

## PROCESS COSTING

### Unit Structure

- 1.0 Learning Objectives
- 1.1 Introduction
- 1.2 Meaning of process costing
- 1.3 Distinction between job costing and process costing
- 1.4 Costing Procedure
- 1.5 Solved illustrations
- 1.6 Valuation of Work-in-progress
- 1.7 Questions
- 1.8 Exercise

---

### 1.0 LEARNING OBJECTIVES

---

After studying this chapter you should be able to understand

- the meaning of Process Costing and its importance
- the distinction between job costing and process costing
- the accounting procedure of process costing including normal loss abnormal loss (or) gain
- the valuation of work-in-progress, using FIFO, LIFO average and weighted average methods
- the steps involved in inter process transfer

---

### 1.1 INTRODUCTION:

---

Process costing is a form of operations costing which is used where standardized homogeneous goods are produced. This costing method is used in industries like chemicals, textiles, steel, rubber, sugar, shoes, petrol etc. Process costing is also used in the assembly type of industries also. It is assumed in process costing that the average cost presents the cost per unit. Cost of production during a particular period is divided by the number of units produced during that period to arrive at the cost per unit.

---

## 1.2 MEANING OF PROCESS COSTING

---

Process costing is a method of costing under which all costs are accumulated for each stage of production or process, and the cost per unit of product is ascertained at each stage of production by dividing the cost of each process by the normal output of that process.

### 1.2.1 Definition:

CIMA London defines process costing as “that form of operation costing which applies where standardize goods are produced”

### 1.2.2 Features of Process Costing:

- (a) The production is continuous
- (b) The product is homogeneous
- (c) The process is standardized
- (d) Output of one process become raw material of another process
- (e) The output of the last process is transferred to finished stock
- (f) Costs are collected process-wise
- (g) Both direct and indirect costs are accumulated in each process
- (h) If there is a stock of semi-finished goods, it is expressed in terms of equivalent units
- (i) The total cost of each process is divided by the normal output of that process to find out cost per unit of that process.

### 1.2.3 Advantages of process costing:

1. Costs are computed periodically at the end of a particular period
2. It is simple and involves less clerical work than job costing
3. It is easy to allocate the expenses to processes in order to have accurate costs.
4. Use of standard costing systems is very effective in process costing situations.
5. Process costing helps in preparation of tender, quotations
6. Since cost data is available for each process, operation and department, good managerial control is possible.

### 1.2.4 Limitations:

1. Cost obtained at each process is only historical cost and are not very useful for effective control.
2. Process costing is based on average cost method, which is not that suitable for performance analysis, evaluation and managerial control.
3. Work-in-progress is generally done on estimated basis which leads to inaccuracy in total cost calculations.
4. The computation of average cost is more difficult in those cases where more than one type of products is manufactured and a division of the cost element is necessary.
5. Where different products arise in the same process and common costs are prorated to various cost units. Such individual products costs may be taken as only approximation and hence not reliable.

## 1.3 DISTINCTION BETWEEN JOBCOSTING AND PROCESS COSTING

Job order costing and process costing are two different systems. Both the systems are used for cost calculation and attachment of cost to each unit completed, but both the systems are suitable in different situations. The basic difference between job costing and process costing are

	Basis of Distinction	Job order costing	Process costing
1.	Specific order	Performed against specific orders	Production is continuous
2.	Nature	Each job many be different.	Product is Homogeneous and standardized.
3.	Cost determination	Cost is determined for each job separately.	Costs are compiled for each process for department on time basis i.e. for a given accounting period.
4.	Cost calculations	Cost is compiled when a job is completed.	Cost is calculated at the end of the cost period.
5.	Control	Proper control is comparatively difficult as each product unit is different and the production is not continuous.	Proper control is comparatively easier as the production is standardized and is more suitable.

6	Transfer	There is usually not transfer from one job to another unless there is some surplus work.	The output of one process is transferred to another process as input.
7	Work-in-Progress	There may or may not be work-in-progress.	There is always some work-in-progress because of continuous production.
8	Suitability	Suitable to industries where production is intermittent and customer orders can be identified in the value of production.	Suitable, where goods are made for stock and productions is continuous.

**1.4 COSTING PROCEDURE**

For each process an individual process account is prepared.  
Each process of production is treated as a distinct cost center.

**1.4.1 Items on the Debit side of Process A/c.**

Each process account is debited with –

- a) Cost of materials used in that process.
- b) Cost of labour incurred in that process.
- c) Direct expenses incurred in that process.
- d) Overheads charged to that process on some pre-determined.
- e) Cost of ratification of normal defectives.
- f) Cost of abnormal gain (if any arises in that process)

**1.4.2 Items on the Credit side:**

Each process account is credited with

- a) Scrap value of Normal Loss (if any) occurs in that process.
- b) Cost of Abnormal Loss (if any occurs in that process)

**1.4.3 Cost of Process:**

The cost of the output of the process (Total Cost less Sales value of scrap) is transferred to the next process. The cost of each process is thus made up to cost brought forward from the previous process and net cost of material, labour and overhead added in that process after

reducing the sales value of scrap. The net cost of the finished process is transferred to the finished goods account. The net cost is divided by the number of units produced to determine the average cost per unit in that process. Specimen of Process Account when there are normal loss and abnormal losses.

Dr.			Cr.		
Process I A/c.					
Particulars	Units	Rs.	Particulars	Units	Rs.
To Basic Material	xxx	xx	By Normal Loss	xx	xx
To Direct Material		xx	By Abnormal Loss	xx	xx
To Direct Wages		xx	By Process II A/c.	xx	xx
To Direct Expenses		xx	(output transferred to		
To Production Overheads		xx	Next process)		
To Cost of Rectification of Normal Defects		xx	By Process I Stock A/c.	xx	xx
To Abnormal Gains		xx			
	xx	xxx		xx	xx

#### 1.4.4 Process Losses:

In many process, some loss is inevitable. Certain production techniques are of such a nature that some loss is inherent to the production. Wastages of material, evaporation of material is unavoidable in some process. But sometimes the Losses are also occurring due to negligence of Labourer, poor quality raw material, poor technology etc. These are normally called as avoidable losses. Basically process losses are classified into two categories

(a) Normal Loss (b) Abnormal Loss

#### 1. Normal Loss:

Normal loss is an unavoidable loss which occurs due to the inherent nature of the materials and production process under normal conditions. It is normally estimated on the basis of past experience of the industry. It may be in the form of normal wastage, normal scrap, normal spoilage, and normal defectiveness. It may occur at any time of the process.

The cost of normal loss is a process. If the normal loss units can be sold as a scrap then the sale value is credited with process account. If some rectification is required before the sale of the normal loss, then debit that cost in the process account. After adjusting the normal loss the cost per unit is calculated with the help of the following formula:

**Cost of good unit:**

$$\frac{\text{Total cost increased} - \text{Sale Value of Scrap}}{\text{Input} - \text{Normal Loss units}}$$

## 2. Abnormal Loss:

Any loss caused by unexpected abnormal conditions such as plant breakdown, substandard material, carelessness, accident etc. such losses are in excess of pre-determined normal losses. This loss is basically avoidable. Thus abnormal losses arrive when actual losses are more than expected losses. The units of abnormal losses in calculated as under:

$$\text{Abnormal Losses} = \text{Actual Loss} - \text{Normal Loss}$$

The value of abnormal loss is done with the help of following formula:

### Value of Abnormal Loss:

$$\frac{\text{Total Cost increase} - \text{Scrap Value of normal Loss}}{\text{units} - \text{Normal Loss Units}} \times \text{Units of abnormal loss Input}$$

Abnormal Process loss should not be allowed to affect the cost of production as it is caused by abnormal (or) unexpected conditions. Such loss representing the cost of materials, labour and overhead charges called abnormal loss account. The sales value of the abnormal loss is credited to Abnormal Loss Account and the balance is written off to costing P & L A/c.

<b>Dr.</b>	<b>Abnormal Loss A/c.</b>	<b>Cr.</b>
------------	---------------------------	------------

	Units	Rs.	Particulars	Units	Rs.
To Process A/c.	xx	xx	By Bank	xx	xx
			By Costing P & L A/c.	xx	xx
	xx	xxx		xx	xx

### 3. Abnormal Gains:

The margin allowed for normal loss is an estimate (i.e. on the basis of expectation in process industries in normal conditions) and slight differences are bound to occur between the actual output of a process and that anticipates. This difference may be positive or negative. If it is negative it is called as abnormal Loss and if it is positive it is Abnormal gain i.e. if the actual loss is less than the normal loss then it is called as abnormal gain. The value of the abnormal gain calculated in the similar manner of abnormal loss. The formula used for abnormal gain is:

#### Abnormal Gain

$$\frac{\text{Total Cost incurred} - \text{Scrap Value of Normal Loss}}{\text{units} - \text{Normal Loss Units}} \times \text{Abnormal Gain Units}$$

The sales values of abnormal gain units are transferred to Normal Loss Account since it arrive out of the savings of Normal Loss. The difference is transferred to Costing P & L A/c. as a Real Gain.

**Dr.** **Abnormal Gain A/c.** **Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Normal Loss A/c.	xx	xx	By Process A/c.	xx	xx
To Costing P & L A/c.	xx	xx			
	xx	xx		xx	xx

#### Check Your Progress:

1. Define the following terms
  - a. Process costing
  - b. Normal Loss
  - c. Abnormal Loss
2. Give the formulas of following
  - a) Cost of good / normal unit
  - b) Value of Abnormal Loss

1.5 SOLVED ILLUSTRATIONS

Illustration 1: (Normal / Abnormal Loss)

Prepare a Process Account, Abnormal Loss Account and Normal Loss Account from the following information.

Input of Raw material	1000 units @ Rs. 20 per unit
Direct Material	Rs. 4,200/-
Direct Wages	Rs. 6,000/-
Production Overheads	Rs. 6,000/-
Actual output transferred to process II	900 units
Normal Loss	5%
Value of Scrap per unit	Rs. 8/-

Solution :

Dr. Process – I A/c. Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Raw material @ 20	1000	20000	By Normal Loss		
To Direct Material		4200	(5% on 1000)	50	400
To Direct Wages		6000	By Abnormal Loss A/c.	50	
To Production Overheads			BY Process – II A/c.		
		6000	(output transferred)	900	
	1000	36200		1000	36200

Dr. Abnormal Loss A/c. Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process – IA/c.	50		By Bank A/c.	50	400
			By Costing P & L A/c.		
	50			50	400



**Dr.****Normal Loss A/c.****Cr.** Process Costing

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process – IA/c.	50	400	BY Bank	50	400

**Working Notes:**

(1) Cost of abnormal Loss :

$$= \frac{\text{Total Cost increased} - \text{Sales value of Scrap} \times \text{abnormal units}}{\text{Input units} - \text{Normal Loss Units}}$$

$$= \frac{36200 - 400}{1000 - 50} \times 50$$

(2) It has been assumed that units of abnormal loss have also been sold at the same rate i.e. of Normal Scrap

**Illustration 2:** (Normal / Abnormal Loss and Abnormal Gain)

The product of a company passes through 3 distinct process. The following information is obtained from the accounts for the month ending January 31, 2008.

Particulars	Process – A	Process – B	Process – C
Direct Material	7800	5940	8886
Direct Wages	6000	9000	12000
Production Overheads	6000	9000	12000

3000 units @ Rs. 3 each were introduced to process – I. There was no stock of materials or work in progress. The output of each process passes directly to the next process and finally to finished stock A/c.

The following additional data is obtained :

Process	Output	Percentage Normal Loss of Input	Value of Scrap per unit (Rs.)
Process – I	2850	5 %	2
Process – II	2520	10 %	4
Process – III	2250	15 %	5

Prepare Process Cost Account, Normal Cost Account and Abnormal Gain or Loss Account.

Solution:

Dr. Process – A A/c. Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Units introduced	3000	9000	By Normal LossA/c.	150	300
To Direct Material		7800	By Process – B A/c.	2850	28500
To Direct Wages		6000	(Units transferred		
To Production			@ Rs. 10/-)		
Overheads		6000			
	3000	28800		3000	28800

Dr. Process – B A/c. Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process – I A/c.	2850	28500	By Normal LossA/c.	285	1140
To Direct Material		5940	By Abnormal Loss A/c.	45	9000
To Direct Wages		9000	By Process – CA/c.	2520	50400
To Production					
Overheads		9000			
	2850	52440		2850	52440

Dr. Process – C A/c. Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process – II A/c.	2520	50400	By Normal Loss A/c.	378	1890
To Direct Material A/c		8886	By Finished Stock A/c.	2250	85500
To Direct Wages		12000			
To Production					
Overheads		12000			
To Abnormal Gain A/c.	108	4104			
	2628	87390		2628	87390

<b>Dr.</b>	<b>Abnormal Gain A/c.</b>	<b>Cr.</b>
------------	---------------------------	------------

Particulars	Units	Rs.	Particulars	Units	Rs.
To Normal LossA/c.	108	540	By Process – CA/c.	108	4104
To Costing P&LA/c.		3564			
	<b>108</b>	<b>4104</b>		<b>108</b>	<b>4104</b>

<b>Dr.</b>	<b>Normal Loss A/c.</b>	<b>Cr.</b>
------------	-------------------------	------------

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process – AA/c.	150	300	By Bank A/c. (Sales)		
To Process – BA/c.	285	1140	Process – A A/c.	150	300
To Process – CA/c.	378	1890	Process – B A/c.	285	1140
			Process – C A/c.	270	1350
			By Abnormal Gain A/c.	108	540
	<b>813</b>	<b>3330</b>		<b>813</b>	<b>3330</b>

## 1.6 INTER PROCESS PROFITS:

Normally the output of one process is transferred to another process at cost but sometimes at a price showing a profit to the transfer process. The transfer price may be made at a price corresponding to current wholesale market price or at cost plus an agreed percentage. The advantage of the method is to find out

Whether the particular process is making profit (or) loss. This will help the management whether to process the product or to buy the product from the market. If the transfer price is higher than the cost price then the process account will show a profit. The complexity brought into the accounting arises from the fact that the interprocess profits introduced remain a part of the prices of process stocks, finished stocks and work-in-progress. The balance cannot show the stock with profit. To avoid the complication a provision must be created to reduce the stock at actual cost prices. This problem arises only in respect of stock on hand at the end of the period because goods sold must have realized the internal profits. The unrealized

profit in the closing stock is eliminated by creating a stock reserve. The amount of stock reserve is calculated by the following formula.

Stock Reserve = Transfer Value of stock x  $\frac{\text{Profit included in transfer price}}{\text{Transfer Price}}$

**Illustration 3 :**

A product passes through three processes before its completion. The output of each process is charged to the next process at a price calculated to give a profit of 20% on transfer price. The output of Process III is transferred to finished stock account on a similar basis. There was no work-in-progress at the beginning of the years. Stock in each process has been valued at prime cost of the process. The following data is available at the end of 31<sup>st</sup> March, 2009.

	Process I	Process II	Process III	Finished Stock Rs.
Direct Material	20000	30000	10000	--
Direct Wages	30000	20000	40000	--
Stock on 31 <sup>st</sup> March 2009	10000	20000	30000	15000
Sale during the year	--	--	--	180000

From above information prepare:

1. Process Cost Account showing the profit at each stage.
2. Actual realized profit and
3. Stock Valuation as would appear in the balance sheet

**Solution:**

**Dr.** **Process – I A/c.** **Cr.**

Particulars	Total Rs.	Cost Rs.	Profit Rs.	Particulars	Total Rs.	Cost Rs.	Profit Rs.
To Materials	20000	20000	--	By Process IIA/c. (Transfer)	50000	40000	10000
To Wages	30000	30000	--				
Total	50000	50000	--				
Les Closing							
Stock c/d	10000	10000	--				

Prime Cost	40000	40000	--				
To Gross							
Profit	10000	--	10000				
(20% on							
TransferPrice)							
	50000	40000	10000		50000	40000	10000
To Stock B/d.	10000	10000	--				

Process Costing

**Dr.**

**Process – II A/c.**

**Cr.**

Particulars	TotalRs.	CostRs.	ProfitRs.	Particulars	TotalRs.	CostRs.	ProfitRs.
To Process	50000	40000	10000	By Process-III			
– I A/c.							
				A/c.	100000	72000	28000
To Material	30000	30000	--	(Transfer)			
To Wages	20000	20000	--				
	100000	90000	10000				
Less :							
Closing							
Stock C/d.	20000	18000	2000				
Prime Cost	80000	72000	8000				
To Gross							
Profit							
(20% on							
TransferPrice)	20000	--	20000				
	100000	72000	28000		100000	72000	28000
To Stock	20000	18000	2000				
B/d.							

