

2) Show the amount of profit which you consider **might** be fairly **taken** on the contract and how you have calculated it.

(Answer : Profit taken P & L A/c : **Rs. 19,200**)

**Wits** : 2/3 of Notional profit as **reduced** on cash basis should be taken to P & L A/c.

7) From the following particulars **relating** to a contract, prepare a) Contract Account, b) **Contractee's** Account and also show how work-in-progress will appear in the Balance Sheet as on **31.12.1989**.

	Rs.
Materials sent to site	85,349
Labour engaged on site	74,375
Plant installed at cost	15,000
Direct Expenditure	4,126
Establishment Charges	3,167
Materials returned to store	549
Work Certified	1,95,000
Cost of Work not yet Certified	4,500
Materials on hand as at 31.12.1989	1,883
wages accrued on 31.12.1989	2,400
Direct Expenditure accrued on 31.12.1989	240
Value of Plant as on 31.12.89	11,000

The contract price had been agreed at Rs. **2,50,000**. Cash had been received from the **contractee** amounting to Rs. **1,80,000**.

(Answer : Notional Profit : Rs. **28,275**; Profit credited to P & L A/c : Rs. 17,400;  
W.I.P. to be shown in B/s : Rs. 8,625)

Note : These questions will help you to understand the unit better. Try to write answers for them. But do not submit your answers to the University. **These** are for your practice **only**.

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# UNIT 13 PROCESS COSTING

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## Structure

- 13.0 Objectives
- 13.1 Introduction
- 13.2 Meaning and Application
- 13.3 Difference between Job Costing and Process Costing
- 13.4 Main Characteristics
- 13.5 Costing Procedure
- 13.6 Process Losses
  - 13.6.1 Normal Process Loss
  - 13.6.2 Abnormal Process Loss
- 13.7 Abnormal Effectiveness
- 13.8 Comprehensive Illustrations
- 13.9 Let Us Sum Up
- 13.10 Key Words
- 13.11 Answers to Check Your Progress.
- 13.12 Terminal Questions/Exercises

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## 13.0 OBJECTIVES

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After studying this unit you should be able to :

- explain the meaning and the main characteristics of process costing
- list the industries for which process costing is suitable
- distinguish between job costing and process costing
- describe the costing procedure followed in process costing and prepare the process account
- distinguish between the normal and abnormal process losses and explain their accounting treatment
- prepare abnormal loss and abnormal gain accounts.

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## 3.1 INTRODUCTION

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Job and contract costing methods about which you learnt in Unit 12, are used for ascertaining the costs of specific job orders involving special orders and individual specifications. These are not considered suitable for industries involving mass production such as chemical plant, paper manufacturing, flour mill, cement works, textile mill, etc. Depending upon the nature of their product and the production processes involved, the organisations engaged in such industries generally use unit costing method or process costing method. You have learnt about unit costing method in Unit 10. In this unit you will learn about the process costing method under which the cost of a product can be ascertained at each stage of production.

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## 13.2 MEANING AND APPLICATION

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Process costing refers to a method of ascertaining the cost of product at each stage or process of manufacture where a product passes through different consecutive processes of production, each distinct and well defined. As a matter of fact, almost every product passes through a series of manufacturing operations before it takes the shape of a final product. But, in most cases, the operations involved are small and the costs incurred on each operation form an insignificant portion of the total cost. Hence, it is not considered worthwhile to compute the cost of each operation separately and so the process costing is not considered useful. Process costing is suitable only where the final product is the result of a series of such process that the output of one process passes on as a raw material to the next process and may otherwise be saleable as a finished product in the market. Take the case of a cotton textile mill, for example, where production of cloth

involves three distinct sequential processes viz., the spinning process, the weaving process and the finishing process. The output of spinning process (yarn) is passed on as a raw material to the weaving process. It can also be sold in the market, if the mill has some surplus. Similarly, the output of weaving process (coarse cloth) is passed on to the finishing process as a raw material and, if there is surplus, it can be sold to other textile mills. For a textile mill, therefore, it will be useful to compute the costs of spinning, weaving and finishing processes separately and ascertain the cost of yarn, coarse cloth and finished cloth. This will also enable them to compare their costs with the market prices thereof.

Thus, the industries to which process costing can be usefully applied, may normally have the following features :

- 1) The production is continuous and passes through a number of consecutive operations or processes.
- 2) The output of one process becomes the input for the next process till final product is obtained.
- 3) The products are standardised and homogenous.
- 4) The output of each process may be saleable in the market.
- 5) The processing of raw material may give rise to the production of joint and/or by-products.

Hence, process costing is usually employed by the following industries :

Chemical works	<b>Distilleries</b>	Textile mills	Sugar works
Soapmaking	Paper mills	Food processing	Paint manufacturing
Breweries	Oil refineries	Canning factories	Milk dairy

### 13.3 DIFFERENCE BETWEEN JOB COSTING AND PROCESS COSTING

The distinction between **job** and process costing arises mainly from the distinctive nature of the manufacturing systems to which they are applicable. The main points of difference can be summarised as follows :

