UNIT 12 UNIT COSTING

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12.0 OBJECTIVES

After studying this unit, you should be able to:

- prepare cost sheet and ascertain the prime cost, the factory/works cost, the cost of production, the cost of goods sold, the cost of sales and profit;
- prepare production account; and
- prepare a statement of quotation and ascertain the selling price/price of the tender.

12.1 INTRODUCTION

Unit costing is one of the most commonly used method of costing by firms which are engaged in manufacturing products with identical units such as

coal, bricks, shoes, sugar, cement, etc. Under this method, cost and profit per unit of output is ascertained by preparing monthly or quarterly cost sheets showing details of the various components of total cost. In this unit, you will learn how cost sheet is prepared and how cost and profit per unit of output is determined.

12.2 MEANING AND APPLICABILITY

Unit costing refers to a method of costing used by industries engaged in mass production of homogeneous/identical products. The basic feature of unit costing is that the cost units are identical. Unit costing is also known as "Single Output Costing". Single or Output Costing is the form of Unit costing used when the enterprise produces basically one homogeneous product or one homogeneous product in two or more grades. Under this method, the cost per unit is arrived at by dividing the total cost by the total number of units produced. Thus, the cost ascertainment involves the following two stages:

i) collection and functional analysis of all costs,

ii) division of total cost by the total number of units produced in order to determine the cost per unit.

This procedure is applicable only when the organisation produces only one product. If, however, the organisation produces several grades of the same product, it becomes imperative to apportion the various costs between the various grades so that the Cost of each grade can be determined separately

Unit costing method can be successfully applied in those industries engaged in assembling, such as automobiles, electronics, typewriters, etc., and also in those industries engaged in production of homogeneous products, such as collieries, quarries, brick making, brewaries, dairies, sugar, cement works etc.

12.3 PREPARATION OF STATEMENT OF COST/ COST SHEET

Under this method of costing, it is customary to prepare a statement of cost which is popularly known as 'Cost Sheet' at periodical intervals. It shows detailed break-up of the total cost and the cost per unit at each stage. It should contain as much information regarding costs as may be necessary for the purposes of cost analysis and cost control. In actual practice, the corresponding figures of the preceding period are also shown in the) Cost Sheet for purposes of comparison. This facilitates cost control.

You learnt about the preparation of Cost Sheet in Unit 3 Block 1. We shall now study about it in more detail. The proforma of Cost Sheet is given here again in Figure 12.1.

Figure 12.1 : Proforma of Cost Sheet

COST SHEET OF…….
for the month ending ……

Output:……. Units

		Total: Rs.	Per unit Rs.
Raw Materials Consumed			
Opening Stock of Raw Materials			
Add : Purchases of Raw Materials	……		
Less: Closing Stocks of Finished Goods	……		
Direct Labour	……	……	……
Other Direct Expenses	……	……	……
PRIME COST		……	……
Factory Overheads			
…….	…….		
…….	…….		
…….	…….		
WORKS COST		…….	…….
Office & Administrative Overheads …….	……	……	……
…….	……		
…….	……		
…….	……		
…….	……		
…….	……		
COST OF PRODUCTION (……units)		……	……
Add : Opening Stock of Finished Goods (……units)		……	……
Less : Closing Stock of Finished Goods (……units)		……	……
COST OF GOODS SOLD (……units)	……		
Selling & Distribution Overheads	……		
……	……	……	……
……..			
……			
COST OF SALES (……units)		……	……
PROFIT (LOSS)		……	……
SALES/SELLING PRICE		……	……

Look at Illustration 1 and see how Cost Sheet is prepared from the given data.