Process III A/c

Particulars	Total Rs.	Cost Rs.	Profit Rs.	Particulars	Total Rs.	Cost Rs.	Profit Rs.
ToprocessII	100000	72000	28000	By Finished stock A/c	150000	97600	52400
A/c							
To Material	10000	10000					
To Wages	40000	40000	-----				
TOTAL	150000	122000	28000				
Less.Closing stock	30000	24400	5600				
To Gross profit	120000	97600	22400				
(20%of transfer price)	30000	-----	30000				
	150000	97600	52400		150000	97600	52400
To Stock b/d	30000	24000	5600				

Finished stock A/c

Particulars	Total Rs.	Cost Rs.	Profit Rs.	Particulars	Total Rs.	Cost Rs.	Profit Rs.
To process III A/c	115000	97600	52400	By Sales	180000	87840	92160
(-)Stock	15000	9760	5240				
To gross profit	135000	87840	92160				
	45000	---	45000				
	180000	87840	92160		180000	87840	92160
To Stock A/c	15000	9760	5240				

Calculation of profit on closing stock  
Profit included in stock = Profit included in transfer price x Value of stock  
Transfer price  
Process I = No profit  
Process Ii =  $\frac{10000 \times 20000}{100000} = 2000$   
Process Iii =  $\frac{28000 \times 30000}{150000} = 5600$   
Finished stock =  $\frac{52400 \times 15000}{150000} = 5240$

**Illustration 4 :**

A product process through three process A, B and C. The details of expenses incurred on the three process during the year 2008 were as under :

	ProcessA	ProcessB	ProcessC
Units introduced	10000		
Cost per unit is Rs. 50/-			
	Rs.	Rs.	Rs.
Sundry Material	6000	9000	3233
Labour	18000	48000	39000
Direct Expenses	3000	11000	18000
Selling price per unit of output	70	100	200

Management expenses during the year were Rs. 80000 and selling were Rs. 5000. There are not allocable to the processes. Actual output of the three process were A – 9300 units, B – 5400 units and C 2100 units. Two-thirds of the output of process A and one half of the output of process B was passed on to the next process A and one-half of the output of process B was passed on to the next process and the balance was sold. The entire output of process C was sold.

The normal losses of the three process, calculated on the input of every process was : Process A – 5%, B – 15% and C – 20%. The loss of process A was sold @ Rs. 3 per unit, that of B @ Rs. 5 per unit and of process C @ Rs. 10 per unit.

Prepare process A, B and C account and the Profit and Loss Account.

**Solution :**

**Dr.** **Process A A/c.** **Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
ToUnits Introduced @RS.50	10000	5,00,000	By Normal Loss	500	1,500
			By Abnormal loss	200	11063
ToSundryMaterials		6,000	By process B	6,200	342958
To Labour		18,000	By output sold	3,100	171479
ToDirect Expenses		3,000			
	10000	5,27,000		10000	5,27,000

Dr.

Process B A/c.

Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process A A/c.	6200	342958	By Normal Loss	930	4650
To Sundry Materials		9000	By Process C A/c.	2700	2,08,165
To Labour		48000	By output sold	2700	2,08,165
To Direct Expenses		11000			
To Abnormal Gains		100221			
A/c. (@ 77.19)					
	6330	420980		6,330	4,20,980

Dr.

Process C A/c.

Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process B A/c.	2700	208165	By Normal Loss	540	5400
To Sundry Materials		3233	By Abnormal Loss	60	7305
To Labour		39000	By output sold	2100	255693
To Direct Expenses		18000	( @ 12.76)		
	2700	268398		2700	268398

Dr.

Profit & Loss A/c.

Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process AA/c.	3100	171479	By Sales( @ Rs. 70)	3100	217000
To Process BA/c.	2700	208165	By Sales(@Rs. 100)	2700	270000
To Process CA/c.	2700	265693	By Sales(@Rs.2000)	2700	420000
To Management Expenses A/c.		80000	BY Abnormal Gain A/c.		9372
To Selling Expenses		50000			
To Abnormal Loss A/c.		17168			
To Net Profit		133867			
		916372			916372



**Dr.****Abnormal Loss A/c.****Cr.**

Process Costing

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process A A/c.	200	11063	By Bank Sales		
To Process B A/c.	60	7305	((@ Rs. 30)	200	600
			By Bank		
			((@ Rs. 10)	60	600
			By P & L A/c.		17168
	<b>260</b>	<b>18368</b>		<b>260</b>	<b>18368</b>

**Dr.****Abnormal Gain A/c.****Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Normal Loss A/c.	130	650	By Process B /c.	130	10022
To Costing P & L A/c.		9372			
	<b>130</b>	<b>10022</b>		<b>130</b>	<b>10022</b>

**Illustration 5**

Mahesh Ltd process a material which passes through three processes. Figures relating to production for the first 6 months of 2009 are as follows.

	ProcessA	ProcessB	ProcessC
Raw material used	1000 tones @ Rs. 200		
Manufacturing Wages	Rs. 40000	Rs. 30000	Rs. 7000
Expenses	Rs. 32500	Rs. 10800	Rs. 3710
Scrap sold @ Rs. 50 per tone	50 tones	30 tones	51 tones
Selling price per tone	Rs. 320	Rs. 450	Rs. 800
Weight Loss	5%	10%	20%

Management expenses were Rs. 10500, selling expenses Rs. 8000 and interest on borrowed capital Rs. 2000. Two third of process I and one half of process 2 are passed on to the next process and the balance are sold.

Prepare Process Account, Process Stock Account and Costing Profit & Loss A/c.

Solution

Dr. Process No. 1 A/c. Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Material @ Rs. 200	1000	200000	By Normal Loss (sale of Scrap)	50	2500
To Wages		40000	By Weight Loss	50	--
To Expenses		32500	By Process I Stock A/c.(@300per tone)	900	270000
	1000	272500		1000	272500

Dr. Process No. 1 Stock A/c. Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process I A/c.	900	270000	By Bank (@ 320)	300	96000
To Costing Profit & Loss A/c.		6000	ByProcessNo.2A/c.	600	180000
	900	276000		900	276000

Dr. Process No. 2 A/c. Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process 1 Stock A/c.	600	180000	By Normal Loss (@ Rs. 50)	30	1500
To wages		30000			
To Expenses		10800	By Weight Loss	60	--
			By Process 2 Stock		
			A/c(@ Rs. 430)	510	219300
	600	220800		600	220800

**Dr.****Process No. 2 Stock A/c.****Cr.**

Process Costing

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process 2 A/c.	510	219300	By Bank		
To Costing P&L A/c.		5100	(sale @ 450)	255	114750
			By Process 3 A/c.	255	109650
	<b>510</b>	<b>244400</b>		<b>510</b>	<b>244400</b>

**Dr.****Process No. 3 A/c.****Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process 2 Stock A/c.	255	109650	By scrap	51	2550
To wages		7000	By Weight Loss	51	--
To Expenses		3710	By Process 3 stock A/c	153	117810
	<b>255</b>	<b>120360</b>		<b>255</b>	<b>120360</b>

**Dr.****Process No. 3 Stock A/c.****Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process 3 A/c.	153	117810	By Bank		
To Costing P & L A/c.		4590	(sale @ 800)	153	122400
	<b>153</b>	<b>122400</b>		<b>153</b>	<b>122400</b>

**Dr.****Costing Profit & Loss A/c.****Cr.**

Particulars	Rs.	Particulars	Rs.
To Management Expenses	10500	By Process 1 Stock A/c.	6000
To Selling Expenses	8000	By Process 2 Stock A/c.	5100
To Interest on Capital	2000	By Process 3 Stock A/c.	4590
		By Net Loss	4810
	<b>20500</b>		<b>20500</b>

---

## 1.7 VALUATION OF WORK-IN-PROGRESS

---

### 1.7.1 Meaning of Work-in-Progress:

Since production is a continuous activity, there may be some incomplete production at the end of an accounting period. Incomplete units mean those units on which percentage of completion with regular to all elements of cost (i.e. material, labour and overhead) is not 100%. Such incomplete production units are known as Work-in-Progress. Such Work-in-Progress is valued in terms of equivalent or effective production units.

### 1.7.2 Meaning of equivalent production units :

This represents the production of a process in terms of complete units. In other words, it means converting the incomplete production into its equivalent of complete units. The term equivalent unit means a notional quantity of completed units substituted for an actual quantity of incomplete physical units in progress, when the aggregate work content of the incomplete units is deemed to be equivalent to that of the substituted quantity. The principle applies when operation costs are apportioned between work in progress and completed units.

Equivalent units of work in progress =  $\frac{\text{Actual no. of units in progress} \times \text{Percentage of work completed}}{\text{Percentage of work completed}}$

Equivalent unit should be calculated separately for each element of cost (viz. material, labour and overheads) because the percentage of completion of the different cost component may be different.

### 1.7.3 Accounting Procedure:

The following procedure is followed when there is Work-in-Progress

- (1) Find out equivalent production after taking into account of the process losses, degree of completion of opening and / or closing stock.
- (2) Find out net process cost according to elements of costs i.e. material, labour and overheads.
- (3) Ascertain cost per unit of equivalent production of each element of cost separately by dividing each element of costs by respective equivalent production units.
- (4) Evaluate the cost of output finished and transferred work in progress

The total cost per unit of equivalent units will be equal to the total cost divided by effective units and cost of work-in-progress will be

equal to the equivalent units of work-in-progress multiply by the cost per unit of effective production. In short the following from steps are involved.

- |                        |                                   |
|------------------------|-----------------------------------|
| Step 1                 | – prepare statement of Equivalent |
| production Step 2      | – Prepare statement of cost per   |
| Equivalent unit Step 3 | – Prepare of Evaluation           |
| Step 4                 | – Prepare process account         |

The problem on equivalent production may be divided into four groups.

- I. when there is only closing work-in-progress but without process losses
- II. when there is only closing work-in-progress but with process losses
- III. when there is only opening as well as closing work-in-progress without process losses
- IV. when there is opening as well as closing work-in-progress with process losses

#### **Situation I :**

##### **Only closing work-in-progress without process losses :**

In this case, the existence of process loss is ignored. Closing work-in-progress is converted into equivalent units on the basis of estimates on degree of completion of materials, labour and production overhead. Afterwards, the cost per equivalent unit is calculated and the same is used to value the finished output transferred and the closing work-in-progress.

#### **Situation II:**

##### **When there is closing work-in-progress with process loss or gain.**

If there are process losses the treatment is same as already discussed in this chapter. In case of normal loss nothing should be added to equivalent production. If abnormal loss is there, it should be considered as good units completed during the period. If units scrapped (normal loss) have any reliable value, the amount should be deducted from the cost of materials in the cost statement before dividing by equivalent production units. Abnormal gain will be deducted to obtain equivalent production.

**Situation III:**

**Opening and closing work-in-progress without process losses.**

Since the production is a continuous activity there is possibility of opening as well as closing work-in-progress. The procedure of conversion of opening work-in-progress will vary depending on the method of apportionment of cost followed viz, FIFO, Average cost Method and LIFO.

Let us discuss the methods of valuation of work-in-progress one by one.

**(a) FIFO Method:** The FIFO method of costing is based on the assumption of that the opening work-in-progress units are the first to be completed. Equivalent production of opening work-in-progress can be calculated as follows:

Equivalent Production = Units of Opening WIP x Percentage of work needed to finish the units

**(b) Average Cost Method:** This method is useful when price fluctuates from period to period. The closing valuation of work-in-progress in the old period is added to the cost of new period and an average rate obtained. In calculating the equivalent production opening units will not be shown separately as units of work-in-progress but included in the units completed and transferred.

**(c) Weighted Average Cost Method:** In this method no distinction is made between completed units from opening inventory and completed units from new production. All units finished during the current accounting period are treated as if they were started and finished during that period. The weighted average cost per unit is determined by dividing the total cost (opening work-in-progress cost + current cost) by equivalent production.

**(d) LIFO Method:** In LIFO method the assumption is that the units entering into the process is the last one first to be completed. The cost of opening work-in-progress is charged to the closing work-in-progress and thus the closing work-in-progress appears cost of opening work-in-progress. The completed units are at their current cost.

## (1) Format of statement of Equivalent Production :

Process Costing

Input		Output		Equivalent Production					
Particulars	Units	Particulars	Units	Material		Labour		Overheads	
				%	Units	%	Units	%	Units
Opening Stock	xx	Units completed	xx	xx	xx	xx	xx		
Units Introduced	xx	Normal Loss	xx	--	--	--	--		
		Abnormal Loss	xx	xx	xx	xx	xx		
	xx	Equivalent Units	xx	xx	xx	xx	xx	xx	Xx

## (2) Statement of cost per Equivalent Units :

Element of costing	Cost Rs.	Equivalent Units	Cost per Equivalent Units Rs
Material Cost (Net)	Xx	Xx	Xx
Labour Cost	Xx	Xx	Xx
Overheads Cost	Xx	xx	Xx
	xx		Xx

## (3) Statement of Evaluation

Particulars	Element of cost	Equivalent Units	Cost per equivalent units Rs.	Cost Rs.	Total Cost Rs.
Units completed	Material	xx	xx	xx	
	Labour	xx	xx	xx	
	Overheads	xx	xx	xx	Xx
Closing WIP	Material	xx	xx	xx	
	Labour	xx	xx	xx	
	Overheads	xx	xx	xx	Xx
Abnormal Loss	Material	xx	xx	xx	
	Labour	xx	xx	xx	
	Overheads	xx	xx	xx	Xx

Illustration 6: (Average Costing)

Prepare a statement of equivalent production, statement of cost, process account from the following information using average costing method.

Opening Stock	50000 Units
Material	Rs. 25000
Labour	Rs. 10000
Overheads	Rs. 25000
Units Introduced	200000 Units
Material	Rs. 100000
Wages	Rs. 75000
Overheads	Rs. 70000

During the period 1,50,000 units were completed and transferred to Process II.

Material 100 %

Labour 50 %

Overheads 40 %

Solution :

Input		Output		Equivalent Production					
Particulars	Units	Particulars	Units	Material		Labour		Overheads	
				%	Units	%	Units	%	Units
Opening		Units							
Stock	50,000	Produced	150000	100	150000	100	150000	100	150000
Introduced	200,000	Closing							
		Stock	100000	100	100000	50	50000	40	40000
	250000		250000		250000		200000		190000

Closing stock 1,00,000 units. Degree of completion.



**Statement of Cost :**

Process Costing

Element	Opening cost Rs.	Current cost Rs.	Total Cost Rs.	Equivalent units	Cost per unit
Material	25,000	1,00,000	1,25,000	2,50,000	0.500
Labour	10,000	75,000	85,000	2,00,000	0.425
Overheads	25,000	70,000	95,000	1,90,000	0.500
	60,000	2,45,000	3,05,000		1.425

**Statement of Apportionment of Cost**

Particulars	Units	Cost per unit	Cost	Total cost
1. Units introduced & transferred	1,50,000	1.425		213,750
2. Closing work-in-progress				
Material	1,00,000	0.500	50,000	
Labour	50,000	0.425	21,250	
Overheads	40,000	0.500	20,000	91,250
				3,05,000

**Dr.****Process I A/c.****Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Opening Stock	50,000	60,000	By Units completed		
To Materials	2,00,000	1,00,000	& transfer	50,000	2,13,750
To Labour		75,000	By Closing Stock	50,000	91,250
To Overheads		70,000			
	2,50,000	3,05,000		2,50,000	3,05,000

**Illustration 7: (FIFO Method)**

From the following information relating to KKN Company Ltd.

Prepare Process Cost Account for Process III for the year 2008.

Opening Stock IN Process III units ofRs. 36,000	5000
Transfer from Process II units ofRs. 8,27,000	2,13,000
Direct Material added in Process III	Rs. 4,01,800
Direct Wages	Rs. 1,98,100
Production Overhead	Rs. 99,050
Units Scrap	11,000 units
Transferred to Process IV units	1,89,000
Closing Stock	18,000 units

**Degree of Completion :**

Opening Stock		Closing Stock	Scrap
Material	70 %	80 %	100 %
Labour	50 %	60 %	80 %
Overhead	50 %	60 %	80 %

There was a normal loss of 5% production and unit scrapped were sold at Rs. 1.50

**Solution :****Process Costing**

Input		Output		Equivalent Production					
Particulars	Units	Particulars	Units	Material		Labour		Overheads	
				%	Units	%	Units	%	Units
Opening		Normal							
Stock	5,000	Loss	10000						
Process II		Op. Stock							
Transfer	213,000	Processed	5000	-	-	30	1500	50	2500
		Introduces &							
		Completed	184000	100	184000	100	184000	100	184000
		Abnormal							
		Loss	1000	100	1000	100	1000	80	800
		Closing							
		Stock	18000	100	18000	80	14400	60	10800
	218000		218000		203000		200900		198100

**Note :** Units Produced: Opening stock + units introduced – closing stock

: 5000 + 213000 – 18000 = 200000

Normal Loss : 5 % of 200000 = 10000 units

**Statement of Cost**

Particulars		CostRs.	Equivalent Units Rs.	Cost Per UnitRs.
Material – I				
Transfer from Previous process	8,27,000			
Less – Value of scrap (normal)	15,000	8,12,000	2,03,000	4.00
Material – II				
Added+ in the process		4,01,800	2,00,900	2.00
Direct Wages		1,98,100	1,98,100	1.00
Overheads		99,050	1,98,100	0.50
				7.50

Statement of Apportionment of Cost

Particulars	Elements	Equivalent Units	Cost Per Unit Rs.	CostRs.	Total costRs.
Op. Stock Processed	Material I	--		--	
	Material II	1,500	2.00	3,000	
	Wages	2,500	1.00	2,500	
	Overheads	2,500	0.50	1,250	6,750
Units introducedand	Material I	1,84,000	4.00	7,36,000	
Completed	Material II	1,84,000	2.00	3,68,000	
	Wages	1,84,000	1.00	1,84,000	
	Overheads	1,84,000	0.50	92,000	13,80,000
Closing stock	Material I	18,000	4.00	72,000	13,86,750
	Material II	14,400	2.00	28,800	
	Wages	10,800	1.00	10,800	
	Overheads	10,800	0.50	5,400	1,17,000
Abnormal loss	Material I	1,000	4.00	4,000	
	Material II	1,000	2.00	2,000	
	Wages	800	1.00	800	
	Overheads	800	0.50	400	7,200
TOTAL					15,10,950

Dr. Process III A/c.

Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Balanceb/d.	5,000	36,000	By Normal Loss	10,000	15,000
To Process II A/c.	2,13,000	8,27,000	By Process IV A/c.	1,89,000	14,22,750
To Materials		4,01,800	By Abnormal Loss	1,000	7,200
To Wages		1,98,100	By Closing Stock	18,000	1,17,000
To Overheads		99,050			
	2,18,000	15,61,950		2,18,000	15,61,950

**Note :**

Cost of goods transferred to Process IV :

Value of Opening Stock	36,000
Cost incurred in this process for Opening Stock	6,750
Cost incurred for the units introduced & Processed	<u>13,80,000</u>
<b>Total</b>	<b><u>14,22,750</u></b>

**Illustration 8**

The following information is given in respect of Process costing 10 :  
3 for the month of January 2009.

Opening stock – 2,000 units made up of

	<b>Rs.</b>
Direct Material – I	12,350
Direct Material – II	13,200
Direct Labour	17,500
Overheads	11,000

Transferred from Process 2 – 20,000 units @ Rs. 6 per unit.  
Transferred to Process 4 – 17,000 units

Expenditure incurred in process – 3

	<b>Rs.</b>
Direct Material	30,000
Direct Labour	60,000
Overheads	60,000

Scrap: 1,000 units – Direct Materials 100%, Direct Labour 60%,  
Overheads 40%.

Normal Loss 10 % of Production. Scrapped units realized Rs. 4/- per unit

Closing stock : 4,000 units – Degree of completion. Direct Materials 80 %, Direct Labour 60 % and Overheads 40 %.

Prepare Process 3 Account using average price method along with necessary supporting statements.

[C. A. – Inter, May 2001]

Solution :

Statement of Equivalent Production (weighted Average cost Material)

Particulars	Total Units	Material – I		Material – II		Labour		Overheads	
				%	Units	%	Units	%	Units
Units Completely									
Processed	17000	100	17000	100	17000	100	17000	100	17000
Normal Loss	1800	--							
10% of (2000 +									
20000 – 4000)									
Abnormal Gain	800	100	800	100	800	100	800	100	800
Closing Stock	4000	100	4000	80	3200	60	2400	40	1600
	22000		20200		19400		18600		17800

Statement of Cost

Particulars	CostRs.	Equivalent Units	Rate / EquivalentUnits Rs.
<b>Material – I :</b>			
Opening balance 2000 units	12,350		
Cost of 20000 units @ Rs. 6			
Per unit	1,20,000		
	1,25,150	20,200	6.1955
<b>Material – II :</b>			
Opening Stock	13,200		
In Process II	30,000		
	43,200	19,400	2.2268
<b>Labour :</b>			
Opening Labour	17,500		
In Process II	60,000		
	77,500	18,600	4.1667
<b>Overheads :</b>			
Opening Stocks	11,000		
In Process II	60,000		
	71,000	17,800	3.9888
<b>Total cost per unit</b>			<b>16.5778</b>

			Rs.
Finished goods	(17000 units x Rs. 16.5778)		2,81,822
Abnormal Units			
Working progress	(800 units x Rs. 16.5778)		13,262
Material I			
Material II		24,782	
Labour	(4000 units x Rs. 6.1955)	7,126	
Overheads	(3200 units x Rs. 2.2268)	10,000	
	(2400 units x Rs. 4.1667)	6,382	48,290
	(1600 units x Rs. 3.9888)		

**Dr.** **Process III A/c.** **Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Opening WIP	2,000	57,050	By Normal Loss	1,800	7,200
To Process 2	20,000	1,20,000	By Finished Goods		
To Direct			Units	17,000	2,81,822
Material II		30,000	By Closing Balance	4,000	48,290
To Direct Labour		60,000			
To Overheads		60,000			
To Abnormal Gain	800	13,262			
	<b>22,800</b>	<b>3,37,312</b>		<b>22,800</b>	<b>3,37,312</b>

### Illustration.9

The finished product of a factory pass through two processes. The entire material being placed in process at the beginning of the first process. From the following production and last data relating to the first process, work out the value of the closing inventory and the value of the materials transferred to the second process.

<b>Process I</b>	<b>Rs.</b>
Opening inventory	10,000
Material	27,500
Labour	50,000
Manufacturing Overheads	40,000
Opening inventory (25 percent complete)	4,000
Put into Process	12,000
Transferred to II Process	10,000
Closing inventory (20 percent completed)	5,000
Spoilage during process	1,000
	[I.C.W.A., Final]

**Solution :**

**Process I A/c**

Particulars	Kg.	AmountRs.	Particulars	Kg.	AmountRs.
Opening Inventory	4,000	10,000	Transferred to Process II	10,000	1,15,750
Material	12,000	27,500	Normal Loss	1,000	--
Labour		50,000	Closing Inventory	5,000	11,750
Manufacturing					
Overheads		40,000			
	<b>16,000</b>	<b>1,27,500</b>		<b>16,000</b>	<b>1,27,500</b>

**Working Note :**

**Statement of Equivalent Production Units**

Particulars	OutputKg.	Material		Labour		Overheads	
		Qty.	%	Qty.	%	Qty.	%
Opening Stock	4,000	3,000	75	3,000	75	3,000	75
Processed							
Completely Processed	6,000	6,000	100	6,000	100	6,000	100
Normal Loss	1,000	--	--	--	--	--	--
Closing Inventory	5,000	1,000	20	1,000	20	1,000	20
	<b>16,000</b>	<b>10,000</b>		<b>10,000</b>		<b>10,000</b>	



**Statement of Element of Cost on the basis of Equivalent Production**

Process Costing

Particulars	CostRs.	Equivalent Units	Cost per UnitRs.
Material	27,500	10,000	2.75
Labour	50,000	10,000	5.00
Overheads	40,000	10,000	4.00
Total			11.75

**Statement of Apportionment of Cost**

Particulars	Elements	Equivalent Units	Cost Per UnitRs.	CostRs.	Total cost Rs.
Op. Stock Processed	Material	3,000	2.75	8,250	
	Labour	3,000	5.00	15,000	
	Overheads	3,000	4.00	12,000	35,250
Completely Processed	Material	6,000	2.75	16,500	
	Labour	6,000	5.00	30,000	
	Overheads	6,000	4.00	24,000	70,500
Closing Inventory	Material	1,000	2.75	2,750	
	Labour	1,000	5.00	5,000	
	Overheads	1,000	4.00	4,000	11,750
<b>TOTAL</b>					<b>1,17,500</b>

**Value of goods transferred to next process**

	Rs.	Units
Value of opening stock (given)	10,000	
Additional cost on opening stock	35,250	4,000
Value of completely processed units	70,500	6,000
	1,15,750	10,000

**Illustration 10**

ABC Limited manufactures a product ‘2X’ by using the process normally R. T. for the month of May 2009, the following data is available.

Process R. T.

Material Introduced	16,000 units
Transfer to next process	14,000 units
Work-in-Process	4,000 units

At the beginning of the month (4/5 completed) 3,000 unitsAt the end of the month (2/3 completed)

**Cost records:**

Work-n-Process at the beginning of the month

Material	Rs. 30,000
Conversioncost	Rs. 29,200
Cost during the month Materials	Rs. 1,20,000
Conversion cost	Rs. 1,60,800

Normal spoiled units are 10% of goods finished output transferred to next process.

Defects in these units are identified in their finished state.

Materials for the product is put in the process at the beginning ofthe cycle of operation, whereas labour and other indirect cost flow evenly over the year. It has no realizable value for spoiled units.

Required :

- (1) Statement of equivalent production (average cost method)
- (2) Statement of cost and distribution of cost
- (3) Process accounts

[C.A. PCE. Nov. 2007]

**Solution :****Statement of Equivalent Production (average cost method)**

Input units	Particulars	Output Units	Equivalent Production			
			Materials		Conversion cost	
			% completed	Equivalent Units	% Completed	Equivalent Units
4000	Opening WIP	--	--			
16000	Introduced and	14,400	100	14,400	100	14,400
	Completed to next					
	Normal spoilage	1,440	100	1,440	100	1,440
	Abnormal spoilage	1,160	100	1,160	100	1,160
	Closing WIP	3,000	100	3,000	66.67	2,000
20000		20000		20000		19000

**Statement showing cost of each element**

Particulars	Materials	Conversion cost
Opening	30,000	29,200
Cost in process	1,20,000	1,60,800
Total (a)	1,50,000	1,90,000
Equivalent Units (b)	20,000	19,000
Cost per unit (a ÷ b)	7.50	10.00

**Statement showing distribution of cost**

Particulars	Equivalent Units	Cost per unit	(Rs.)	
Units completed				
Materials	14,400	7.50	1,08,000	2,52,000
Conversion cost	14,400	10.00	1,44,000	
Normal spoilage (10 %)	1,440	17.50		
<b>Closing stock :</b>				
Material	3,000	7.50	22,500	42,500
Conversion cost	2,000	10.00	20,000	
<b>Abnormal Stock:</b>				
Material	1,160	7.50	8,700	20,300
Conversion Stock	1,160	10.00	11,600	

Dr.

Process A/c.

Cr.

Particulars	Rs.	Particulars	Rs.
To Opening WIP	59,200	By Profit and Loss A/c. (abnormal)	20,300
To Material Introduced	1,20,000	By Transfer to Next Process	2,77,200
To Conversion cost Incurred	1,60,800	By Closing WIP	42,500
	340000		3,40,000

Illustration.11

GH & Co. manufactures a product. The process costing is followed and work-in-progress stocks at the end of each month are valued at FIFO basis.

At the beginning of the month of June, the inventory of work-in-progress showed 400 units, 40% complete, valued as follows:

	Rs.
Material	3,600
Labour	3,400
Overheads	1,000
Total	8,000

In the month of June, materials were purchased for Rs. 75,000. Wages and overheads in the month amounted to Rs. 79,800 and Rs. 21,280 respectively. Actual issue of material to production was Rs. 68,500. Finished stock in the month was 2500 units. There was no loss in process.

All the end of the month, the work-in-process inventory was 500 units, 60 percent complete as to labour and overheads and 80 % complete as to materials.

Prepare a Process Account for recording the month’s transactions and prepare a Process Cost Sheet showing total and units costs [I.C.W.A., Final]

**Solution:****Dr.****Process A/c.****Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Opening Stock	400	8,000	BY Transfer to		
To Material	2,600	68,500	Finished stock	2,500	1,56,094
To Labour		79,800	By Work-in-		
To Overheads		21,280	Progress	500	21,486
	<b>3000</b>	<b>1,77,580</b>		<b>3000</b>	<b>1,77,580</b>

**Working Note :**

## Statement of Equivalent Production (Units)

Input	Particulars	Output	Material		Labour		Overhead	
			Qty.	%	Qty.	%	Qty.	%
400	Opening Stock	400	240	60	240	60	240	60
2600	Completely Processed Work-in- Progress	2,100	2,100	100	2,100	100	2,100	100
		500	400	80	300	60	300	60
3000		3,000	2,740		2,640		2,640	

**Working Note :**

- (1) For opening stock also equivalent production has been calculated as it was partly complete and it has to be converted into finished product in this period. They were completed 60 % in this period.
- (2) Total units produced in a month are 2,50 units. Out of this 400 units of opening stock has been deducted because they have been partly processed in this particular month and we have already calculated equivalent units of opening stock. Only, 2,100 units have been introduced and completed in the particular period.
- (3) For closing stock also equivalent production in terms of total units completed has been calculated.

Statement of Element of cost on the basis of Equivalent Units

	CostRs.	Equivalent Units	Cost perunit Rs.
Material	68,500	2.740	25.000
Labour	79,800	2.640	30.2273
Overheads	21,280	2.640	8.0606

Statement of Apportionment of Cost

Particulars		Equivalent Units	Cost Per Unit Rs.	DetailsRs.	TotalRs.
Op. Stock Processed	Material	240	25.0000	6,000	15,190
	Labour	240	30.2273	7,255	
	Overheads	240	8.0606	1,935	
Completely Processed	Material	2,100	25.0000	52,500	1,32,904
	Labour	2,100	30.2273	63,477	
	Overheads	2,100	8.0606	16,927	
Work-in-Process	Material	400	25.0000	10,000	21,486
	Labour	300	30.2273	9,068	
	Overheads	300	8.0606	2,418	
				<b>TOTAL</b>	<b>1,69,580</b>

Total Cost of 2500 units

	Rs.
Cost of opening stock	8,000
Additional cost of opening stock processed	15,190
Cost of completely processed	1,32,904
	<b>1,56,094</b>

Illustration 12

The following data is available in respect of Process I for February 1990.

(1) Opening stock of work-in-process 800 units at a total cost of Rs. 4,000. Process Costing

(2) Degree of completion of opening work in process

Materials	100 %
-----------	-------

Labour	60 %
--------	------

Overheads	60 %
-----------	------

(3) Input of materials at a total cost of Rs. 36,800 for 9,200 units

(4) Direct wages incurred Rs. 16,7540

(5) Production overheads Rs. 8,370

(6) Units scrapped 1,200 units. The stage of completion of these units was

Materials	100 %
-----------	-------

Labour	80 %
--------	------

Overheads	80 %
-----------	------

(7) Closing work-in-process : 900 units. The stage of completion of these units was :

Materials	100 %
-----------	-------

Labour	70 %
--------	------

Overheads	70 %
-----------	------

(8) 7,900 units were completed and transferred to the next process.

(9) Normal Loss is 80 % of the total input (opening stock plus units put in)

(10) Scrap value is Rs. 4 per unit

You are required to :

(a) Compute equivalent production

(b) Calculate the cost per equivalent unit for each element

(c) Calculate the cost of abnormal loss (or gain), closing work in process and the units transferred to the next process using the FIFO method.

(d) Show the Process Account for February 1990

[C.A., Inter]

(a) Statement of Equivalent Production (FIFO Method)

input		Output		Equivalent			
Particulars	units	Particulars	Units	Material		Labour & Overheads	
				Units	%	Units	%
Op. Stock of W.I.P.	800	Units completed	800	--		320	40
Units Introduced	9,200	Work on Op. stock					
		New units	7100	7100	100	7,100	100
		Closing stock	900	900	100	630	70
		Normal Loss	800	--		--	
		Abnormal Loss	400	400	100	320	100
	10,000		10,000	8,400		8,370	

(b) Statement of cost per equivalent units for each element

Particulars	CostRs.	EquivalentUnit	Cost PerUnit
Material	36,800		
Less : Scraprealization			
(800 units @ Rs. 4)	<u>3,200</u>		
	33,600	8,400	4.00
Labour	16,740	8,370	2.00
Overheads	8,370	8,370	1.00

I Statement showing cost of abnormal loss, closing WIP and units transferred to the next process :

Particulars	Cost per unitRs.	Equivalent unit	Total costRs.
Abnormal Loss			
Materials	4.00	400	1,600
Labour	2.00	320	640
Overheads	1.00	320	320
			2,560
Closing WIP			
Material	4.00	900	3,600
Labour	2.00	630	1,260
Overheads	1.00	630	630
7900 units transferred to next Process			5,490
(i) Cost of opening WIP (80 units)			4,000
(ii) Cost incurred on opening WIP			
Material	--	--	
Labour	2.00	320	640
Overheads	1.00	320	320
			960



(iii) Cost of completing 7100 units			
Material	4.00	7100	28400
Labour	2.00	7100	14200
Overheads	1.00	7100	7100
			49700
Total (I + ii + iii)			<b>54600</b>

Dr.

Process A/c. for February 1990

Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Opening WIP	800	4000	By Finished Goods	7900	54660
To Materials	9200	36800	By Closing WIP	900	5490
To Labour	--	16740	By Normal Loss	800	3200
To Overheads	--	8370	By Abnormal Loss	400	2560
	10000	65910		<b>10000</b>	<b>65910</b>

## 1.8 EXERCISE

### 1.8.1 Objective type:

#### Answer in Brief

1. State any four features of process costing.
2. Define process costing,
3. What do you mean by normal loss? How is it treated in process cost accounts?
4. What do you mean by abnormal loss? How is it treated in process cost accounts?
5. Distinguish between normal loss and abnormal loss.
6. What do you mean by abnormal effective? How is it treated in process cost accounts?
7. What do you mean by inter process profit? What purpose does it serve?
8. What do you mean by equivalent production?

- 9. Name any four industries in which process costing is applicable?
- 10. Enumerate any two advantages of process costing.
- 11. Enumerate any two disadvantages of process costing.
- 12. What do you mean by equivalent units?