JOB COSTING	PROCESS COSTING
1) Job costing measures product costs in industries where production is <b>intermittant and</b> against <b>specific orders</b> from <b>customers</b> .	1) Process costing is used in industries where production is <b>continuous and</b> is <b>meant</b> for stock and sale.
2) Costs are collected and analysed by <b>individual jobs</b> or work orders <b>regardless</b> of the time <b>taken</b> to <b>complete</b> them.	2) Costs are accumulated and analysed by <b>departments</b> or <b>processes on a time basis</b> .
3) The job cost is a <b>terminal cost</b> . The accumulation of costs in respect of a job is <b>stopped</b> when the job is completed and disposed off.	3) Process cost is a period cost. Under process costing system, costs are <b>computed</b> at the end of <b>each specified period</b> .
4) The cost of <b>each</b> job order or unit of production <b>can</b> be separately <b>identified</b> without averaging the total cost of production.	4) The unit cost of a process <b>represents</b> an average cost for the period, obtained <b>after</b> adjustment of work-in-progress.
5) There are usually no <b>transfers</b> from one <b>job</b> to another except in case of surplus material.	5) Costs are <b>transferred from</b> one <b>process</b> to another process till completion.
6) <b>There may</b> or may not be any work-in-progress at the end of an accounting period. However, <b>the</b> value of <b>uncompleted</b> job is easy to obtain.	6) There is always some <b>work-in-progress</b> at the <b>beginning</b> as well as at the end of the period. This <b>presents</b> the knotty problem of valuation of work-in-progress.
7) <b>Proner</b> control requires greater <b>supervision</b> due to discrete nature of the Job.	7) Control of process <b>activities</b> is <b>comparatively easy</b> because production is <b>more stable</b> and standardised.
8) Job costing is applied in any situation where <b>"one-off"</b> orders are being executed. For example, <b>machine-tools, general-engineering, printing, motor-car repairs, etc.</b>	8) <b>Process costing</b> is applied under conditions of continuous production, sequential <b>processing</b> and <b>uniform</b> outputs. For example : cement, <b>chemical</b> products, bottling and <b>canning</b> , oil refining, <b>soap-making, etc.</b>

### 13.4 MAIN CHARACTERISTICS

- 1) Process costing applies to industries where production is continuous and passes through a series of processes, each distinct and well-defined.
- 2) All costs (material, labour and overheads) are accumulated and classified by processes.
- 3) **An account** is maintained for each process to which all direct and indirect costs are allocated or apportioned.
- 4) Production in terms of physical quantities is also recorded in respective process accounts.
- 5) Average cost per **unit** is worked out for each process.
- 6) Since the output of each but last process becomes the input of the next process, and that of the last process is transferred to Finished Stock Account. The **total cost** of finished product comprises of the cumulative costs of all processes.
- 7) Average cost per unit provides the basis for transfer of costs to subsequent process.

#### Check Your Progress A

1 What do you mean by process costing?

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.....

2 Mention **any** three features relating to industries which adopt process costing.

.....

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3 State whether **the following** statements are True or False :

- i) Process costing is a multi-step method or procedure to measure product costs in mass production industries.
- ii) Process costing is used by industries where each unit of output is different from another.
- iii) In process costing average cost per unit provides **the basis** for transfer to subsequent process.
- iv) Process costing is applied to industries where standardised goods are produced **usually** for stock.
- v) Process costing can be usefully employed by a company manufacturing custom-made machinery.

### 13.5 COSTING PROCEDURE

You have learnt that, under process costing method, a separate **account** is opened for each **process** in **respect** of **which** the costs are to be ascertained. It should be noted that each Process **account will have an additional** column on both debit and credit sides for recording **the physical quantities**. **Look at** Figure 13.1 which shows the **proforma** of a process account.

Process I Account

Month ended : .....

Dr.

Cr.

Particulars	Qty. (units)	Amount Rs.	Particulars	Qty. (units)	Amount Rs.

The main steps involved in costing procedure are as follows :

- 1) Debit the cost of basic raw material to the first process account showing both quantity and amount involved.
- 2) Show costs of other materials, direct labour and direct expenses pertaining to each process in their respective process accounts.
- 3) Debit each process account with production overheads as given or on some equitable basis.
- 4) Credit the process account with realisable value of scrap and containers of materials returned or sold, if given. Alternatively, their amounts can be deducted from cost of raw materials.
- 5) Ascertain the total cost of the process and calculate average cost per unit of output.
- 6) If the whole output of a process has been transferred to the next process, the total cost may be shown on the credit side as transfer to next process. The same shall be shown on the debit side of the next process account.
- 7) If a portion of output has been earmarked for sale or has been sold, show its cost as transfer to store and the balance as transfer to the next process. It should be noted that when a portion of output has been sold, the process account should be credited only with its cost, and not the sale value.
- 8) The cost of containers used for packaging the finished goods should be debited to the last process account.
- 9) The total cost of the last process shall be transferred to Finished Stock Account.
- 10) The Finished Stock Account is like the Trading Account. Hence, sales will be credited to this account and gross profit ascertained.

Look at Illustrations 1 and 2 and study how process accounts are prepared.

**Illustration 1**

In the course of manufacture, a product passes through three distinct processes, A, B and C. During a four week period, 1,000 units are produced and the following information is made available :

	Process A Rs.	Process B Rs.	Process C Rs.
Direct Materials	2,000	1,000	—
Direct Wages	1,500	700	800
Direct Expenses	300	100	—

Indirect production costs were Rs. 4,500 and these are to be apportioned to the processes on the basis of direct wage cost. Prepare the necessary process accounts.