Illustration 1: In a factory 20,000 units of Product X were manufactured in the month of September, 2018. From the following figures obtained from the costing records, prepare a Cost Sheet showing the total cost and cost per unit:

	Rs.
Direct Material Consumed	2,00,000
Direct Wages	1,60,000
Other Direct Expenses	40,000
Factory Overheads	80,000
Office & Administrative Overheads	60,000
Selling & Distribution Overheads	60,000

Solution:

Cost Sheet of Product 'X' for the Month of September, 2018

Output : 20,000 units

	Total Cost Rs.	Cost Per unit Rs.
Cost of Direct Materials	2,00,000	10.00
Cost of Direct Labour	1,60,000	8.00
Cost of Other Direct Expenses	40,000	2.00
PRIME COST	4,00,000	20.00
Add Factory Overheads	80,000	4.00
FACTORY/WORKS COST	4,80,000	24.00
Add : Office & Administrative Overheads	60,000	3.00
COST OF PRODUCTION	5,40,000	27.00
Add: Selling & Distribution Overheads	60,000	3.00
TOTAL COST/COST OF SALES	6,00,000	30.00

Note: Cost per unit for each component of total cost has been arrived at by dividing the amount by the total output.

12.3.1 Ascertainment of Cost of Direct Materials

While considering the cost of direct materials, only the cost of direct materials actually used or consumed should be taken into account. Normally, all the raw materials purchased in a particular period are not consumed during the same period. Certain amount of raw materials is always kept in stock so that production may not be interrupted for want of materials. In most cases, the cost of direct materials actually used in production is not given. It should be determined in the following manner:

Cost of Direct Materials Used in Production		**Rs.**
Cost of Opening Stock of Raw Materials	……..	
Add : Cost of Raw Materials purchased	……..	
Add : Carriage/Freight on purchases, if any	……..	……..
Cost of Raw Materials available for use		……..
Less: Cost of Closing Stock of Raw Materials		…….. ……..

Look at Illustration 2 and see how cost of direct materials consumed is worked out.

Illustration 2 : From the particulars given below, determine the cost of direct materials consumed.

	Rs.
Opening Stock of Raw Materials	40,000
Purchase of Raw Materials	2,40,000
Carriage Inwards	20,000
Closing Stock of Raw Materials	50,000
Carriage Outwards	20,000
Production Wages	1,80,000

Solution:

Cost of Direct Materials Used in Production	Rs.	Rs.
Cost of Opening Stock of Raw Materials	40,000	
Add: Cost of Raw Materials purchased	2,40,000	
Add: Carriage Inward	20,000	2,60,000
Cost of Raw Materials available for use		3,00,000
Less: Cost of Closing Stock of Raw Materials		50,000 2,50,000

Value of stock of raw materials may be determined in any one of the methods discussed in Unit 5 on materials. However, in the absence of any indication in the given problem, it would be better to value the stock of raw materials on FIFO basis and to give a note to that effect.

12.3.2 Ascertainment of Cost of Direct Labour

While considering the cost of direct labour, only the cost of direct labour actually used in production should be taken into account. If there are outstanding or prepaid direct wages, the same should be adjusted in the following manner:

Cost of Direct Labour Used in Production	Rs.
Direct Wages paid	……
Add: Outstanding Direct Wages, if any	……
Less: Pre-paid Direct Wages, if any	
	…….. ……..
	……..

12.3.3 Ascertainment of Cost of Other Direct Expenses/Chargeable Expenses

Similarly, if there are outstanding or pre-paid direct/chargeable expenses, the same should be adjusted in the same manner as direct labour in order to ascertain the actual cost of direct/chargeable expenses. These expenses include hire-charges paid for special machinery or plant taken on hire, cost of special moulds, designs, and patterns, cost of patents and royalties, etc.

12.3.4 Ascertainment of Prime Cost

Prime cost refers to the direct cost. It is the sum total of three direct elements of cost i.e., direct materials, direct labour and other direct expenses.

While determining the prime cost, we should always take the summation of the cost of direct materials, direct labour and expenses actually used in production. However, it is important to note here that direct materials will not form part of prime cost in those industries where the product is extracted from natural resources like collieries, quarries.