**Multiple Choice Questions**

- 1. The type of spoilage that should not affect the cost of inventories is
  - (a) Abnormal spoilage
  - (b) Normal spoilage
  - (c) Seasonal spoilage
  - (d) Indirect spoilage
- 2. Materials may not be put into process
  - (a) At the beginning of an operation
  - (b) Continuously
  - (c) At the end of the operation
  - (d) In the shipping department.
- 3. Process cost method is especially suitable for
  - (a) Custom production
  - (b) Standard costs
  - (c) FIFO
  - (d) LIFO
- 4. In process costing, costs follow
  - (a) Price rise
  - (b) Price declines
  - (c) Product flow
  - (d) Finished goods
- 5. When average costing is used, the opening inventory costs are
  - (a) Kept separate from the costs for the new period
  - (b) Added to the costs of the new period
  - (c) Subtracted from the new costs
  - (d) Averaged with other costs to arrive at total cost.
- 6. A disadvantage of FIFO costing is that
  - (a) The first units produced cannot be distinguished from later production.
  - (b) Several units costs are used at the same time.
  - (c) The units have to be kept separate
  - (d) The shipping costs are higher

7. Which of the following method of costing can be used in a large oil refinery?
- (a) Process costing (c) Unit costing  
(b) Operating costing (d) Job costing
8. Which of the following is odd :
- (a) Construction-Contract costing  
(b) Ship-building-Job costing  
(c) Brick manufacturing – Process costing  
(d) Transport undertaking – Operating costing
9. A product which has practically no sales or utility value is
- (a) Waste (c) Spoilage  
(b) Scrap (d) Defectives
10. Trimmings in timber industry should be treated as a :
- (a) Waste (c) Spoilage  
(b) Scrap (d) Defectives
11. The type of process loss that should not affect the cost of inventory is
- (a) Abnormal loss (c) Seasonal loss  
(b) normal loss (d) standard loss
12. The stage where joint products are separated from each other is known as
- (a) break-even point (b) angle of incidence  
(c) split-off point
13. Fifty units are put in a process at a total cost of Rs. 90. Wastage is normally 10% without any scrap value. If output is 40 units the amount of abnormal loss would be
- (a) Rs. 80 (c) Rs. 10  
(b) Rs. 8 (d) Rs. 9

14. Abnormal loss is charged to
- (a) process account
  - (b) costing profit and loss account
  - (c) Normal loss account

(Answers: 1(a), 2 (d), 3 (b), 4(c), 5(a), 6(b), 7(a), 8(c), 9(a), 10(b).)11 (a), 12(c), 13 (c), 14(b) )

**1.8.2 Short notes**

- 1. Write a short note-Inter process profits.(Apr-08)
- 2. Write a Short Note-Treatment of losses in Process.(Apr 07)
- 3. Write a short Note-Equivalent Production. (Apr-07)
- 4. Describe the main features of process costing.
- 5. Explain the features of process costing
- 6. How would you treat abnormal gain?

**1.8.3. Long questions**

- 1. What do you mean by inter-process profits in process cost accounts.
- 2. Explain the methods to be adopted in the treatment of joint products and by-products in process account.
- 3. What do you understand by 'Normal' and 'Abnormal' Wastage during the process of manufacture?
- 4. Describe briefly the method known as Process Costing, stating four types of manufactures which would be suitable for its application. A description of the method of dealing with by- products is not required.
- 5. Explain the concept of Equivalent Production. Discuss the two methods of its valuation.

**1.8.4 Practical ProblemsIllustration 1:**

During a particular period 2,000 units at a cost of ` 60,000 were introduced into Process 'A' (at the beginning). The normal loss was estimated at 5% of the input. At the end, 1,400 units were produced and transferred to the Process 'B', 460 units being partially completed and 140 units scrapped. The partially completed units had reached the following state of production:

Materials	100% complete
Labour	50% complete
Overheads	50% complete

Additional costs incurred during the process were: Materials Rs. 17,000

Labour Rs. 33,400

Overheads Rs. 16,700

The units scrapped realised Rs. 10 per unit. Prepare Process 'A' A/c with all relevant statements.

(Ans.: Equivalent Units, Material: 1,900, Labour: 1,670, Overheads: 1,670 Transfer to Process B 1,400 units @Rs. 70 p.u.)

(M.Com. Mar. 2002)

### Illustration 2 :

XYZ Ltd. is engaged in process industry. During the month August 2000, 2000 Units were introduced in process 'X'. The normal loss was estimated at 5% of input. At the end of the month 1,400 units had been produced and transferred to process 'Y'. 460 units were incomplete and 140 units, after passing through fully the entire process had to be scrapped. The incomplete units had reached the following state of completion:

Materials	75% Completed
Labour	50% Completed
Overheads	50% Completed

Following are the further information on the process 'X' :

Cost of the 2000 units	Rs. 58,000
Additional Direct materials	Rs. 14,400 Direct
Labour	Rs. 33,400
Direct Overheads	Rs. 16,700
Units scrapped realised	Rs. 10 each

Prepare statement of equivalent production, statement of cost, statement of evaluation and process 'X' account.

(M.Com. Mar. 2005)

**Ans.** (Equivalent Units, Material: 1,785, Labour: 1,670, Overheads: 1,670)

### Illustration 3 : (FIFO)

The following information is available for Process IV of Swastik Fabrications Ltd. for the month of March 2005.

Opening Stock: 4,800 units @ Rs.16,500

Degree of Completion: Material 70%

Labour 60%

Overheads 60% Transfer from Process III: 30,600 units @ Rs. 30,600  
Transfer to Process V: 27,600 units

Direct Material introduced in Process IV: Rs. 13,440 Direct Labour introduced in Process IV: Rs. 39,420 Production overheads incurred Rs. 52,560

Units scrapped: 2,400

Degree of completion:	Material	100%
Labour	70%	

Overheads	70%
-----------	-----

Closing stock 5400 units

Degree of completion:	Material	60%
	Labour	40%
	Overheads	40%

There was a normal loss of 10% of production in the process. Unites scrapped were realised at Re. 1 per unit. From the above information prepare:

- 1) Statement of equivalent production
- 2) Cost of equivalent unit for each element of the cost, the loss, the work-in-process, etc.
- 3) Process account using FIFO method.

(M.Com. Oct. 2005)

Ans. (Equivalent Units, Material I: 27,600, Material II: 26,880, Labour: 26,460, Overheads: 26,460)

**Illustration 4 : (FIFO)**

The following data pertains to Process I for March 2003 of Beta Limited :

Particulars	Units	Rs.
Opening Work-in-Progress ... ..	1,500	15,000
Degree of completion :		
Materials 100%; Labour and overheads 33⅓%		
Input of Materials ... ..	18,500	52,000
Direct Labour ... ..		14,000
Overheads ... ..		28,000
Closing Work-in-Progress ... ..	5,000	

Degree of Completion Materials 90% and Labour and Overheads 30%.

Normal Process Loss is 10% of total input (opening work in progress units + units put in).

Scrap value 2.00 per unit.

Units transferred to the next process 15,000 units. You are required to:

- 1) Compute equivalent units of production.
- 2) Compute cost per equivalent unit for each cost element i.e., materials, labour and overheads.
- 3) Compute the cost of finished output and closing work-in-progress.
- 4) Prepare the process and other Account.

**Assume:**

- i) FIFO Method is used by the Company.
- ii) The cost of opening work-in-progress is fully transferred to the next process.

(M.Com. Mar.2006)

**Ans.** (Equivalent Units, Material: 16000, Labour: 14,000, Overheads: 14,000)

**Illustration 5: (Weighted Average)**

From the following details prepare Statement at Equivalent Production, statement of Cost and find the value of: (a) Output transferred and (b) Closing work in progress

Opening work in progress (units)	2,000
Materials (100% Complete)	7,500
Labour (60 % Complete)	3,000
Overheads (60% Complete)	1,500
Units introduced into this process	8,000

There are 2,000 units in process at the end and the stage of completion is estimated to be :

Materials	100%
Labour	50%
Overheads	50%

8,000 units are transferred to next process. The process costs for the period are:

Materials	Rs. 1, 00,000
Labour	Rs. 78,000
Overheads	Rs. 39,000

(M.Com. Oct. 2006)

Ans. (Equivalent Units, Material:10,000, Labour: 9,000, Overheads: 9,000)

**Illustration 6 : (Average)**

Shete and Shete Pvt. Ltd. gives the following particulars relating to process ‘P’ in its plants for the month of January 2007 :

Particulars	Rs.	Rs.
<b>Work-in-Progress (500 units)</b>		
<b>01-01-2007</b>		
Material (100%) ... ..	12,000	-
Degree of Completion Labour (50%) ... ..	7,200	-
Overheads (50%) ... ..	16,000	35,200
<b>Units introduced during the Month</b>		
January, 2007 – Units – 19,500 ... ..	-	-
<b>Processing Cost incurred during the Month</b>		
January, 2007                      Materials ... ..	4,65,500	-
Labour ... ..	1,80,000	-
Overheads ... ..	<u>2,64,800</u>	9,10,300



Particulars	Units
Output transferred to Process Q ... ..	18,200
Units Scrapped (Degree of Completion Material 100%, Labour 80% and Overheads 80%) ... ..	1,400
Work-in-Progress (Closing Balance) ... ..	400
(Degree of Completion-Materials 100%, Labour and Overheads 50%)	

Normal loss in processing is 5% of total input and scrapped units fetch 2.50 each. Prepare the following statements for Process 'P' for January, 2007 :

- Statement of Equivalent Production
- Statement of Cost and Statement of Evaluation
- Process 'P' A/c
- Abnormal Loss A/c Use Average Method

(Mar. 07, adapted)

**Ans.** (Equivalent Units, Material: 19,000, Labour: 18,720, Overheads: 18,720)

### Illustration 26 : (FIFO – No Losses)

Avdoot Ltd., a manufacturer of a specialized product, is have a process costing system. The stock of work-in-progress at the end of each month is valued on First in First Out (FIFO) basis. At the beginning of January 2008 the stock of work-in-progress was 2000 units (40% completed) which was valued as :

Material	Rs. 18,000
Labour	Rs. 17,000
Overheads	Rs. 5,300

During the month of January 2008, actual issue of materials for the production purpose was Rs. 3,42,500. wages and overheads in the month of January, 2008 amounted to Rs. 4,02,600 and Rs. 1,12,200 respectively. Finished production taken into the stock in the month was 12,500 units. There was no loss in the process. At the end of the month of January, 2008 the stock of Work-in-Progress was

2500 units (60% complete as to Labour and Overheads and 80% complete as to materials). Prepare the following statements for January, 2008.

- a) No. of units introduced in the process    b) Statement of Equivalent Production  
c) Statement of Cost    d) Statement of Evaluation    e) Process Account.

(Apr. 08, adapted) (Equivalent Units, Material: 13,700, Labour: 13,200, Overheads:13,200)

**Illustration 27 : (FIFO – Process A/c with Abnormal Loss)**

From the following information prepare Process account as per FIFO assumption:

Opening stock	Degree of completion
80 units @ Rs. 6 per unit Rs. 4,800	
	Material 60%
	Labour 40%
	Overheads 40%

Transfer from previous process : 12,000 units costing Rs. 16,350  
Transfer to next process : 9,700; Units scrapped 1,300 units Normal loss 10%; Closing stock : 1,800 units

Degree of completion			
For units scrapped :		For closing stock :	
Material	100%	Material	60%
Labour	50%	Labour	50%
Overheads	50%	Overheads	50%
Scrap realised Re. 1.00 per unit			
Other information	Rs.		
Material	10,500		
Labour	20,760		
Overheads	16,470		

(M.Com, Oct. 2008, adapted)(Ans. Equivalent Units, Material I: 10,900, Material II: 10,500, Labour: 10,380, Overheads: 10,380)



## **COST ALLOCATION**

### **Unit Structure**

2.0 Introduction

2.1 Types of cost

2.2 Cost driver

2.3 Methods of allocation of cost

2.4 Step Down Method

2.5 Reciprocal Method of cost allocation

2.6 Activity Based costing

2.7 Difference between Traditional Cost System and ABC system

2.8 Illustrations

---

### **2.0 INTRODUCTION**

---

Cost Allocation or cost assignment is the process of identifying and assigning costs to the various cost objects. These cost objects could be those for which the company needs to find out the cost separately. A few examples of cost objects can be a product, customer, project, department, and so on. The need for cost allocation arises because some costs are not directly attributable to the particular cost object. In other words, these costs are incurred for various objects, and then the sum is split and allocated to multiple cost objects. These costs are generally indirect. Since these costs are not directly traceable, an accountant uses their due diligence to allocate these costs in the best possible way. It results in an allocation that could be partially arbitrary, and thus, many refer cost allocation exercise as the spreading of a cost. Cost allocation is the process of identifying, accumulating, and assigning costs to costs objects such as departments, products, programs, or a branch of a company. It involves identifying the cost objects in a company, identifying the costs incurred by the cost objects, and then assigning the costs to the cost objects based on specific criteria.

When costs are allocated in the right way, the business is able to trace the specific cost objects that are making profits or losses for the company. If costs are allocated to the wrong cost objects, the company may be assigning resources to cost objects that do not yield as much profits as expected.

---

## 2.1 TYPES OF COSTS

---

There are several types of costs that an organization must define before allocating costs to their specific cost objects. These costs include:

**1. Direct cost**

Direct costs are costs that can be attributed to a specific product or service, and they do not need to be allocated to the specific cost object. It is because the organization knows what expenses go to the specific departments that generate profits and the costs incurred in producing specific products or services. For example, the salaries paid to factory workers assigned to a specific division is known than does not need to be allocated again to that division.

**2. Indirect Cost**

Indirect costs are costs that are not directly related to a specific cost object like a function, product, or department. They are costs that are needed for the sake of the company's operations and health. Some common examples of indirect costs include security costs, administration costs, etc. The costs are first identified, pooled, and then allocated to specific cost objects within the organization.

Indirect costs can be divided into fixed and variable costs. Fixed costs are costs that are fixed for a specific product or department. An example of a fixed cost is the remuneration of a project supervisor assigned to a specific division. The other category of indirect cost is variable costs, which vary with the level of output. Indirect costs increase or decrease with changes in the level of output.

**3. Overhead costs**

Overhead costs are indirect costs that are not part of manufacturing costs. They are not related to the labor or material costs that are incurred in the production of goods or services. They support the production or selling processes of the goods or services. Overhead costs are charged to the expense account, and they must be continually paid regardless of whether the company is selling goods or not. Some common examples of overhead costs are rental expenses, utilities, insurance, postage and printing, administrative and legal expenses and research and development costs.

---

## 2.2 COST DRIVER

---

A cost driver triggers a change in the cost of an activity. The concept is most commonly used to assign overhead costs to the number of produced units. It can also be used in activity-based costing analysis to determine the causes of overhead, which can be used to minimize overhead costs. A large number of cost drivers may be used within an activity-based costing system. If a business is only concerned with following the minimum accounting requirements to allocate overhead to produced goods, then just a single cost driver should be used. It is an

activity that is the root cause of why a cost occurs. It must be applicable and relevant to the event that is incurring a cost. A cost driver assists with allocation expenses in a systematic manner that results in more accurate calculations of the true costs of producing specific products.

**Cost pool:** It is an aggregate of all the costs associated with performing a particular business activity.

An activity cost driver refers to actions that cause variable cost to increase or decrease for a business. Therefore, identifying what product/service is causing particular costs can help the business to become more profitable by better understanding the specific activities that are driving the costs. **Allocating cost drivers appropriately is important in accurately determining the cost of producing a good or service, as well as making financial projections.**

Activity cost drivers are specific activities that cause variable expenses to be incurred. One variable expense can comprise more than a single activity cost driver. For example, machine hours and labor hours can be activity cost drivers in the manufacturing of a product.

All variable expenses can be broken down and looked at by one or several activity cost drivers, which can also be influenced by several factors. For example, if the minimum wage increases, it can cause the cost of producing a product to also increase.

Examples of Activity Cost Drivers

- Direct labour hours
- Machine setups required
- Number of customer contacts
- Number of customer change orders

## Examples of Activity and its Cost Drivers

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Machine Set-up</li> <li>• Purchase Materials</li> <li>• Warehousing</li> <li>• Material Handling</li> <li>• Inspection</li> <li>• Quality Testing</li> <li>• Receiving Material</li> <li>• Packing</li> <li>• Store Delivery</li> <li>• Line Item Ordering</li> </ul> | <ul style="list-style-type: none"> <li>• No. of Production Runs</li> <li>• No. of orders Placed</li> <li>• Items in Stock</li> <li>• No. of Parts</li> <li>• Inspection per Item</li> <li>• Hours of Test Time</li> <li>• No. of Receiving Orders</li> <li>• No. of Packing Orders</li> <li>• No. of Store Delivers</li> <li>• No. of Line Items</li> </ul> |
|--|---|

---

## 2.3 METHODS OF ALLOCATING COST

---

### Direct method of cost allocation

The direct method is considered the most simple method of allocating the cost of service departments to operating departments. In the direct method, interactions between service departments are ignored and costs are allocated just to operating departments. Under this method, the costs incurred by service departments are not allocated to each other; rather, they are directly allocated to operating departments using some appropriate allocation base. In other words, we can say that the **direct method of departmental cost allocation** ignores the service provided by a service department to itself and to other service departments.