## Process A Account

Output : 1,000 units

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Direct Materials		2,000	By Transfer to Process B at Rs. 6.05 per unit		6,050
To Direct Wages		1,500			
To Direct Expenses		300			
To Overheads (7/30)		2,250			
		6,050			6,050

$$\text{Cost Per Unit of output} = \frac{6,050}{1,000} = \text{Rs. } 6.05$$

## Process B Account

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Transfer from Process A		6,050	By Transfer to Process C at Rs. 8.90 per unit		8,900
To Direct Materials		1,000			
To Direct Wages		700			
To Direct Expenses		100			
To overhead (7/30)		1,050			
		8,900			8,900

$$\text{Cost Per Unit of output} = \frac{8,900}{1,000} = \text{Rs. } 8.90$$

## Process C Account

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Transfer from Process B		8,900	By Transfer to Finished Stock A/c at Rs. 10.90 per unit		10,900
To Direct Wages		800			
To Overheads (8/30)		1,200			
		10,900			10,900

$$\text{Cost Per Unit of output} = \frac{10,900}{1,000} = \text{Rs. } 10.90$$

## Finished Stock Account

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Transfer from Process C	1,000	10,900			

## Illustration 2

The following details are extracted from the costing records of an oil mill for the year ended 31st March, 1989 :

	Crushing Rs.	Refining Rs.	Finishing Rs.
Cost of labour	2,500	1,000	1,500
Electric power	600	360	240
Sundry materials	100	2,000	—
Steam	600	450	450
Repairs of machinery	280	330	140
Factory expenses	1,320	600	220
Cost of Casks	—	—	7,500

300 tonnes of crude oil were produced. 250 tonnes of oil were produced by the refining process. 248 tonnes of refined oil were finished for delivery. Copra sacks were sold for Rs. 400. 175 tonnes of copra residue were sold for Rs. 11,000. Loss in weight in crushing 25 tonnes, 45 tonnes of by-products obtained from refining process valued at Rs. 6,750.

You are required to show the accounts in respect of each of the following stages of manufacture for the purpose of arriving at the cost per tonne of each process and the total cost per tonne of the finished oil.

(a) Copra Crushing Process (b) Refining Process (c) Finishing Process including casking.

### Solution

#### Crushing Process Account

Dr.			Cr.		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Copra used	500	2,00,000	By Loss in Weight	25	—
To Labour		2,500	By Sale of Copra Residue	175	11,000
To Electric Power		600	By Sale of Copra Sacks	—	400
To Sundry Materials		100			
To Repairs to Machinery		280	By Transfer to Refining Process A/c	300	1,94,000
To Steam		600			
To Factory Expenses		1,320			
	<u>500</u>	<u>2,05,400</u>		<u>500</u>	<u>2,05,400</u>

Cost Per Unit of Crude Oil =  $\frac{1,94,000}{300}$  or Rs. 646.67

#### Refining Process Account

Dr.			Cr.		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Transfer from Crushing Process A/c	300	1,94,000	By Loss in Weight	5	—
To Labour		1,000	By Sale of By-product	45	6,750
To Electric Power		360	By Transfer to Finishing Process A/c	250	1,92,050
To Sundry Materials		2,000			
To Steam		450			
To Repairs to Machinery		330			
To Factory Expenses		660			
	<u>300</u>	<u>1,98,800</u>		<u>300</u>	<u>1,98,800</u>

Cost Per tonne of Refined Oil =  $\frac{1,92,050}{250}$  or Rs. 768.20

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Transfer from Refining Process A/c	250	1,92,050	By Loss in Weight	2	—
To Labour		1,500	By Finished 'stock A/c	248	2,02,100
To Electric Power		240			
To Steam		450			
To Repairs to Machinery		140			
To Factory Expenses		220			
To Cost of Casks		7,500			
	250	2,02,100		250	2,02,100

Cost Per tonne of Finished Oil =  $\frac{2,02,100}{248}$  or Rs. 814.92

## 13.6 PROCESS LOSSES

In most manufacturing industries, some loss or wastage of materials always occurs while they pass through different stages of production. Consequently, the output from a process is usually less than the input. This difference is termed as a process loss.

Process losses can be classified into two categories : (1) normal process loss, and (2) abnormal process loss. Let us understand the nature of each type of loss and study its treatment in process costing.

### 13.6.1 Normal Process Loss

Certain losses are inherent in the production process. They cannot be avoided because of the very nature of materials or the production process. These include losses due to evaporation, chemical reaction, scrap, or unavoidable spoilage. The loss of output resulting from such factors is termed as 'normal process loss' or 'normal wastage'. Since such a loss is quite expected under normal conditions, it can always be worked out in advance on the basis of past experience.

**Accounting treatment :** It is a fundamental accounting principle that the cost of any normal loss should be absorbed by the cost of production of good units. Hence, for ascertaining the cost per unit of output, the total cost should be divided by the number of good units (normal output). However, if the wastage has some realisable value, the same should be credited to the process account and duly adjusted in the cost of output. For example, 500 tonnes of raw material costing Rs. 5,000 have been placed in a process I. The other process costs are : labour—Rs. 2,500 and overheads—Rs. 1,100. If 10% of material is normally lost in the process and the wastage realises Re, 1 per unit, the cost per unit of output will be ascertained as follows :

#### Process I Account

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Materials	500	5,000	By Normal Wastage	50	50
To Labour	—	2,500	By Transfer to next Process	450	8,550
To Overheads		1,100			
	500	8,600		500	8,600

Cost Per Unit of Output =  $\frac{8,600}{450}$  = Rs. 19 per tonne

The same thing you had observed in Illustration 2 where 500 tonnes of copra was put in crushing process and only 300 tonnes of crude oil was produced. The cost per tonne of oil was worked out by dividing the total cost (after adjusting the sale value of copra residue) by 300. Obviously, it had been assumed that 40% loss of weight was normal at crushing stage in case of coconut oil production.

**13.6.2 Abnormal Process Loss**

Any loss of material which is in excess of normal loss, is termed as 'abnormal process loss' or 'abnormal wastage'. For example, the normal loss in crushing process is 40%. If the input is 500 tonnes the normal output shall be 300 tonnes. If the actual output is 280 tonnes, the loss of 20 tonnes is treated as abnormal loss. This loss may occur due to some unexpected or abnormal operating conditions, such as accidents, carelessness, inefficiency or use of sub-standard materials. Such losses must be thoroughly investigated and, where necessary, remedial steps should be taken to prevent any recurrence.

