	6383	6397	6412	6427	6442	1	3	4	6	7	9	10	12	13
.81	6457	6471	6486	6501	6516	6531	6546	6561	6577	6592	2	3	5	6	8	9	11	12	14
.82	6607	6622	6637	6653	6668	6683	6699	6714	6730	6745	2	3	5	6	8	9	11	12	14
.83	6761	6776	6792	6808	6823	6839	6855	6871	6887	6902	2	3	5	6	8	9	11	13	14
.84	6918	6934	6950	6966	6982	6998	7015	7031	7047	7063	2	3	5	6	8	10	11	13	15
.85	7079	7096	7112	7129	7145	7161	7178	7194	7211	7228	2	3	5	7	8	10	12	13	15
.86	7244	7261	7278	7295	7311	7328	7345	7362	7379	7396	2	3	5	7	8	10	12	13	15
.87	7413	7430	7447	7464	7482	7499	7516	7534	7551	7568	2	3	5	7	9	10	12	14	16
.88	7586	7603	7621	7638	7656	7674	7691	7709	7727	7745	2	4	5	7	9	11	12	14	16
.89	7762	7780	7798	7816	7834	7852	7870	7889	7907	7925	2	4	5	7	9	11	13	14	16
.90	7943	7962	7980	7998	8017	8035	8054	8072	8091	8110	2	4	6	7	9	11	13	15	17
.91	8128	8147	8166	8185	8204	8222	8241	8260	8279	8299	2	4	6	8	9	11	13	15	17
.92	8318	8337	8356	8375	8395	8414	8433	8453	8472	8492	2	4	6	8	10	12	14	15	17
.93	8511	8531	8551	8570	8590	8610	8630	8650	8670	8690	2	4	6	8	10	12	14	16	18
.94	8710	8730	8750	8770	8790	8810	8831	8851	8872	8892	2	4	6	8	10	12	14	16	18
.95	8913	8933	8954	8974	8995	9016	9036	9057	9078	9099	2	4	6	8	10	12	15	17	19
.96	9120	9141	9162	9183	9204	9226	9247	9268	9290	9311	2	4	6	8	11	13	15	17	19
.97	9333	9354	9376	9397	9419	9441	9462	9484	9506	9528	2	4	7	9	11	13	15	17	20
.98	9550	9572	9594	9616	9638	9660	9683	9705	9727	9750	2	4	7	9	11	13	16	18	20
.99	9772	9795	9817	9840	9863	9886	9908	9931	9954	9977	2	5	7	9	11	14	16	18	20