A firm generates various expenses that can be assigned to a specific “cost item” — such as a commodity, program, function, or service. These costs include anything from mop floors to functional equipment. You should, however, generate enough income to pay such corporation overhead expenditures. This means that revenue must surpass total costs. The direct allocation technique is one of numerous cost allocation strategies used to allocate indirect costs to activities. It is one of the most often used techniqueThe direct technique is the easiest in terms of cost allocation, even though it has several shortcomings. Nevertheless, because of its simplicity of using it, it became one of the most widely applied cost allocation techniques in recent years. In a nutshell, it assumes that service departments do not give facilities or services to each other, and it merely distributes the service departments’ costs in the company’s manufacturing departments.

The direct approach of transferring service department costs to the operational department is the simplest way of allocating costs between divisions. As a result of this technique, the expenses involved by service departments are not assigned to one another. Still, they are instead allotted straight to operational departments using a suitable rate of allocation.

The direct approach assigns the expenses of all the support departments to every other manufacturing unit calculated based on the rates of each operational department rates. Services that other support departments receive are not considered in this method of cost allocation. With the help of this approach, it is possible to completely charge operational departments with the overhead expenditures for which they are accountable. Firms that use the direct method completely transfer excess costs from service departments to inventories, even though there may be cross-costs across service departments, because of the nature of the business.

For instance, the cleaning crew offers services to sanitize all business buildings. In contrast, the maintenance department oversees the firm’s machinery, and the information technology department oversees maintaining the organization’s computer networks. Assume that a service Department 1 utilizes a few of the facilities provided by Service

Department 2. Such services will be excluded from consideration throughout the cost allocation procedure. Because such services are not assigned to certain other service divisions, many cost auditors think that the direct approach is not as precise as other methods.

### Advantages and disadvantages

Many organizations use direct method for allocating departmental costs because it is very simple and easy to employ.

The major disadvantage of direct method is that it ignores interdepartmental services and can therefore lead to distorted products and services cost. Moreover, it is commonly considered a less accurate method when compared with other methods available for departmental cost allocation.

There is, however, a disadvantage to using this approach. Direct allocation does not enable companies to shift expenditures from one support department to another support department and vice versa. Depending on the nature of your company, this is a possibility. Assume that there is an HR and maintenance department. Allowing for the possibility that almost all the HR and maintenance department support expenditures are assigned to an operational unit through direct allocation. As a result, HR and maintenance department expenses are completely depleted.

Q.1) The Murphy Company has two service departments and two operating departments as shown below:

	SERVICE DEPARTMENTS		OPERATING DEPARTMENTS		Total
	Dept. A	Dept. B	Dept. X	Dept. Y	
Departmental costs before allocation	\$180,000	\$45,000	\$130,500	\$344,500	\$700,000
Employee hours	6,000	3,000	9,000	15,000	33,000
Space occupied - square feet	5,000	100	3,000	22,000	30,100

The two service departments provide service to each other as well as to operating departments. The department A's cost is allocated on the basis of employee hours and department B's cost is allocated on the basis of square feet occupied.

**Required:** Allocate the cost of service departments to operating departments using direct method of cost allocation.



Solution

	SERVICE DEPARTMENTS		OPERATING DEPARTMENTS		Total
	Dept. A	Dept. B	Dept. X	Dept. Y	
Departmental costs before allocation	\$180,000	\$45,000	\$130,500	\$344,500	\$700,000
<i>Allocation:</i>					
Department A cost (9/24,15/24)*	(180,000)		67,500	112,500	
Department B cost (3/25, 22/25)**		(45,000)	5,400	39,600	
	\$ 0	\$ 0	\$203,400	\$496,600	\$700,000

*Department A’s cost has been allocated on the basis of employee hours:*

9,000 hours + 15,000 hours = 24,000 hours.

Allocated to department X:  $\$180,000 \times (9/24) = \$67,500$

Allocated to department Y:  $\$180,000 \times (15/24) = \$112,500$

*Department B’s cost has been allocated on the basis of spaces occupied:*

3,000 square feet + 22,000 square feet = 25,000 square feet.

Allocated to department X:  $\$45,000 \times (3/25) = \$5,400$

Allocated to department Y:  $\$45,000 \times (22/25) = \$39,600$

On the other hand, the human resources department assists the maintenance department throughout the same time frame. It goes without saying that the maintenance department should bear a portion of the costs of human resources. However, the expenditures of the maintenance department have already been transferred in whole to another operating unit.

---

**2.4 STEP DOWN METHOD:**

---

In the step down method, one service department’s costs are allocated to another service department as well as operating departments that use it. Any amount of the allocation base attributable to the service department whose cost has already been allocated is ignored. Each service department assigns its own costs to operating departments plus the costs that have been allocated to it from other service departments.

The step technique of distributing service department expenses is the second way of allocating costs. As part of a sequential process, service expenses are allocated to operational departments and other service departments by using this approach. The following are the critical phases in the allocation process:

1. Service departments that offer services to the greatest number of other service departments or that have the greatest proportion of their expenses used by the other service departments receive priority in allocating their



expenses to certain other service departments. It also distributes the remainder of its expenses across the operational divisions.

2. The service department that offers services to the second-highest number of other services departments or has the second-highest proportion of its expenses absorbed by other service departments, oversees allocating its expenses towards the other service departments. At this point, all the company's other expenses have been assigned to the operational divisions.

3. Till the service department offering services to the fewest amount of other service departments or having the lowest proportion of its expenses absorbed by the other service departments is assigned its expenses, the procedure is repeated. The procedure comes to an end when all the allotment has been accomplished.

### Advantages

This technique is easy and uncomplicated to execute and can be finished quickly. Due to the higher level of convenience, supervisors willing and eager to reduce the time spent on record keeping and forming accounting reports are far more likely to select it, even though the precision offered is not the highest in this cost allocation.

Q.1) The TCS Company uses the step method for allocating the costs of its service departments to operating departments. The company has two service departments and two operating departments. The selected information for the four departments is given below:

	SERVICE DEPARTMENTS		OPERATING DEPARTMENTS		Total
	Dept. A	Dept. B	Dept. X	Dept. Y	
Departmental costs before allocation	\$180,000	\$45,000	\$130,500	\$344,500	\$700,000
Employee hours	6,000	3,000	9,000	15,000	33,000
Space occupied - square feet	5,000	100	3,000	22,000	30,100

The company uses employee hours as the base for allocating the cost of department A and space occupied for allocating the cost of department B.

**Required:** Allocate the cost of service departments to operating departments using step down method.

Solution

	SERVICE DEPARTMENTS		OPERATING DEPARTMENTS		Total
	Dept. A	Dept. B	Dept. X	Dept. Y	
Departmental costs before allocation	\$180,000	\$45,000	\$130,500	\$344,500	\$700,000
Allocation:					
Department A cost (3/27, 9/27, 15/27)*	(180,000)	20,000	60,000	100,000	
Department B cost (3/25, 22/25)**		(65,000)	7,800	57,200	
Total costs after allocation	\$ 0	\$ 0	\$198,300	\$501,700	\$700,000

Allocation of department A’s cost:

Allocation ratio:

Department B:  $3,000 / (3,000 + 9,000 + 15,000) = 3,000 / 27,000$  or  $3/27$   
Department X:  $9,000 / (3,000 + 9,000 + 15,000) = 9,000 / 27,000$  or  $9/27$   
Department Y:  $15,000 / (3,000 + 9,000 + 15,000) = 15,000 / 27,000$  or  $15/27$

Allocated to department B:  $\$180,000 \times (3/27) = \$20,000$   
Allocated to department X:  $\$180,000 \times (9/27) = \$60,000$   
Allocated to department Y:  $\$180,000 \times (15/27) = \$100,000$

Allocation of department B’s cost:

Allocation ratio:  
Department X:  $3,000 / (3,000 + 22,000) = 3,000 / 25,000$  or  $3/25$   
Department Y:  $22,000 / (3,000 + 22,000) = 22,000 / 25,000$  or  $22/25$

Total cost of department B:  $\$45,000 + \$20,000 = \$65,000$

Allocated to department X:  $\$65,000 \times (3/25) = \$7,800$   
Allocated to department Y:  $\$65,000 \times (22/25) = \$57,200$

Q.2) The Religare Company provides the following selected data about its three service and two operating departments:

	SERVICE DEPARTMENTS			OPERATING DEPARTMENTS		Total
	Dept A	Dept B	Dept C	Dept X	Dept Y	
Overhead costs	\$180,000	\$105,000	\$48,000	\$200,000	\$267,000	\$800,000
Number of employees	60	35	140	315	210	760
Square feet of space occupied	5,000	10,000	20,000	40,000	100,000	175,000
Hours of press time	--	--	--	15,000	30,000	45,000

The order and bases for allocating service department costs is given below:

Cost Allocation

1. Department A; allocation base is “number of employees”.
2. Department B; allocation base is “space occupied”.
3. Department C; allocation base is “hours of time”.

**Required:** Allocate the cost of service departments to operating departments using step down method of cost allocation.

### Solution

ALLOCATION BASES						
	Department A		Department B		Department C	
Department B data	35 Empl.	1/20	--	--	--	--
Department C data	140 Empl.	4/20	20,000 Sq. feet	1/8	--	--
Department X data	315 Empl.	9/20	40,000 Sq. feet	2/8	15,000 Hrs.	1/3
Department Y data	210 Empl.	6/20	100,000 Sq. feet	5/8	30,000 Hrs.	2/3
	700 Empl.	20/20	160,000 Sq. feet	8/8	50,000 Hrs.	3/3

	SERVICE DEPARTMENTS			OPERATING DEPARTMENTS		Total
	Dept A	Dept B	Dept C	Dept X	Dept Y	
Overhead costs	\$180,000	\$105,000	\$48,000	\$200,000	\$267,000	\$800,000
<b>Allocation:</b>						
Department A (1/20, 4/20, 9/20, 6/20)	(180,000)	9,000	36,000	81,000	54,000	
Department B (1/8, 2/8, 5/8)		(114,000)	14,250	28,500	71,250	
Department C (1/3, 2/3)			(98,250)	32,750	65,500	
	\$ 0	\$ 0	\$ 0	\$342,250	\$457,750	\$800,000

## 2.5 RECIPROCAL METHOD OF COST ALLOCATION

Reciprocal method is a method of allocating service department costs to other departments that gives full recognition to interdepartmental services. Although it is the most accurate, it is also the most complicated. In the reciprocal method, the relationship between the service departments is recognized. This means service department costs are allocated to and from the other service departments. The reciprocal method gives full recognition to interdepartmental services. Under the step method, only partial recognition of interdepartmental services is possible. The step method always allocates costs forward never backward. The reciprocal method, by contrast, allocates service department costs in both directions. The reciprocal allocation requires the use of simultaneous equations. Other names for the reciprocal method are simultaneous solution method, cross

allocation method, matrix allocation method and double distribution method.

Under this method the true cost of the service departments are computed first with the help of simultaneous equations and these are then distributed to producing departments on the basis of given percentage or ratio. Remember that true cost of the service department means the cost of the service department which includes original cost of the department plus the share of the other service department. The main advantage of this method is to have an accurate distribution in a single step in the distribution summary.

**Use of Reciprocal Method**

This method is rarely used in practice for two reasons. First, the computations are relatively complex. Although the complexity issue could be overcome by use of computers, there is no evidence that computers have made the reciprocal method more popular. Second, the step method usually provides results that are a reasonable approximation of the results that the reciprocal method would provide. Thus, companies have little motivation to use the more complex reciprocal method.

Q.1) A company has two service and two producing departments. The two service departments serve not only to producing departments but also to each other. The departmental estimates for the next year are as follows.

<b>Producing</b>	<b>departments:</b>	
A		
B		50,000
<b>Service</b>	<b>departments:</b>	40,000
X		10,000
Y		8,800

**The service departments costs are to be distributed as under:**

Cost of X : 50% to A, 40% to B, and 10% to Y

Cost of Y : 40% to A, 40% to B, and 20% to X

***Required:***

Transfer the service departments costs to each other and to producing departments.

**Solution:**

Now we solve the given illustration first using the simultaneous equation method as follows: **Original costs of service departments:**

$$X = \text{Rs. } 10,000$$

$$Y = \text{Rs. } 8,800$$

**After getting the share from distribution of service departments:**

$$X = \text{Rs. } 10,000 + 20\% Y$$

$$Y = \text{Rs. } 8,800 + 10\% X$$

**By putting the value of Y in equation (1)**

$$X = \text{Rs. } 10,000 + 20\%(\text{Rs. } 8,800 + 10\%X)$$

$$X = \text{Rs. } 10,000 + 1,760 + 0.2X$$

$$X - 0.2X = \text{Rs. } 10,000 + \text{Rs. } 1,760$$

$$0.98X = \text{Rs. } 11,760$$

$$X = 11,760 / 0.98$$

$$= \text{Rs. } 12,000$$

**By putting the value of X in equation (2)**

$$Y = \text{Rs. } 8,800 + 10\%(\text{Rs. } 12,000)$$

$$Y = \text{Rs. } 8,800 + \text{Rs. } 1,200$$

$$= \text{Rs. } 10,000$$

**Distribution Summary**

Department	Producing		Service	
Original costs				
Distribution of service department costs:	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>
	Rs	Rs	Rs	Rs
X	50,000	40,000	10,000	8,800
Y	6,000	4,800	(12,000)	1,200
Total	4,000	4,000	2,000	(10,000)
departmental overheads	60,000	48,800	Nil	Nil

---

## 2.6 ACTIVITY BASED COSTING

---

Activity based costing (ABC) assigns manufacturing overhead costs to products in a more logical manner than the traditional approach of simply allocating costs on the basis of machine hours. Activity based costing first assigns costs to the activities that are the real cause of the overhead. It then assigns the cost of those activities only to the products that are actually demanding the activities. ABC works best in complex environments, where there are many machines and products, and tangled processes that are not easy to sort out. Conversely, it is of less use in a streamlined environment where production processes are abbreviated, so that costs are easy to assign.

Activity based costing is basically a change in accent. People perform activities and activities use resources. Thus, by controlling activities the manager is making sure that costs are controlled at their source. A wise manager will not focus on how to estimate product costs, but will focus more on why the costs were there in the first place. When intending an activity based costing system this should be utilized as a departure point.

**Advantages of Activity Based Costing System**

- The first and most significant benefit is the accuracy in the procedure of costing with regards to the product line, the consumers of the product, the stock-keeping units employed by the administration and the channel and group which streamline the flow of the product from the maker to the consumer.
- This system better helps in the procedure of understanding the concept of overhead costs i.e. the distribution of common business resources as they are utilized by particular product lines and their association to particular cost driver.
- The system is simple to interpret and understand is it is available, useable and specifically implement capable across all norms of business set-ups.
- This procedure consumes unitary cost, or marginal cost as the calculation base in comparison to the conventional cost accounting techniques which employ total cost.
- This system is specifically useful in recognizing and ear-marking some of the matters business activities which are a stress or burden on the business i.e. wasteful or non value adding services..
- This procedure permits firms to implement costing policies across another diagonal of the company as business procedures, supply chains and value addition channels are capably and optimally analyzed in this procedure.
- This system mimics the actual business procedure as the appropriation of common pool resources takes place in the same way as common resources are utilized in the business.
- Disadvantages of Activity Based Costing System
- Data collection procedure for this system is very time consuming.
- The capital expense on the activity based system and its subsequent running costs can be a road block for companies.
- The system is very apparent which some managers would not authorize of as they would like to keep some things out of the view of the owners of the firm.
- ABC Costing System is very costly to implement and maintain in a manufacturing and serving departments. Data concerning numerous



activity measures must be collected, checked, and entered into the system.

- ABC costing systems produces the reports that are different from the profit and loss reports produced through traditional costing systems.
- As most of the companies are using , traditional costing systems, so because of the difference in the costing basis the costing and financial reports of the two companies of the same industry could not be compared for performance evaluation purposes.
- Adaptability of ABC Costing System is not suitable for all kind of companies because small companies have not many resources to ad
- Data Produced through ABC Costing System can easily misinterpret and can lead towards wrong decisions. So manager should use the data produced through ABC Costing System with extreme care and should assign the costs that are relevant to the products, customers and should not consider the other cost objects that are irrelevant.
- ABC costing system does not comply with the GAAP and a company has to produce its reports for internal and external purposes by using traditional and ABC costing system both at a time.
- In ABC costing system costs are allocated on the base of cost drivers and activities undertaken to manufacture the product, definitely, it provides the accurate and proper allocation of the costs to the products but there is a danger of over or under costing of the products when irrelevant cost drivers or activities are assigned to the products or services produced.

### **Steps in ABC**

- Identify which activities are necessary to create a product
- Separate each activity into its own cost pool
- Assign activity cost drivers to each cost pool
- Divide the total overhead in each cost pool by the total cost drivers to get your costdriver rate
- Compute how many hours, parts, units, etc. that the activity used and multiply it by thecost driver rate to find total cost
- Calculate Cost per Unit by dividing the Total Cost by Total Units produced.