**Accounting treatment:** Abnormal loss does not form part of the cost of good units otherwise it will unnecessarily inflate the cost of production. Hence, the cost of abnormal loss is excluded from process costs by transferring it to the costing Profit and Loss Account. In such a situation, the real problem arises in ascertaining the cost of abnormal process loss. The guiding principle in this regard is to treat the abnormal loss as the loss of good units of output. Hence, *the cost of abnormal loss units is ascertained in the same manner, and on identical basis, as the good units of production.* This implies that the total process cost should be spread proportionately over both good units and the abnormal loss units.

You should adopt the following procedure to deal with the problem of abnormal loss in process costing :

- 1) Work out the quantum of normal loss and show it on the credit side of the respective process account along with its realisable value.
- 2) Assuming there is no abnormal loss, work out the cost per unit of output as follows :
 
$$\frac{\text{Cost of Production}}{\text{Normal Output}}$$
- 3) Ascertain the cost of abnormal loss units on the basis of the cost per unit as calculated above.
- 4) Debit Abnormal Loss Account and credit the respective process account with quantity and amount of the abnormal wastage.
- 5) The balance in the Process Account shall now show the cost of the actual output which shall be transferred to the next process account.
- 6) Prepare Abnormal Loss Account and show the cost of abnormal loss units on its debit side and their scrap value on its credit side. The balance in Abnormal Loss Account is transferred to the Costing Profit and Loss Account.

Look at Illustration 3 and study how abnormal loss is treated in process costing.

**Illustration 3**

1200 Units were introduced into a process at a cost of Rs. 12,000. The additional expenditure incurred for the process was Rs. 3,000. From past experience and technical estimates, a normal loss equal to one-sixth of the input is expected which has scrap value of Re. 1 per unit. The actual output for the period was 900 units. Complete the Process Account and show how abnormal loss will be treated in accounts.

**Solution**

Process Account					
Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
To Materials	Rs. 1,200	Rs. 12,000	By Normal Loss	Rs. 200	Rs. 200
To Expenses	—	3,000	By Abnormal Loss	100	1,480
			<b>By Cost of Production</b>		
			tr. to next Process	900	13,320
	<u>1,200</u>	<u>15,000</u>		<u>1,200</u>	<u>15,000</u>

$$\begin{aligned} \text{Cost of Production Per Unit} &= \frac{\text{Cost of Production}}{\text{Normal Output}} \\ &= \frac{14,800}{1,000} \\ &= \text{Rs. 14.80 per unit} \end{aligned}$$

**Abnormal Loss Account**

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
To Process A/c	100	Rs. 1,480	By P&L A/c (scrap value)	100	Rs. 100
			By Cash A/c		1,380
	100	1,480		100	1,480

**Working Notes**

- 1) Normal Output = Total Input - Normal Loss Units  
 = 1,200 - (1/6 of 1,200)  
 = 1,200 - 200  
 = 1,000 Units
- 2) Cost of Production :  
 = Total Expenditure - Scrap Value of Normal Loss Units  
 = 15,000 - 200  
 = Rs. 14,800.
- 3) Abnormal Loss Units = Normal Output - Actual Output  
 = 1,000 - 900  
 = 100 Units
- 4) Cost of Abnormal Loss  
 = Abnormal Loss Units × Cost of Production Per unit  
 = 100 × 14.80 = Rs. 1,480

### 13.7 ABNORMAL EFFECTIVENESS

It is quite possible that the actual output of a process is more than the expected (normal) output. This will happen when the actual loss is less than the normal loss which may be the result of efficiency or overestimation of normal loss. In such a situation, the excess of actual output over normal output is regarded as 'abnormal gain'. The presence of abnormal effectiveness should not affect the cost per unit of output because it will be **calculated** in the same manner as in case of abnormal loss.

**Accounting treatment :** The value of abnormal gain units is calculated with the help of the cost per unit of output. It will be shown on the debit side of the respective process account and on the credit side of a newly opened Abnormal Gain Account. Abnormal Gain Account is closed by transfer to Costing Profit and Loss Account.

It must be noted that whether there is **abnormal** loss or abnormal gain, the normal loss is shown in the process account on the basis of pre-determined rate, and not on the basis of actual loss. Hence, in case of abnormal effectiveness, the realisable value of normal loss units as shown in the process account will be more than the actual amount realised on the sale of scrap. This unrealised amount of scrap should be adjusted by showing it on the credit side of Normal Loss Account and on the debit side of the Abnormal Gain Account before its balance is transferred to the Costing Profit and Loss Account.

Look at Illustration 4 and study how abnormal effectiveness is treated in process costing.

**Illustration 4**

Based on data given in **Illustration 3** and assuming the actual output was 1,050 units, prepare the Process Account and show how abnormal loss effectiveness will be treated in accounts.

**Solution**

Process Account

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
To Material	1,200	Rs. 12,000	By Normal Loss	200	Rs. 200
To Expenses	—	3,000	By Cost of Production tr. to next Process	1,050	15,540
To Abnormal Gain	50	740			
	<u>1,250</u>	<u>15,740</u>		<u>1,250</u>	<u>15,740</u>

Cost of Production per Unit of Output

$$\begin{aligned}
 &= \frac{\text{Cost of Production}}{\text{Normal Output}} \\
 &= \frac{14,800}{1,000} \\
 &= \text{Rs. 14.80 per unit.}
 \end{aligned}$$

Abnormal Gain Account

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
To Normal Loss A/c. (unrealised scrap value)	50	Rs. 50	By Process A/c	50	Rs. 740
To P&L A/c		690			
	<u>50</u>	<u>740</u>		<u>50</u>	<u>740</u>

**Working Notes**

- Normal Output = Total Input - Normal Loss  
 = 1,200 - (1/6 of 1,200)  
 = 1,200 - 200  
 = 1,000 Units
- Cost of Production = Total Expenditure - Scrap Value of Normal Loss  
 = 15,000 - 200  
 = Rs. 14,800
- Abnormal Effectiveness = Actual output - Normal Output  
 = 1,050 - 1,000  
 = 50 Units
- Value of Abnormal Effectiveness = Abnormal Effectiveness × Cost of Production per unit = 50 × 14.80  
 = Rs. 740

**Check Your Progress B**

1 What do you mean by process loss?

.....  
 .....  
 .....

2 List three causes of abnormal process loss.

.....  
 .....  
 .....

3 What is abnormal effectiveness?

.....  
 .....  
 .....  
 .....

4 Fill in the blanks.

- i) The type of loss which does affect the cost of good units is called ..... process loss.
- ii) Process loss usually has some ..... value.
- iii) Excess of actual loss over the normal loss is called .....
- iv) In case of abnormal loss as well as abnormal effectiveness, the average cost of production is calculated by dividing the total cost of production by .....
- v) In case of abnormal effectiveness, the unrealised scrap value is debited to Abnormal Gain Account and credited to ..... Account.
- vi) In case of abnormal loss, its scrap value is credited to Abnormal Loss Account and debited to ..... Account.

**13.8 COMPREHENSIVE ILLUSTRATIONS**

**Illustration 5**

In a factory the product passes through two processes A and B. A loss of 5% is allowed in Process A and 2% in Process B, nothing being realised by disposal of the wastage.

During April 1990, 10,000 units of material costing Rs. 6 per unit were introduced in Process A. The other costs were as follows :

	Process A	Process B
	Rs.	Rs.
Materials	—	6,140
Labour	10,000	6,000
Overheads	6,000	4,600

The output was 9,300 units from Process A. 9,200 units were produced in Process B which were transferred to the warehouse, 8,000 units of the finished product were sold at Rs. 15/- per unit, the selling and distribution expenses were Rs. 2 per unit. Prepare (i) Process Accounts, and (ii) a statement of Profit and Loss of the firm for April, 1990, assuming there were no opening stocks of any type.

**Solution**

**Process A Account**

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
To Materials	10,000	Rs. 60,000	By Normal Loss (5% of 10,000)	500	Rs. —
To Labour		10,000	By Abnormal Loss	200	1,600
To Overheads		6,000	By Transfer to Process B at Rs. 8 per unit	9,300	74,400
	<u>10,000</u>	<u>76,000</u>		<u>10,000</u>	<u>76,000</u>

Dr.			Cr		
Particulars	Units	Amount	Particulars	Units	Amount
To Transfer from Process A	9,300	Rs. 74,400	By Normal Loss (2% of 9,300)	186	Rs. —
To Material		6,140	By Finished Stock		
To Labour		6,000	A/c at Rs. 10 per unit	9,200	92,000
To Overhead		4,600			
To Abnormal Gain	86	860			
	<b>9,386</b>	<b>92,000</b>		<b>9,386</b>	<b>92,000</b>

## Statement of Profit and Loss for April, 1990

Profit on sale of 8,000 units	Rs. 40,000
Less : Abnormal Loss in Process A	1,600
	38,400
Add : Abnormal Gain in Process B	860
	39,260
Less : Setting and Distribution Expenses	16,000
	<b>23,260</b>

Note : The valuation of unsold stock has been ignored.

## Working Notes

- 1) Normal Output = Total Input - Normal Loss  
 In Process A = 10,000 - 500 = 9,500 units  
 In Process B = 9,300 - 186 = 9,114 units
- 2) Cost of Production = Total Expenditure - Scrap value of Normal Loss  
 In Process A = 76,000 - NIL = Rs. 76,000  
 In Process B = 91,140 - NIL = 91,140
- 3) Cost of Production per Unit =  $\frac{\text{Cost of Production}}{\text{Normal Output}}$   
 In Process A =  $\frac{76,000}{9,500}$  = Rs. 8 per unit  
 In Process B =  $\frac{91,140}{9,114}$  = Rs. 10 per unit
- 4) Normal Loss Unit = Normal Output - Actual Output  
 In Process A = 9,500 - 9,300 = 200 units
- 5) Cost of Abnormal Loss = Ab. Loss Units × Cost per Unit  
 In Process A = 200 × 8 = Rs. 1,600
- 6) Abnormal Gain Units = Actual Output - Normal Output  
 In Process B = 9,200 - 914 = 86 units
- 7) Value of Abnormal Gain = Abnormal Gain Units × Cost Per Unit  
 In Process B = 86 × 10 = Rs. 860

## Illustration 6

Product 'Z' is obtained after it passes through three distinct processes. The following information is obtained from the accounts for the month-ending December, 31, 1989 :

Items	Total	Processes		
		I	II	III
	Rs.	Rs.	Rs.	Rs.
Direct Material	7,542	2,600	1,980	2,962

Direct Wages	9,000	2,000	3,000	4,000
Production Overhead	9,000	—	—	—

Process Costing

1,000 Units at Rs. 3 each were introduced in process I. There was no stock of materials or work-in-progress at the beginning or at the end of the period. The output of each process passes direct to the next process and finally to finished stock. Production overheads are recovered at 100 per cent of direct wages. The following additional data are obtained :

Process	Output during the month	Percentage of Normal loss to Input	Value of Scrap per unit
I	950	5%	Rs. 2
II	840	10%	Rs. 4
III	750	15%	Rs. 5

Prepare process accounts; and normal loss, abnormal gain and abnormal loss accounts.