**Uses of ABC**

- Identification of necessary activities: The ABC system shows how overhead is used, which helps to determine whether certain activities are necessary for production.
- Focus on Value adding activities: The Activity Based Costing helps the management on focusing the forces on value adding activities and eliminate non-value adding activities.
- Ensuring profit margin: The specific allocation of costs also helps to set prices that produce a healthy small business profit margin.
- Product pricing: With an ABC system, the business can assign costs to each activity in the production process, allowing it to more accurately set a price that accounts for how much it costs to create a product.
- Measures to improve productivity: The accurate cost information helps the management to adopt productivity improvement approaches like Total Quality Management (TQM), Business Process Re-engineering (BPR) etc.
- Help in deciding Make or Buy: The management can take make or buy decisions by considering the cost of manufacture of a product or sub contract the same with an outside agency through Activity Based Costing analysis.

**2.7 DIFFERENCE BETWEEN TRADITIONAL COST SYSTEM AND ABC SYSTEM**

Basis	Traditional	ABC
1. Cost pools	One or limited number	Many
2. Applied Rate	Volume based	Activity Based
3. Applied for	Labour Intensive	Capital Intensive
4. Benefits	Simple, Inexpensive	Accurate product costing, identification of necessary activities etc
5. Cost assignments	Primary and secondary distribution of Overhead and then allocation of Overhead as per the suitable rate	Allocation of cost pool based on cost drivers then allocation of costs to product or service based on the drivers used by the particular product or service
6. Focus	Departments or responsibility centres	Processes and activities



## 2.8 PRACTICAL SUM

Problems involving calculations of Total cost and CPU under both Traditional and ABC methods.

### Question:

Amrit Company produces 3 products A, B and C. The company follows Activity Based Costing system. Information related to various costs of these products for the last year:

Particulars	A	B	C
Production and Sales (Units)	15000	12000	18000
Selling Price p.u. (Rs.)	7.5	12	13
Raw Material Usage (kg) p.u.	2	3	4
Direct labour hours p.u.	0.1	0.15	0.2
Machine Hours p.u.	0.5	0.7	0.9
No. of Production runs p.a.	16	12	8
No. of purchase orders p.a.	24	28	42
No. of deliveries to retailers p.a.	48	60	32

The price of Raw materials remained constant through out the year at Rs.1.2 per kg and the labour cost was Rs.14.8 per hour. The annual Overhead costs are as follows:

Overheads	Rs
Machine set up costs	26550
Machine running costs	66400
Procurement Costs	48000
Delivery costs	54320

**Solution: Traditional Method**

a) Calculation of Total Overhead

Overheads	Rs
Machine set up costs	26550
Machine running costs	66400
Procurement Costs	48000
Delivery costs	54320
Total	195270

b) Calculation of Overhead Absorption rate

Particulars	A	B	C	Total
Production Volumes	15000	12000	18000	
Labour hours p.u.	0.1	0.15	0.2	
Total Labour hours	1500	1800	3600	6900

Overhead absorption rate =  $195270 / 6900 = \text{Rs.}28.30$  per hour.

c) Calculation of Cost p.u.

Particulars	A	B	C
Raw material cost (Usage * Rs.1.20)	2.4	3.6	4.8
Direct Labour Cost (Labour hours * Rs.14.80)	1.48	2.22	2.96
Overhead (Labour hours * Rs.28.30)	2.83	4.25	5.66
CPU	6.71	10.07	13.42

## a) Calculation of Overhead Absorption rate

Cost Pool	Rs.	Cost Driver		Rate of OH per activity (Rs.)
Machine costs set up	26550	No. of Production runs p.a.	$(16+12+8) = 36$ runs	$26550/36 = 737.50$ per run
Machine costs running	66400	No. of Machine Hours p.a.	$(7500+8400+16200)\# = 32100$ hours	$66400/32100 = 2.0685$ per hour
Procurement Costs	48000	No. of purchase orders p.a.	$(24+28+42) = 94$ orders	$48000/94 = 510.6383$ per order
Delivery costs	54320	No. of deliveries to retailers p.a.	$(48+30+62) = 140$ deliveries	$54320/140 = 388$ per delivery

# Total Machine hours p.a. = Machine hours p.u. \* Total units produced  
 $A = 0.5 * 15000 = 7500$

$B = 0.7 * 12000 = 8400$   $C = 0.9 * 18000 = 16200$

## b) Calculation of Cost p.u.

Particulars	A	B	C
Material Cost	2.4	3.6	4.8
Labour Cost	1.48	2.22	1.96
Overhead: ##			
Machine set up Costs	$(737.50 * 16) / 15000 = 0.7867$	$(737.50 * 12) / 12000 = 0.7375$	$(737.50 * 8) / 18000 = 0.3278$
Machine running Costs	$(2.0685 * 7500) / 15000 = 1.034$	$(2.0685 * 8400) / 12000 = 1.4479$	$(2.0685 * 16200) / 18000 = 1.8616$
Procurement Costs	$(510.6383 * 24) / 15000 = 0.817$	$(510.6383 * 28) / 12000 = 1.1915$	$(510.6383 * 42) / 18000 = 1.1915$
Delivery costs	$(388 * 48) / 15000 = 1.2416$	$(388 * 30) / 12000 = 0.97$	$(388 * 62) / 18000 = 1.3364$
Total CPU	7.7593	10.1669	11.4773

## Overheads p.u. for products A, B and C

= (Overhead absorption rate \* No. of cost drivers used by the individual products p.a.) / No. of units produced



## RESPONSIBILITY ACCOUNTING

### Unit Structure

- 3.0 Introduction
- 3.1 Objectives of responsibility accounting
- 3.2 Assumptions and Requisites of responsibility accounting
- 3.3 Types of cost centres
- 3.4 Concept of controllability
- 3.5 Residual income
- 3.6 Segment performance
- 3.7 Illustrations
- 3.8 Controllable cost
- 3.9 Exercise

---

### 3.0 INTRODUCTION

---

Responsibility accounting is a kind of management accounting that is accountable for all the management, budgeting, and internal accounting of a company. The primary objective of this accounting is to support all the Planning, costing, and responsibility centers of a company.

The accounting generally includes the preparation of a monthly and annual budget for an individual responsibility center. It also accounts for the cost and revenue of a company, where reports are accumulated monthly or annually and reported to the concerned manager for the feedback. Responsibility accounting mainly focuses on responsibilities centers.

For instance, if Mr X, the manager of a unit, plans the budget of his department, he is responsible for keeping the budget under control. Mr X will have all the required information about the cost of his department. In case, if the expenditure is more than the allocated budget than Mr X will try to find the error and take necessary action and measures to correct it. Mr X will be personally accountable for the performance of his unit.

#### Features of Responsibility accounting

- The main feature of responsibility accounting is to define the cost centers at the initial stage which we earlier referred to as responsibility centers.

- For each center, there should be a fixed target which the department has to achieve in the defined deadline, so setting targets for the center is very crucial.
- Then, we must track the performance of each responsibility center and also compare the actual performance with the target performance.
- The variance between the actual performance and target performance is analyzed and post that the responsibility of each center should be fixed.
- Then corrective action has to be taken by the management and it should be individually communicated to the concerned person taking care of the responsibility center.

---

### **3.1 OBJECTIVES**

---

- Know how cost and management accounting will be used for managerial planning and control.
- Appreciate the structure and process in designing responsibility accounting system;
- Understand the concept of responsibility centres;
- Familiar with different methods of evaluating the performance of different segments of an organisation; and
- Identify the benefits, and essentials of success of measuring and reporting of costs by managerial levels of responsibility.

---

### **2.2 ASSUMPTIONS AND REQUISITES**

---

- (1) The areas of responsibility are defined for which managers should be held responsible.
- (2) Managers are only charged with the items and responsibility over which they can exercise a significant degree of direct control.
- (3) Managers should actively participate in establishing the goals or budgets against which their performance is measured.
- (4) Goals defined for each area of responsibility should be attainable with efficient and effective performance.
- (5) Control (performance) reports should contain significant information related to each area of responsibility.
- (6) Responsibility centre managers should try to accomplish the budgets and objectives established for their respective areas of responsibility.

**Requisites**

The following are must for efficient implementation of responsibility accounting:

- 1) A company must have a clearly defined organizational structure that is understandable to all without any ambiguity.
- 2) There should be clear measures and standards for the evaluation of performance.
- 3) A manager who is accountable for a responsibility center must know all the evaluation parameters with utmost clarity in advance.
- 4) All those accountability and evaluation parameters should be controllable at the level of the manager.
- 5) Uncontrollable factors need to be addressed separately.

---

**3.3 TYPES OF COST CENTERS:**

---

**Cost center**

It is a unit in a company that has control over the cost only, such as the production department. The cost center does not exercise control over other functions, such as revenues or investments. A point to note is that a manager responsible for any cost center is only responsible for the controllable costs, and not uncontrollable costs.

**Revenue center**

This unit is only responsible for generating revenues, and not any other business function. The sales and marketing department are an example of a revenue center

**Profit centre**

It is accountable for both costs and revenues. One example of this is the factory, whose cost is the raw material, and revenue is the products it transfers to other departments. Also, branches of a company in different regions are responsible for both costs and revenues.

**Investment centre**

It has control over costs, revenues, and investments. Or, we can say the person is responsible for investing the assets of a company most efficiently. Such a cost center works as a separate entity, such as a corporate headquarters. A company measures the performance of an investment center by using ratios, such as ROI (return on investment), economic value-added, and more.

Responsibility accounting is closely related with the goal of controllability. Controllability is the degree of influence that a specific manager has over costs, revenues, or other items in question. Accordingly, in responsibility accounting those elements in a certain area of activity are identified which are controllable and then a person is given the responsibility for managing such elements.

Responsibility accounting implies that individuals in an organisation can not be responsible for those items which they can not control. They should also not claim any authority over those revenues which are not the result of their actions and performances. For instance, a foreman in a production department can be held responsible only for direct material and direct labour costs, because these are the costs which are controllable by him.

On the other hand, divisional manager of the production division can be held accountable for all direct and indirect costs incurred in his division. Generally, those decision makers who are placed higher in the authority hierarchy, are held responsible for a greater number of activities and financial elements. In the long run, however, all costs are controllable by someone in the organisation.

There are various criteria to measure divisional performance such as profit on turnover, sales per employee and sales growth etc.

The most popular criteria are:

Return on Investment (ROI)

Residual Income (RI)

Return on investment

Divisional operating profit is generally, used as a common measure of performance. But divisional profit by itself does not provide a basis for measuring a division performance in generating a return on the funds invested in the division. For example, Division A and Division B had an operating profit of Rs.1,00,000 and Rs.80,000 respectively does not necessarily mean that Division A was more successful than Division B. The difference in profit levels may be due to the difference in the size of the divisions. Therefore, a suitable measure may be used to scale the profit for the amount of capital invested in the division. One common method is Return on Investment (ROI) which will be calculated as follows :

Return on Investment =  $\frac{\text{Profit}}{\text{Capital employed}} \times 100$

ROI =  $\frac{\text{Profit}}{\text{Sales}} \times \frac{\text{sales}}{\text{Capital employed}}$

Q.1) Peacock Company Ltd. has six segments for which the following information is available for the year 31<sup>st</sup> March, 2005:

	I (Rs. in Lakhs)	II (Rs. in Lakhs)	III (Rs. in Lakhs)	IV (Rs. in Lakhs)	V (Rs. in Lakhs)	VI (Rs. in Lakhs)
Capital employed	1500	1200	3000	2400	4500	6000
Sales	3000	3000	6000	3600	18000	12000
Net profit	150	300	150	720	450	1200

You are required to measure the performance of different segments.

Solution

The return on investment can be analysed as follows:

	Segments					
	I	II	III	IV	V	VI
Profit/ Sales (Profit ÷ Sales x 100)	5%	10%	2.5%	20%	2.5%	10%
Turnover of capital (Sales ÷ Capital Employed)	2	2.5	2	1.5	4	2
ROI (Profit ÷ Capital Employed x 100)	10%	25%	5%	30%	10%	20%



The above analysis gives the following conclusions regarding the Responsibility Accounting performance of different segments:

- 1) The manager of segment I is not showing a satisfactory level of ROI even though his turnover of capital is not too bad. He must be motivated to increase his profit sales ratio.
- 2) Segment II is performing well as profit, sales ratio and turnover of capital, are relatively good.
- 3) The performance of segment III is not satisfactory as its profit margin and capital turnover is Poor.
- 4) The performance of segment IV is good as its profit margin is high with a reasonable capital turnover.
- 5) In respect of segment VI, the manager should be motivated to increase its profit margin but maintains a very good turnover of capital.
- 6) The manager of segment VI is performing well comparing to other segments, as it maintains a good ROI, fairly good capital turnover and reasonably good profit margin.

The segments which show a low capital turnover should be investigated and remedial action should be initiated particularly in segments IV, I and III.

---

### 3.5 RESIDUAL INCOME

---

Residual income is the profit remaining after deduction of the cost of capital on investment. It is the excess of net earnings over the cost of capital. Any income earned above the cost of capital is profit to the firm. The cost of capital charged to each division will be the same rate that is applicable to the organization as a whole. The more the income earned above the cost of capital, the better off the firm will be.

The Residual Income may be calculated as follows:

$$RI = \text{Profit} - (\text{Capital Charge} \times \text{Investment Centre Asset})$$

Where, capital is the minimum acceptable rate of return on investment.

This method is used as a substitute for or along with ROI as means of evaluating managerial performance and motivates the managers to act to the aims of goal congruence. The firm is interested to maximise its income above the cost of capital. If the divisional managers are measured only through ROI, they will not necessarily maximise RI. If managers are encouraged to maximise RI, they will accept all projects above the minimum acceptable rate of return. That is why most managers recognise the weakness of ROI and take into account when ROI is lowered by a new investment.

Q.1) A division of a company earns a profit of Rs.1,00,000 for an investment of Rs.4,00,000. There is an opportunity to make an additional investment of Rs.2,00,000 which earns an annual income of Rs.40,000. You are required to calculate residual income if the company requires a minimum return of 15 per cent on its investment and comment.

Solution

Before the additional Investment:

$$\begin{aligned} \text{RI} &= \text{Rs.1,00,000} - (15\% \text{ of Rs.4,00,000}) \\ &= \text{Rs.1,00,000} - \text{Rs.60,000} \\ &= \text{Rs.40,000} \end{aligned}$$

RI from additional Investment

$$\begin{aligned} \text{RI} &= \text{Rs.40,000} - (15\% \text{ of } 2,00,000) \\ &= \text{Rs.40,000} - \text{Rs.30,000} \\ &= \text{Rs. 10,000} \end{aligned}$$

Total Residual Income on an investment of Rs.6,00,000 is Rs.50,000. The additional investment increases residual income and is improving the measure of performance.

Q.2) Sunrise Company has three divisions A, B and C. The investment in these divisions amounted to Rs.2,00,000, Rs.6,00,000 and Rs.4,00,000 respectively. The profits in these divisions were Rs.50,000, Rs.60,000 and Rs.80,000 respectively. The cost of capital is 10 per cent. From the above data, comment the performance of the three divisions.

Solution

	Divisions		
	A	B	C
Profit	Rs. 50,000	Rs. 60,000	Rs. 80,000
Investment	Rs. 2,00,000	Rs. 6,00,000	Rs. 4,00,000
ROI $\left(\frac{\text{Profit}}{\text{Investment}}\right) \times 100$	25% $\left(\frac{50,000}{2,00,000} \times 100\right)$	10% $\left(\frac{60,000}{6,00,000} \times 100\right)$	20% $\left(\frac{80,000}{4,00,000} \times 100\right)$
RI = Profit – Cost of capital:	Rs. 30,000 (50,000 – 20,000)	NIL (60,000 – 10% of 6,00,000)	Rs. 40,000 (80,000 – 10% of 4,00,000)

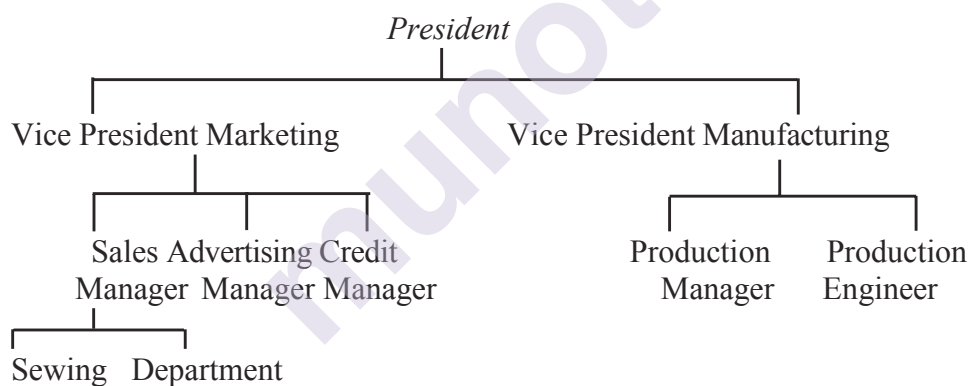
In terms of profit division C has done best performance. If evaluation is done on the basis of ROI criteria division A is the best performer. If residual income is the criterion, division C is the best.

A segment or division may be either a profit centre having responsibility for both revenues and operating costs, or an investment centre, having responsibility for assets in addition to revenues and operating costs.