### Solution

#### Process I Account

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
To Units introduced	1,000	Rs. 3,000	By Normal Loss (5% of 1,000)	50	Rs. 100
To Direct Materials		2,600	To Transfer to Process II	950	9,500
To Direct Wages		2,000			
To Production Overheads		2,000			
	<u>1,000</u>	<u>9,600</u>		<u>1,000</u>	<u>9,600</u>

#### Process II Account

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
To Transfer from Process I	950	Rs. 9,500	By Normal Loss (10% of 950)	95	Rs. 380
To Direct Materials		1,980	By Abnormal Loss	15	300
To Direct Wages		3,000	By Transfer to Process III	840	16,800
To Production Overheads		3,000			
	<u>950</u>	<u>17,480</u>		<u>950</u>	<u>17,480</u>

#### Process III Account

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
To Transfer from Process II	840	Rs. 16,800	By Normal Loss (15% of 840)	126	Rs. 630
To Direct Materials		2,962	By Transfer to Finished Stock A/c	750	28,500
To Direct Wages		4,000			
To Production Overheads		4,000			
To Abnormal Gain	36	1,368			
	<u>876</u>	<u>29,130</u>		<u>876</u>	<u>29,130</u>

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Process I	50	100	By Cash A/c :		
To Process II	95	380	Process I	50	100
To Process III	126	630	Process II	95	380
			Process III	90	450
			By Abnormal Gain A/c	36	180
	<u>271</u>	<u>1,110</u>		<u>271</u>	<u>1,110</u>

## Abnormal Loss Account

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Process II A/c	15	300	By Cash A/c	15	60
			By Profit & Loss A/c (loss)		240
	<u>15</u>	<u>300</u>		<u>15</u>	<u>300</u>

## Abnormal Gain Account

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Normal Loss A/c (unrealised scrap)	36	180	By Process III A/c	36	1,368
To Profit & Loss A/c (gain)		1,188			
	<u>36</u>	<u>1,368</u>		<u>36</u>	<u>1,368</u>

## Working Notes :-

1) Cost of Population = Total cost - Scrap value of Normal Loss

In Process I = 9,600 - 100 = Rs. 9,500

In Process II = 17,480 - 380 = Rs. 17,100

In Process III = 27,762 - 630 = Rs. 27,132

2) Cost of Production per Unit =  $\frac{\text{Cost of Production}}{\text{Normal Output}}$

In Process I =  $\frac{9,500}{950}$  = Rs. 10 per unit

In Process II =  $\frac{17,100}{855}$  = Rs. 20 per unit

In Process III =  $\frac{27,132}{714}$  = Rs. 38 per unit

3) Abnormal Loss Units = Normal Output - Actual Output

In Process I = 950 - 950 = NIL

In Process II = 855 - 840 = 15 units

4) Cost of Abnormal Loss = Abnormal Loss Units × cost per unit

In Process I = NIL

In Process II = 15 × 20 = 300

5) Abnormal Gain Units = Actual Output - Normal Output

In Process III = 750 - 714 = 36 units

6) Value of Abnormal Gain = Ab. Gain Units × Cost per unit

In Process III = 36 × 38 = Rs. 1,368

**Illustration 7**

A product passes through two processes P & Q and then to Finished Stock Account. It is ascertained that in each process normally 5% of the weight of output is lost and 10% is scrap which from process P realises Rs. 80 per tonne and from process Q Rs. 200 per tonne.

The following data is available for both the processes for the month of February, 1991.

	P	Q
Materials in tonnes	1,000	70
Cost of materials per tonne in rupees	125	200
Wages in rupees	28,000	10,000
Mfg. expenses in rupees	8,000	5,250
Output in tonnes	830	780

prepare process accounts, showing cost per tonne of each process. There was no stock or work-in-progress in any process.

**Solution**

**Process P Account**

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
	Ton.	Rs.		Ton.	Rs.
To Materials	1,000	1,25,000	By Loss in Weight (5% of 1,000)	50	—
To Wages		28,000	By Normal Loss (10% of 1,000)	100	8,000
To Mfg. Exp.		8,000	By Abnormal Loss	20	3,600
			By Transfer to Process Q at Rs. 180 per tonne	830	1,49,400
	1,000	1,61,000		1,000	1,61,000

$$\begin{aligned} \text{Cost of Output per tonne} &= \frac{\text{Cost of Production}}{\text{Normal Output}} \\ &= \frac{1,53,000}{850} \\ &= 180 \text{ per tonne} \end{aligned}$$

**Process Q Account**

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
	Ton.	Rs.		Ton.	Rs.
To Transfer from Process P	830	1,49,400	By Loss in Weight (5% of 900)	45	—
To Materials	70	14,000	By Normal Loss (10% of 900)	90	18,000
To Wages		10,000	By Transfer to Finished stock		
To Mfg. Exp.		5,250	at Rs. 210 per tonne.	780	1,63,800
To Abnormal Gain	15	3,150			
	915	1,81,800		915	1,81,800

$$\begin{aligned} \text{Cost of Output per tonne} &= \frac{\text{Cost of Production}}{\text{Normal Output}} \\ &= \frac{1,53,000}{850} \\ &= 210 \text{ per tonne} \end{aligned}$$

working Notes

- 1) Normal Loss Unit In Process P = Normal Output - Actual Output = 850 - 830 = 20 tonne
- 2) Cost of Abnormal Loss In Process P = Ab. Loss Units × Cost Per Unit = 20 × 180 = Rs. 3,600
- 3) Abnormal Gain Units In Process Q = Actual Output - Normal Output = 780 - 765 = 15 tonne
- 4) Value of Abnormal Gain = Abnormal Gain Units × Cost per unit = 15 × 210 = **Rs. 3,150**
- 5) Loss in weight has no scrap value

Illustration 8

A company manufactures and sells three chemicals produced by three consecutive processes known as A, B and C. In each process, 2% of the weight put in is lost and 10% is scrap. The scrap realises in Process A and B - Rs. 100 per tonne and in C - Rs. 200 per tonne. The other details are as follows :

	A	B	C
Materials(in tonnes)	100	140	1,348
Cost of Materials per tonne (in rupees)	120	200	80
Mfg. Expenses (in rupees)	30,800	24,810	1,832
Output retained for sale	25%	50%	100%
Output sent to next process	75%	50%	

Solution

Process A Account

Dr.			Cr.		
Particulars.	Units	Amount	Particulars	Units	Amount
	Ton.	Rs.		Ton.	Rs.
To Materials	100	12,000	By Loss in Weight	2	—
To Mfg. Exp.		30,000	By Scrap	10	1,000
			By Transfer to stores for sale	22	10,450
			By Transfer to Process B	66	31,350
	<b>100</b>	<b>42,800</b>		<b>100</b>	<b>42,800</b>

$$\text{Cost of Production per tonne} = \frac{42,800}{88} = \text{Rs. 475 per tonne}$$

Process B Account

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
	Ton.	Rs.		Ton.	Rs.
To Transfer from Process A	66	31,350	By Loss in Weight	4	—
To Materials	134	26,800	By Scrap	20	2,000
To Mfg. Exp.		24,810	By Transfer to stores for sale	88	41,480
			By Transfer to Process C	88	41,480
	<b>200</b>	<b>82,960</b>		<b>200</b>	<b>82,960</b>

$$\text{Cost of Production per tonne} = \frac{80,960}{176} = \text{Rs. 460 per tonne}$$

Dr.			Cr.		
Particulars	Units	Amount	Particulars	Units	Amount
	Ton.	Rs.		Ton.	Rs.
To Transfer from Process B	88	41,480	By Loss in weight	28	—
To Materials	1,312	1,04,960	By Scrap	140	28,800
To Mfg. Exp.	—	1,864	By Transfer to finished stock	1,232	1,19,504
	1,400	1,48,304		1,400	1,48,304

$$\begin{aligned} \text{Cost of Production per tonne} &= \frac{1,19,504}{1,232} \\ &= \text{Rs. 96 per tonne} \end{aligned}$$

## 13.9 LET US SUM UP

Process costing refers to a method of ascertaining the cost of a product at each stage or process of manufacture. This method is applied where (i) the production is continuous and passes through a **number** of processes, (ii) the product of one process becomes the material of the next process, and (iii) the **products** are standardised and homogeneous. Process costing, therefore, is considered suitable for industries like textile, oil refining, paper, breweries, etc.

Under process costing, a **separate** account is opened for each process of manufacture and all costs relevant to a process are debited **thereto**. If the whole **output** of a process is transferred to the **next** process, the total cost is shown on the credit side as a transfer to the next process. If a part of the output is retained for **sale** in the market, the proportionate cost of such output is shown as a transfer to store. As for the last process, its total cost is transferred to the finished Stock Account.

Process losses can be **normal** or abnormal. Normal losses are inherent in any process. They cannot be avoided. Hence, such losses should **be** absorbed by good production. Abnormal losses are caused usually by factors like use of sub-standard material, inefficiency or accidents. Their cost is **determined** on the basis of the cost per unit of output and transferred to the Costing Profit and Loss Account through the Abnormal Loss Account.

In some cases, the actual output **may** be more **than** the normal output. In such a situation, the excess is regarded as abnormal effectiveness (also called abnormal gain). The cost of such gain is also determined on the basis of the cost per unit of **output** and transferred to the Costing Profit and Loss Account.

## 13.10 KEY WORDS

**Abnormal Process Loss** : Excess of actual loss over normal loss which is caused by factors like accidents, inefficiency, etc.

**Abnormal Gain** : Excess of actual output over normally expected output. It is also called 'abnormal effectiveness'.

**By-Product** : A product of relatively small value produced incidently from processing the raw material for the main product.

**Joint Product** : Two or more products resulting from **processing** a particular raw material. Both have equally high value and merit recognition.

**Mass Production Industries** : Industries engaged in a standardised and homogeneous product on large scale.

**Normal Output** : The normally expected output from processing certain quantity of **raw** material.

**Normal Process Loss** : Loss of materials expected under normal operation conditions and inherent in the process of manufacture.

**13.11 ANSWERS TO CHECK YOUR PROGRESS**

- A 3 i) True, ii) False, iii) True, iv) True, v) False  
 B 4 i) Normal, ii) Realisable, iii) Abnormal Loss, iv) Normal Output, v) Normal Loss vi) Cash

**13.12 TERMINAL QUESTIONS/EXERCISES**

- 1) Distinguish between job costing and process costing.
- 2) State the main characteristics of process costing and outline the costing procedure thereof.
- 3) Explain the meaning of normal and abnormal process losses and state how, they are treated in cost accounts.
- 4) Explain the following terms :
  - a) Abnormal Effectiveness
  - b) By-Products
  - c) Joint Products

## Exercises

- 1) Chemical X passes through three consecutive processes P, Q and R. From the following cost data relating to the three processes, prepare the process cost accounts and find out the cost of production of each process. The production per month was 270 bottles.