The manager of each segment are free to take decisions regarding the performance of their centres. When an organization grows it is inevitable to create divisions or segments to control operations of different divisions. This requires accounting information which discloses not only the objectives and performances of divisions but also whether or not each division is performing in the interest of the organization as a whole. This section illustrates how segment data should be presented so that meaningful decisions regarding segment performance can be taken.

A manager's performance is evaluated generally on the basis of comparison of costs incurred with costs budgeted. It is therefore, important to allocate appropriate costs to the respective segments. While allocating the costs, the costs relating to general administration or head office should not be charged to any segment as these costs remain constant irrespective of the volume of sales by each department. Let us see the following illustration:

- 1) A simplified representation of organization of Digital Co. Ltd. is presented below:



#### Cutting Department

The company manufactures cloth potholders in a simple process of cutting the potholders in various shapes and then sewing the contrasting pieces together to form the finished potholder.

The accounting system reports the following data for the year 2004-05:

	Budgeted	Actual
	Rs.	Rs.
Bad debt losses	500	300
Cloth used	3,100	3,400
Advertising	400	400
Credit reports	120	105
Sales representatives' travel exp.	900	1,020
Sales commissions	700	700
Cutting labour	600	660
Thread	50	45
Sewing labour	1,700	1,840
Cutting utilites	80	70
Credit department salaries	800	800
Sewing utilities	90	95
Vice-President, Marketing office exp.	2,000	2,140
Production engineering expense	1,300	1,220
Sales management office expenses	1,600	1,570
Production manager's office exp.	1,800	1,700
Vice-President, manufacturing office expenses	2,100	2,010

Using the data given, prepare responsibility accounting reports for the two vice-presidents.

**Solution**

Responsibility accounting tailors reports to each level of management to include those items which they can control and for which they are responsible. The items for which they are responsible are generally determined by the organization structure as reflected in the organization chart. Responsibility report highlights variances to assist in the process of management by exception. Reports for higher-level managers are in summary form in order to avoid flooding them with more detail than is needed.

With these general ideas in mind, one can turn to the responsibility reports required by the problem. Each report is assumed to contain a one-line summary of the expenses of the subordinate departments. From the organization chart, the contents of the reports will, therefore, be as follows:

Vice-president, marketing	: Sales expense + advertising expense + credit expense
Sales expense	: Sales representatives' travel expense + sales commissions + sales management office
Advertising expense	: Advertising
Credit expense	: Credit reports + credit department salaries + bad debt losses
Vice-president, manufacturing	: Production expense + production engineering expense + production manager's office expenses
Production Manager	: Sewing department + cutting department, i.e. thread + sewing labour + sewing utilities + cloth used + cutting labour + cutting utilities

Notice that these reports do not contain the expenses of the vice-president's offices. Although sometimes included, they are not here on the ground that the vice presidents cannot control their own salaries, the major component of these categories. If they are excluded on these reports, they would be included as an item on the president's report, where they are controllable.

Since the lower level reports are summarized in the higher-level reports, it is usually easier to begin with the lower-level reports.

i) Production Manager	Budgeted	Actual	Variance
Controllable expense report:	Rs.	Rs.	Rs.
Sewing department	1,840	1,980	140U
Cutting department	3,780	4,130	350U
Total	5,620	6,110	<u>490U</u>
ii) Vice-President, Manufacturing			
Controllable expense report:	5,620	6,110	490U
Production departments			
Production manager's expenses	1,800	1,700	100F
Production engineer's expenses	1,300	1,220	80F
Total	<u>8,720</u>	<u>9,030</u>	<u>310U</u>
iii) Vice-President, Marketing			
Controllable expenses summary:			
Sales manager's expense	3,200	3,290	90U

Advertising expense	400	400	-
Credit expense	1,420	1,205	215F
<hr/> Total	5,020	<hr/> 4,895	<hr/>
	125F		

Responsibility Accounting

Standard Costing Probably the most significant variances are in the production departments, with an average unfavourable variance of 8.7 percent (  $\frac{490 \times 100}{5620}$  ) of the budgeted amount and the credit department, with a

favourable variance of 15.1 percent (  $\frac{215 \times 100}{1420}$  ) of the budgeted amount. The credit

department variance results primarily from a better than normal bad debt loss experience. The production department’s variance should be investigated if 8.7 percent appears large relative to past experience.

Illustration 2

Kelly Services Ltd. has five plants---A,B,C,D and E. Each plant has a forming, cleaning and packing department. Each level of management at the company has responsibility over costs incurred at its level. The budget for the year ended March, 2005 has been set up as follows:

Plant	Budgeted Cost (Rs.)
A	1,35,000
B	1,22,500
C	1,08,400
D	1,35,000
E	1,35,000

Budgeted information for Plant C is as follows:

	Rs.
Plant manager’s office	2,350
Forming department	30,000
Cleaning department	55,450
Packing department	20,600

Budgeted information for Plant C forming department is as follows:

Responsibility Accounting

	Rs.
Direct material	8,333
Direct labour	15,000
Factory overhead	6,667

The following additional budgeted costs available:

	Rs.
President's Office	16,250
Vice President---Marketing	20,000
Vice President---Manufacturing office	4,167

The following actual costs were incurred during the year:

Plant	Budgeted Cost Rs.
A	1,27,650
B	1,24,300
C	1,08,475
D	1,31,100
E	1,36,800

Actual costs for Plant C Forming department were as follows:

Rs. Responsibility Accounting

Direct materials	333	Under budget
Direct labour	4,000	Under budget
Factory overhead	333	Over budget

Actual cost for Plant C plant manager were:

Rs.

Plant manager's office	2,475
Cleaning department	57,500
Packing department	22,500
Forming department	?

Actual costs for the president’s level were:

Rs.

President’s Office	16,375
Vice president---marketing	29,800
Vice-president---manufacturing	6,33,315

Prepare a responsibility report for the year showing the details of the budgeted, actual and variance amounts for levels 1 through 4 for the following areas:

Level 1-Forming department---Plant C Level 2-Plant manager---Plant C  
Level 3-Vice president-manufacturingLevel 4-President.

Solution

Kelly Services

Responsibility Report for the Year ended March 2005

BudgetedActualVariance

Level 4-President:

	Rs.	Rs.	Rs.
President’s Office	16,250	16,375	125
Vice-president---marketing	20,000 9,800	29,800	
Vice-president---manufacturing	6,40,000 (6,752)	6,33,315	
Total Controllable costs	<u>6,76,250</u>	<u>6,79,490</u>	
	3,173	79	

Standard Costing

Level3-Vice  
President---  
Manufacturing

4,990\* 823

Vice-president---  
manufacturing office:

Plant A	1,27,650	(7,350)
Plant B	1,24,300	1,800
Plant C	1,08,475	75
Plant D	1,31,100	(3,900)



Plant E	1,36,800	1,800
Total Controllable Costs	<u>6,33,315</u>	<u>(6752)</u>

Level 2 - Plant Manager ---Plant C:

Plant manager's office	2,475	125
Forming department	26,000	(4,000)
Cleaning department	57,500	2,050
Packing department	22,500	1,900
Total controllable costs	<u>1,08,475</u>	<u>75</u>

Level 1-Forming Department-Plant C:

Direct material	8,000	(333)
Direct labour	11,000	(4,000)
Factory overhad	7,000	333
Total controllable costs	<u>26,000</u>	<u>4,000</u>

\* The difference in the actual total controllable cost arrived and the figure as given in the illustration is to be treated as the actual cost of manufacturing office of vicepresident.

( ) Variance favourable (Figures within parentheses indicate favourable variance)

### 3.8 CONTROLLABLE COST

Controllable cost are costs which can be controlled. Such costs are controllable in the short run and the discretion lies with the managers or production supervisors whether to incur them or not.

Also, the “controllable” factor is relative and depends upon the hierarchy and level of management taking the decision. For instance, consider the case of yarn purchase in a cotton mill. Now since the yarn is a direct material for the production of cotton and the management is

authorized to negotiate vendor contracts best suited to organization needs. However, the production supervisor charged with the running of day to day operations has no say in yarn prices. Direct material cost is consequently a controllable cost for the management but an uncontrollable cost for the supervisor.

Controllable costs can also be referred to as variable costs as is commonly used in the accounting parlance. In short, controllable costs are likely direct costs related to the level of production or core services of a business.

If an item of expense directly impacts the manufacturing process it a controllable cost. Secondly, the controllable cost is incurred in direct proportion to the production volume.

Controllable cost constitutes the bulk of production costs. As a result, it has a direct impact on profitability margins. For this reason, it is also intuitive that such costs remain controllable. The management would always like to control or tailor these costs in order to ensure they are in line with the profit forecasts and budgetary requirements. To sum up, direct materials, direct labour & factory overheads are prime examples of controllable costs.

---

### 3.9 EXERCISE

---

Q.1) Fill in the blanks

- 1) \_\_\_\_\_ is a controllable cost
- 2) \_\_\_\_\_ is also called as variable cost
- 3) A segment or division may be a \_\_\_\_\_.
- 4) \_\_\_\_\_ is the profit remaining after deduction of the cost of capital on investment
- (5) \_\_\_\_\_ is only responsible for generating revenues, and not any other business function

- (1) Material, 2) Controllable cost , 3) Profit centre 4) Residual income  
5) Revenue centre

Q.2) Short notes

- 1) Controllable cost
- 2) Segment reporting
- 3) Responsibility centres



## TRANSFER PRICING

### Unit Structure

#### 4.0 Introduction

#### 4.1 Objectives

#### 4.2 Advantages and Disadvantages

#### 4.3 Cost based transfer pricing

#### 4.4 Negotiated Transfer Pricing

#### 4.5 Target Costing

#### 4.6 Comparison between Target costing and Cost plus pricing

#### 4.7 Inflation accounting

#### 4.8 Illustrations

---

### 4.0 INTRODUCTION

---

Transfer pricing is the setting of the price for goods and services sold between controlled (or related) legal entities within an enterprise. For example, if a subsidiary company sells goods to a parent company, the cost of those goods paid by the parent to the subsidiary is the transfer price. Legal entities considered under the control of a single corporation include branches and companies that are wholly or majority owned ultimately by the parent corporation. Certain jurisdictions consider entities to be under common control if they share family members on their boards of directors. Transfer pricing can be used as **a profit allocation method** to attribute a multinational corporation's net profit (or loss) before tax to countries where it does business. Transfer pricing results in **the setting of prices among divisions** within an enterprise. Transfer pricing accounting occurs when goods or services are exchanged between divisions of the same company. A transfer price is based on market prices in charging another division, subsidiary, or holding company for services rendered. Companies use transfer pricing to reduce the overall tax burden of the parent company.

---

### 4.1 OBJECTIVES

---

- True and fair reporting of financial statements
- Better estimation of profits generated by entities from associated transfers
- Avoidance of double taxation and avoiding tax evasion by entities
- Promoting competitiveness among the associated enterprises.

---

## 4.2 ADVANTAGES AND DISADVANTAGES

---

- The critical importance of Transfer Pricing provisions is that there will be an equal and fair distribution of resources between associated entities leading to nondiscriminatory trade transactions.
- This provides opportunities for associated enterprises to transact business between them as the transactions are valued at market price, this will enhance the scope of business and have a positive impact on the group company as a whole due to internal profits generated by these associated entities,
- Also, it is useful for the tax authorities to determine the actual value of such transactions and to estimate the profits derived from such transactions taking place between associate entities. Without transfer pricing provision, there would be a reduction or avoidance of tax by misleading authorities and transferring or reporting profits based on the limitation presents in tax provisions.
- It is used not only by multi-company organizations but also by entities that satisfy the conditions of associated enterprises.

### Disadvantages

- This would require additional administrative cost and a time-consuming process.
- There are few limitations in the determination of arms-length price as two products cannot be compared due to the homogenous nature of such commodities or services.

---

## 4.3 COST BASED TRANSFER PRICING:

---

When external markets do not exist or are not available to the company or when information about external market prices is not readily available, companies may decide to use some forms of cost-based transfer pricing system. Cost-based transfer prices may be in different forms such as variable cost, actual full cost, full cost plus profit margin, standard full cost.

### *(a) Variable Cost:*

Variable cost-based pricing approach is useful when the selling division is operating below capacity. The manager of the selling division will generally not like this transfer price because it yields no profit to that division. In this pricing system, only variable production costs are transferred. These costs are direct materials, direct labour and variable factory overhead.

Variable cost has the major advantage of encouraging maximum profits for the entire firm. By passing only variable costs alone to the next division, production and pricing decisions are based on cost- volume-profit relationships for the firm as a whole. The obvious problem is that

selling division is left holding all its fixed costs and operating expenses. That division is now a loss division, no where near a profit centre.

***(b) Actual Full Cost:***

In actual full cost approach, transfer price is based on the total product cost per unit which will include direct materials, direct labour and factory overhead. When full cost is used for transfer pricing, the selling division can not realise a profit on the goods transferred. This may be disincentive to the selling division. Further, full cost transfer pricing can provide perverse incentives and distort performance measures. A full cost transfer price would have shutdown the chances of any negotiation between divisions about selling at transfer prices.

***(c) Full Cost Plus Profit Margin:***

Full cost plus mark up (or profit margin) overcomes the weaknesses of full cost basis transfer pricing system. The full cost plus price include the allowed cost of the item plus a mark up or other profit allowance. With such a system, the selling division obtains a profit contribution on units transferred and hence, benefits if performance is measured on the basis of divisional operating profits. However, the manager of the buying division would naturally object that his costs (and hence reported performance) are adversely affected.

The basic question in full cost plus mark up is 'what should be the percentage of mark up.' It can be suggested that the mark up percentage should cover operating expenses and provide a target return on sales or assets.

***(d) Standard Costs:***

In actual cost approaches, there is a problem of measuring cost. Actual cost does not provide any incentive to the selling division to control cost. All product costs are transferred to the buying division. While transferring actual costs any variances or inefficiencies in the selling division are passed along to the buying division.

The problem of isolating the variances that have been transferred to subsequent buyer division becomes extremely complex. To promote responsibility in the selling division and to isolate variances within divisions, standard costs are usually used as a basis for transfer pricing in cost-based systems.

Whether transferring at differential costs or full costs, standard costs, where available, are often used as the basis for the transfer. This encourages efficiency in the selling division because inefficiencies are not passed onto the buying division. Otherwise, the selling division can transfer cost inefficiencies to the buying division. Use of standard cost reduces risk to the buyer. The buyer knows that standard costs will be transferred and avoids being charged with suppliers' cost overruns

---

## 4.4 NEGOTIATED TRANSFER PRICING:

---

Negotiated prices are generally preferred as a middle solution between market prices and cost-based prices. Under negotiated prices, the managers involved act much the same as the managers of independent companies. Negotiation strategies may be similar to those employed when trading with outside markets. If both divisions are free to deal either with each other or in the external market, the negotiated price will likely be close to the external market price. If all of a selling division's output can not be sold in the external market (that is, a portion must be sold to the buying division), the negotiated price will likely be less than the market price and the total margin will be shared by the divisions.

Negotiated price avoids mistrusts, bad feelings and undesirable bargaining interests among divisional managers. Also, it provides an opportunity to achieve the objectives of goal congruence, autonomy and accurate performance evaluation. The overall company is beneficiary if selling and buying divisions can agree upon some mutually transfer prices. Negotiated transfer price is considered as a vital integrating tool among divisions of a company which is necessary to achieve goal congruence.

If negotiations help ensure goal congruence, top management has little temptation to intervene between divisions. The agreed prices also can be used for performance measurement without creating any friction. The use of negotiated prices is consistent with the concept of decentralised decision-making in the divisionalised firms.

**However, negotiated prices have the following disadvantages:**

- (1) A great deal of management effort, time and resources can be consumed in the negotiating process.
- (2) The final emerging negotiated price may depend more on the divisional manager's ability and skill to negotiate than on the other factors. Thus, performance measures will be distorted leading to incorrect evaluation of divisional performance.
- (3) One divisional manager having some private information may take advantage of another divisional manager.
- (4) It is time-consuming for the managers involved.
- (5) It leads to conflicts between divisions.
- (6) It may lead to a suboptimal level of output if the negotiated price is above the opportunity cost of supplying the transferred goods.

---

## 4.5 TARGET COSTING

---

**Target costing is a structural approach to determine the cost at which a proposed product with specified function and quality must be produced, to generate a desired level of profitability at its anticipated selling price.**

**In other words, Target Costing is a cost management tool for producing overall cost of product over its entire life cycle with the help of the function engineering and research and development. Target cost is called estimated cost of the product that helps a manufacturing unit to remain. It competes in the market in the long run.** Target costing is a cost management technique. Target cost is the difference between target sales minus target margin. It is, thus, the difference between estimated selling price of a proposed product with specified functionality and quality and the target margin.

**The features of target costing are as follows:**

1. It is viewed as an integral part of the design and introduction of new products.
2. A target selling price is determined using various sales forecasting techniques.
3. The target selling price is the establishment of target production volumes, given the relationship between price and volume.
4. Target costing process is to determine, cost reduction targets.
5. A fair degree of judgement is needed where the allowable cost and the target cost differ.