Items	Process P	Process Q	Process R
Materials	8,750	4,250	2,900
Labour	3,600	9,000	2,700
Direct Expenses :			
Fuel	1,500	1,500	1,500
Carriage Inwards	1,500	1,500	1,500
Factory Expenses	1,170	3,240	1,125

Indirect expenses Rs. 3,825 should be apportioned on the basis of labour.

(Answer : Total Cost : P-Rs. 17,420, Q-Rs. 39,160, R-Rs. 49,560

Unit Cost : P-Rs. 64.52, Q-Rs. 145.04, R-Rs. 183.55)

- 2) In the month of May, 1991, 6,000 tonnes of raw material A costing Rs. 150 per tonne were produced through process No. 3 for the manufacture of solvent X.  
 The total operating cost of the process for the month was Rs. 12,50,000. 10% of the input was wasted and was disposed off at Rs. 25 per tonne.  
 Prepare the Process 3 Account for the month of May, 1991 assuming that the wastage was
  - i) the normal process loss
  - ii) an abnormal loss due to poor quality material.
 (Answer : i) Finished stock Rs. 21,35,000 @ Rs. 395.37 per tonne.  
 ii) Finished stock Rs. 19,35,000 @ Rs. 358.33 per tonne.)
- 3) 600 Kgs. of a material was charged to Process I at the rate of Rs. 4 per kg. The direct labour accounted for Rs. 200 and the other departmental expenses amounted to Rs. 760. The normal loss is 10% of input and the net production was 500 kgs. Assuming that the scrap is sold at Rs. 2 per kg., prepare the Process I Account clearly showing the values of normal and abnormal loss.

(Answer : Normal loss Rs. 120; Abnormal loss Rs. 240; Transfer to Process II Rs. 3,000)

4) The particulars for the last process are as follows :

	Units	Rs.
Transfer to last process from the first process	4,000	9,000
Transfer to Finished Stock from the last process	3,240	—
Direct Wages		2,000
Direct Materials used		3,000

The factory overhead in process was absorbed at 400% of direct materials. Allowance for normal loss is 20% of units worked. The scrap value of the wastage was Rs. 5 per unit. You are required to prepare

- Last Process Account
- Normal Wastage Account
- Abnormal Effectiveness Account.

(Answer : Transfer to Finished stock' Rs. 22,275; Abnormal Effectiveness Transfer to P & L A/c Rs. 75 (275-200))

5) The product of a manufacturing company passes through two processes A and B. It is ascertained that in each process 10% of the total weight is lost and 20% is scrap. The realisation from scrap amounts to Rs. 160 per tonne and Rs. 400 per tonne from processes A and B respectively.

The process figures are as follows :

	Process A	Process B
Materials consumed in tons	2,000	140
Cost per tonne	Rs. 250	400
Wages	Rs. 36,000	Rs. 24,000
Manufacturing Expenses	Rs. 12,000	Rs. 10,000

Prepare process accounts showing the cost per tonne of output in each process.

(Answer : Transfer to Finished stock 1,078 units at Rs. 4,50,800  
Process A Cost per unit : Rs. 345.71, Process B-Rs. 418.18)

6) X Manufacturing Company's product passes through two distinct processes A and B then to Finished Stock. It is known from past experience that wastage occurs in the process as follows : in Process A, 5% of the units entering the process and in Process B, 10% of the units entering the process. The scrap value of wastage in process A is Rs. 16 per 100 units and in Process B is Rs. 20 per 100 units. The process figures are :

	Process A	Process B
	Rs.	Rs.
Materials consumed	6,000	3,000
Wages	7,000	4,000
Manufacturing Expenses	2,000	2,000

5,000 units were brought into Process A, costing Rs. 5,000. The outputs were : Process A = 4,700 units, Process B = 4,150 units. Prepare Process Accounts showing the cost of the output.

(Answer : Process A : cost per unit—Rs. 4.20; Abnormal Loss—Rs. 202 (210—)  
Process B : cost per unit—Rs. 6.77; Abnormal Loss—Rs. 434 (542-108))

7) The product of a company passes through three distinct processes to completion. From the past experience it is ascertained that wastage is incurred in each process as under : Process A 2%, Process B 5%, Process C 10%

The wastage of Processes A and B is sold at Rs. 10 per 100 units and that of Process C at Rs. 80 per 100 units.

Following is the information regarding the production of March, 1979 :

	Process A	Process B	Process C
Materials	12,000	8,000	4,000
Direct Labour	16,000	12,000	6,000
Machine Expenses	2,000	2,000	3,000
Other Factory Expenses	3,500	3,800	4,200

20,000 units have been issued to Process A at a cost of Rs. 20,000. The output of each process has been as under :

Process A 19,500 Units

Process B 18,800 Units

Process C 16,000 Units

There was no stock or work-in-progress in any process in the beginning and in the end of March.

Prepare Process Accounts.

(Answer : Transfer to Finished stock 16,000 units at Rs. 90,549.50)

Note : These questions will help you to understand the unit better. Try to write answers for them. But do not submit your answers to the University. These are for your practice only.

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**SOME USEFUL BOOKS**

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- Arora, M.N. 1988. *A Text Book of Cost Accountancy*, Vikas Publishing House Pvt. Ltd. : New Delhi. (Chapters 14, 15, 16, 17, 19)
- Bhar, B.K. 1990. *Cost Accounting - Methods and Problems*, Academic Publishers : Calcutta.
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- Nigam B.M.L. and G.L. Sharma, 1990. *Theory and Techniques of Cost Accounting*, Himalaya Publishing House : Bombay. (Chapters 11, 12, 14, 17)
- Owler, L.W.J. and J.L. Brown, 1984. *Wheldon's Cost Accounting*, ELBS : London. (Chapters 17, 18)