**Characteristics of Target Costing**

**The main characteristics of target costing system are as under:**

**(1) Identification of Opportunities –**

With the help of value engineering and value analysis, opportunities, for cost reduction can be identified easily. Value engineering involves searching the opportunities to modify the design for reducing the cost without reducing the quality of the product.

Similarly, value analysis involves rejecting non-value adding activities which may minimise the cost without reducing quality of the product. Thus current cost is reduced to the level of target cost. It is presumed that when production commences, the total cost will meet the target and profit also.

**(2) Target Cost –**

Target cost is decided by deducting target income from the target price.

**(3) Integral Part of Design –**

Target costing is known as an integral part of the design and introduction of new products.

**(4)Target Price –**

It is the estimated market price of the product. It is a target price which is determined by using various sales forecasting techniques in which consideration is made for design specifications of the product and competitive market conditions.

**(5) Cost Reduction Target –**

Cost reduction target is fixed, which requires estimation of current cost of the new product. It is based on existing technologies and its various components. The excess of current cost over target cost indicates the cost reduction.

**Objectives**

- 1. To lower the costs of new products so that the required profit level can be ensured.
- 2. The new products meet the levels of quality, delivery timing and price required by the market.
- 3. To motivate all company employees to achieve the target profit during new product development by making target costing a company wide profit management activity.

---

**4.6 COMPARISION BETWEEN TARGET COSTING AND COST PLUS PRICING**

---

Target costing and cost-plus pricing are two different things. In product development, target costing is a management technique used to determine the cost of manufacturing a product, while cost-plus pricing is a system used to determine the selling price of the product. **Cost-plus pricing** starts with an estimate of the **costs** incurred to build a product, and a certain profit percentage is added to establish the **price**. ... **Target costing** integrates the product design, desired **price**, desired profit, and desired **cost** into one process beginning at the product development stage.

**1.7) Inflation Accounting.**

Inflation accounting refers to the adjustment of the financial statements during inflationary periods. This special accounting technique is only used in inflationary periods where the general level of prices is usually high for three consecutive quarters.

It involves the recording of the income and expenditure of the business at the current prices and reinstating all the three statements of the company and analyze the cost and the trend of the current company.

There are various kinds of techniques that are involved in inflation accounting and there are various methods attached to it.

- **Current Purchasing Power Method:** This technique involves the adjustment of the financial statements to the current price changes. It



involves recalculating the historical financial figures of the company at the current purchasing power which is done by applying a certain conversion factor.

- **Current Cost Accounting:** Under this method, the cost categories and the various cost items and the items in the balance sheet are shown at the current cost rather than the historical cost and the profit is determined on the actual cost period and not on the basis of the sales.
- **Current Value:** Under this method, all assets and liabilities are measured and are reinstated at their current cost structure.
- **Replacement Cost Accounting:** The cost of replacing is the parameter under which all the assets and the liabilities on the balance sheet are recorded.

### **Advantages of Inflation Accounting**

The following are the advantage of Inflation Accounting:

- It reflects the current and not the historical cost of the balance sheet.
- It is highly effective in times of general inflation or hyperinflation.
- Depreciation of the business is valued and cost on the current price and not on the historical or the carrying value of the asset which is the correct method.
- Profit and loss will reflect the true condition of the company.
- Financial ratios based on figures, adjusted to the current value, are more meaningful.

### **Disadvantages of Inflation Accounting**

The following are the disadvantage of Inflation Accounting:

- Changing in price is a never-ending process hence it becomes difficult every time to reinstate the figures of the company and present the financial statements.
- Inflation accounting is a complicated process and it involves too much calculation and the data gathering process.
- In times of deflation, the depreciation cost will be on a lower side hence it does not reflect the true picture.

---

## **4.8 ILLUSTRATIONS**

---

**Q1) A firm had Rs 2,00,000 as cash at bank on April 1, 2011. The consumer price index on that date was 200. During the year ended 31st March, 2012 the receipts and payments were stated below:**

Receipts		₹	Index	Payments		₹	Index
June 1	Sales	1,05,000	210	Sept. 15	Costs	2,15,000	215
January 15	Sales	3,45,000	230	Dec. 1	Plant	2,00,000	225
				Mar. 20	Costs	1,50,000	240

Ascertain the profit or loss on account of price changes; the year end index was 240.

Solution:

Statement showing Profit/Loss on Cash during the year ended 31st March, 2012:

	Historical ₹	Adjustment	Constant ₹
Opening Balance	2,00,000	240/200	2,40,000
Receipts: June 1	1,05,000	240/210	1,20,000
Jan. 15	3,45,000	240/230	3,60,000
	<u>6,50,000</u>		<u>7,20,000</u>
Payments: Sept. 15	2,15,000	240/215	2,40,000
Dec. 1	2,00,000	240/225	2,13,333
Mar. 20	1,50,000	240/240	1,50,000
	<u>5,65,000</u>		<u>6,03,333</u>
Balance	<u>85,000</u>		<u>1,16,667</u>

The balance according to Constant Rupees should have been Rs 1,16,667 whereas the actual balance is only Rs 85,000. Therefore, as a result of changes in prices, there has been a loss of Rs 31,667.

Q.2)Below is given a simplified balance sheet and statement of profit and loss of a company in existence for about 10 years:

A Ltd. Balance Sheet as at 31st March, 2012				₹
Particulars	Note No.	Figures as at the end of current reporting period	Figures as at the end of the previous reporting period	
<b>I. Equity and Liabilities</b>				
Shareholders' funds				
Share capital		413	413	
Reserves and surplus	1	100	(83)	
Non-current liabilities				
Long-term borrowings	2	985	1,005	
Current liabilities				
Sundry current liabilities		241	213	
Short-term provision		55	—	
		<u>1,794</u>	<u>1,548</u>	
<b>II. Assets</b>				
Non-Current assets				
Fixed assets				
Tangible assets	3	737	884	
Capital work in progress		76	38	
Current assets				
Inventories	4	475	358	
Trade receivables	5	191	133	
Cash and cash equivalents	6	54	32	
Short-term loans and advances		261	103	
		<u>1,794</u>	<u>1,548</u>	

**Statement of Profit and Loss for the year ended 31st March, 2012**

Transfer pricing

(₹ in lakhs)			
Particular	Note No.	Figures for the current reporting period	Figures for the previous reporting period
Revenue from operations	7	2,478	1,741
Other income		62	124
<b>I Total revenue</b>		<b>2,540</b>	<b>1,865</b>
Expense	8		
Cost of material consumed		948	721
Finance cost		108	185
Depreciation*	9	236	91
Other expenses		981	649
<b>II Total expenses</b>		<b>2,273</b>	<b>1,646</b>
<b>Profit (I - II)</b>		<b>267</b>	<b>219</b>

Depreciation charge comes to Rs 124 lakhs.

**The following facts are established:**

(1) The price indices of tangible assets had climbed to 200 in the beginning of 2011-2012 and to 225 by the end of the year with the prices ten years ago being 100; the price increase in 2010-2011 was only 6%. Till the end of 2010-2011 the company had not made any substantial additions to the tangible assets. The company considers the life of the tangible assets to be 20 years and would prefer the straight line basis of depreciation.

(2) Prices of materials rose by 54% and of finished goods by 35% during 2011-2012; rates relating to manufacturing costs increased by 20%.

(3) The value of finished goods stock in the beginning and at the end of the year was respectively Rs 158 lakhs and Rs 203 lakhs.

Prepare the current cost accounting balance sheet as at 31st March, 2012 and statement of profit and loss for the year 2011-2012 on that basis.

**Solution:**

**The following assumptions are made:**

- (a) Material stocks are valued on FIFO basis.
- (b) Loans and advance are against supplies of materials and stores, so also current liabilities.:

The various adjustments required under CCA are worked out below (to the nearest lakh of rupee):

(i) The current cost of tangible assets on the basis of price changes:			
(a) March 31, 2010:—			₹ lakhs
Present "Cost" $1217 \times 200/100$			2,434
Less: 9 years' depreciation on straight line basis (life being 20 years)			1,095
			<u>1,339</u>
Add: Work-in-progress 38 plus 3%, i.e., half the increase in prices			39
			<u>1,378</u>
Amount shown in Balance Sheet			922
Credit to Current Cost Accounting Reserve			<u>456</u>
(b) March 31, 2011:			
Present cost of assets as on 31.3.2011, $1,217 \times 225/100$			2,738
Present cost of assets installed during the year (assuming half the increasing price applies, i.e., $82 \times 225/212.5$ )			94
			<u>2,832</u>
Less: Depreciation for 10 years on 2,738		1,389	
For ½ year on 94		<u>2</u>	<u>1,371</u>
			1,461
Work-in-progress: 76 plus 6¼, i.e., ½ the increasing prices			81
			<u>1,542</u>
Amount shown in the Balance Sheet			813
Credit to Current Cost Accounting Reserve			<u>729</u>
(ii) Depreciation for 2011-2012			
			₹ lakhs
1/20 of 2,434 — the current cost of fixed assets in the beginning			122
1/40 of increasing the values of these assets during 2011-2012			
assuming the increase was gradual during the year			8
1/40 of assets installed during the year			<u>2</u>
			132
Depreciation charged in the accounts (236 less 112 which is in the nature of appropriate of profits)			<u>124</u>
Additional depreciation to be charged			<u>8</u>
(iii) Increase in value of inventories:			
Finished Goods (as given)	31.3.2011		31.3.2012
	158		203
Materials and Stores	216*	$311 \times \frac{154}{127}$	377
Process Stocks	42*		46*
As per Balance Sheet	<u>358</u>		<u>475</u>
Credit to Current Cost Accounting Reserve	<u>58</u>		<u>151</u>
(iv) Cost of Sales Adjustment:			
Purchases as per accounts already given:			
Materials consumed			948
Add: Closing Stock of materials and stores			311
			<u>1,259</u>
Less: Opening stock of materials and stores			216
Purchases			<u>1,043</u>
Increase by 27% (half of total in the year)			282
			<u>1,325</u>

(e) Gearing Adjustment:	
Additional depreciation charge	8
COSA	258
MWCA	22
Total	<u>288</u>
45.3% of 288	<u>130</u>

The Profit and Loss Adjustments for 2011-2012 may be set out as shown below:

Operating Profit:	₹ lakhs	₹ lakhs
Profit as given		267
Add: Interest		108
Extra Depreciation		112
		<u>487</u>
C.C.A. Adjustments:		
Depreciation	8	
COSA	258	
MWCA	<u>22</u>	288
		<u>790</u>
Add: Gearing Adjustment: 45.3% of 288	130	
Less: Interest	<u>108</u>	22
Profit as per Current Cost Accounts		<u>221</u>
Less: Appropriation towards Depreciation Reserve		<u>112</u>
		<u>109</u>

The Current Cost Accounting Reserve on 31.3.2012 will stand at ₹ 1,038 lakh as shown below:

	₹ lakhs
Increase in the value of: Fixed assets	729
Inventories	151
Adjustment for Depreciation, COSA and MWCA	<u>288</u>
	<u>1,168</u>
Less: Gearing Adjustment	<u>130</u>
	<u>1,038</u>

The Current Cost Accounting Balance Sheet is set out below:

**A Ltd.**

**Balance Sheet as at 31st March, 2012**

(₹ in lakhs)		
Particulars	Note No.	Amounts as at 31st March, 2012
<b>I. Equity and Liabilities</b>		
Shareholders' funds		
Share capital		413
Reserve and surplus	2	980
Non-current liabilities		
Long-term borrowings	2	985
Current liabilities	3	296
Total		<u>2,674</u>
<b>II. Assets</b>		
Non-current assets		
Tangible assets	4	1,461
Capital work in progress		81
Current assets		
Inventories	5	626
Trade receivables	6	191
Cash and cash equivalents	7	54
Short term loans and advances		261
Total		<u>2,674</u>



Statement of Profit and Loss for the year ended 31st March, 2012

(₹ in lakh)

Particular	Note No.	Amounts for the year ended 31st March 2012
Revenue from operations	7	2,478
Other income		62
Gearing adjustment		130
I Total revenue		2,670
Expenses		
Cost of materials consumed		1,164
Finance cost	8	108
Depreciation		132
Other expenses	9	1,023
Monetary working capital adjustment		22
II Total expenses		2,449
Profit before appropriations, (I—II)		221
Appropriation:		
Transfer to depreciation reserve		112
Profit left after appropriation		109

Notes:

1. Reserves and Surplus	
Current Cost According Reserve	1,038
General Reserve and Surplus	(58)*
	980
*₹ 100 lakh less adjustment in the P & L Account totalling in net to ₹ 158 lakh	
2. Long-term Borrowings	
Loan	985
3. Current Liabilities	
Accounts of Credit Suppliers	241
Short-term Provisions	55
	296
4. Tangible Assets	
Tangible Assets, as valued	2,832
Less: Depreciation till date	1,371
	1,461
5. Inventories	
Finished Goods	203
Materials and Store	377
Work in Process	46
	626
6. Trade Receivable	
Accounts of Credit Customers	191
7. Cash and Cash Equivalents	
Balance with Bank	54
8. Revenue from Operations	
Sales of Goods in Trade	2,478
9. Finance Cost	
Interest on Loan	108
10. Other Expenses	
Excise Duty	366
Manufacturing Costs	457
Other Costs	200
	1,023

**Some observations:**

The accounts given above are naturally much too simple compared to the actual situation but, nevertheless, they are based on reality. **The following observations on these accounts may be pertinent:**

(i) The additional depreciation for the current year is only Rs 8 lakh; this low figure is because the depreciation actually charged in the accounts is much higher than that warranted on straight line basis with a life of 20 years. Generally, in industrial concerns the adjustment required for depreciation will be heavy. COSA in the above case is very large. This is because there was a very big increase in the prices of materials — 54%. Normally, the adjustment may not be large. Still the point that emerges is that if prices rise rapidly and if there is big time lag between purchase and consumption, the adjustment in respect of cost of sales will be material. Trading concerns cannot naturally ignore COSA. The gearing adjustment has reduced the debit to the Profit and Loss Account by Rs 130 lakhs. Indian companies normally resort to loans in a big way and, hence, for Indian companies this adjustment will be generally substantial. In the case under discussion, interest payment was only Rs 108 lakhs, showing that due to rise in prices, there was a saving of Rs 22 lakhs because of the fixed nature of monetary obligations.

On 31st March, 2002, when the general price index was say 100, Forward Ltd. purchased fixed assets of Rs one crore. It had also permanent working capital of Rs 40 lakh. The entire amount required for purchase and permanent working capital was financed by 10% redeemable preference share capital. Forward Ltd. wants to maintain its physical capital.

On 31st March, 2012, the company had reserves of Rs 1.75 crore. The general price index on this day was 200. The written down value of fixed assets was Rs 10 lakh and they were sold for Rs 1.5 crore. The proceeds were utilised for redemption of preference shares.

On the same day (31st March, 2012) the company purchased a new factory for Rs 10 crore. The ratio of permanent working capital to cost of assets is to be maintained at 0.4 : 1.

The company raised the additional funds required by issue of equity shares.

Based on the above information (a) Quantify the amount of equity capital raised and (b) Show the Balance Sheet as on 1.4.2012.

**Solution:**

(₹ in crores)

- (i) Preference share capital on 31st March, 2002:
- |   |            |
|---|------------|
| Fixed assets                            | 1.0        |
| Working capital                         | 0.4        |
| 10% Redeemable preference share capital | <u>1.4</u> |

To maintain physical capital, the company needs to evaluate the financial capital on 31st March, 2012 which is required to maintain the existing operating capability of the physical assets. On the basis of price index data available, it has been worked out as follows:

$$₹ 1.4 \text{ crore} \times \frac{200}{100} = ₹ 2.8 \text{ crore}$$

The actual amount has been more than this minimum capital required to be maintained as can be seen below:

- (ii) Working capital on 31st March 2012;  
before the given transactions or events:
- |  |             |
|--|-------------|
| Preference share capital                 | 1.40        |
| Add: Reserves                            | <u>1.75</u> |
|  | 3.15        |
| Less: Written down value of fixed assets | <u>0.10</u> |
|  | 3.05        |
- (iii) Position as on 31st March, 2012,  
after sale of fixed assets and redemption of preference shares:
- |                                     |             |             |
|-------------------------------------|-------------|-------------|
| Liabilities:                        |             |             |
| Reserves                            | 1.75        | —           |
| Add: Profit on sale of fixed assets | <u>1.40</u> | <u>3.15</u> |
|                                     |             | 3.15        |
| Assets:                             |             |             |
| Fixed assets                        |             |             |
| Working capital                     |             | 3.15        |
| ₹ (3.05 + 1.50 – 1.40) crore        |             | <u>3.15</u> |
- (iv) Amount of equity capital raised:
- |  |              |
|--|--------------|
| Amount required for purchase of new factory  | 10.00        |
| Permanent working capital requirement at 40% | <u>4.00</u>  |
|  | 14.00        |
| Less: Existing working capital               | <u>3.15</u>  |
|  | <u>10.85</u> |

(b)

**Forward Ltd:  
Balance Sheet as on 1st April, 2010**

(₹ in crores)

Particulars	Note No.	Amounts as at April, 2012
<b>I. Equity and Liabilities</b>		
Shareholders' funds		
Share capital	1	10.85
Reserve and surplus		<u>3.15</u>
		<u>14.00</u>