12.3.5 Ascertainment of Factory/Works Cost

Factory/Works Cost refers to the summation of prime cost and factory overheads. Factory overheads include cost of indirect materials, indirect labour and other indirect expenses incurred in the factory which are related to production. It is determined as follows:

	Rs.
Cost of Direct Materials	……
Cost of Direct Labour	……
Cost of other Direct Expenses	……
PRIME COST	……
Add Factory Overheads	……
FACTORY/ WORKS COST	……

Illustration 3 : From the following particulars, prepare a statement showing (a) Cost of Direct Materials consumed, (b) Prime cost, (C) Factory overheads and(d) Factory Cost.

	Rs.
Stock of Raw Materials on 1.4.90	24,000
Stock of Raw Materials, on 30.04.90	31,000
Purchase of Raw Materials	1,10,000
Productive Wages	75,000
Drawing Office Salaries	7,800
Counting House Salaries	8,500
Freight on Purchase of Materials	6,000
Rent, Rates, Taxes & Insurance (Factory)	9,000
Rent, Rates, Taxes & Insurance (Office)	6,000

Carriage Outwards	9,500
Repairs of Plant & Machinery	4,500
Travelling Expenses	12,000
Gas and Water Charges (Factory)	3,500
Gas and Water Charges (Office)	1,200
General Charges	7,500
Manager's Salary (3/4 time devoted to Factory and ¼ time devoted to Office)	24,000
Depreciation on Plant & Machinery	6,500
Depreciation on Furniture	1,000
Directors' Fees	9,000
Advertisement	15,000

Solution :

Statement of Cost for the month of April, 2018

	Rs.	Rs.	Rs.
Cost of Direct Materials Consumed			
Cost of Opening Stock of Raw Materials		24,000	
Add: Cost of Raw Materials purchased	1,10,000		
Add: Freight on purchases	6,000	1,16,000	
Cost of Raw Materials available for use		1,40,000	
Less: Cost of Closing Stock of Raw Materials		31,000	1,09,000
Cost of Direct Labour			75,000
PRIME COST			1,84,000
Factory Overheads			
Drawing Office Salaries		7,800	
Rent, Rates, Taxes & Insurance (Factory)		9,000	
Repairs to Plant & Machinery		4,500	
Gas & Water Charges		3,500	
Managers Salary (24,000)		18,000	
Depreciation of Plant & Machinery		6,500	
FACTORY/WORKS COST			49,300
			2,33,300

12.3.6 Ascertainment of Cost of Production

Cost of production refers to the summation of factory/works cost and office & administrative overheads. Office and administrative overheads include the cost of indirect materials, indirect labour and other indirect expenses

incurred in office which are related to administration. Based on data given in Illustration 3, the 'Cost of Production' will be determined as follows:

		Rs.
FACTORY/WORKS COST		2,33,300
Add: Office & Administrative Overheads		
Counting House Salaries	Rs.	
Rent, Rates, Taxes & Insurance (Office)	8,500	
Gas & Water Charges (Office	6,000	
General Charges	1,200	
Managers Salary (¼ x 24,000	7,500	
Depreciation on Furniture	6,000	
Directors' Fees	1,000	
	9,000	39,200
COST OF PRODUCTION		2,72,500

administrative expenses do not form part of the cost of production. But, Cost Accounting literature in India still makes a distinction between the terms 'cost of production' and 'works cost'.

Accordingly, in the Indian context, the cost of production includes office and administration expenses for cost accounting purposes.

12.3.7 Ascertainment of Total Cost/Cost of Sales

Total Cost/Cost of Sales refers to the summation of cost of production of goods produced and selling & distribution overheads. Selling and distribution overheads include cost of indirect materials, indirect labour and other indirect expenses which are incurred for the purpose of sale and distribution. Based on data given in Illustration 3, the Total Cost/Cast of Sales will be determined as follows:

		Rs.
COST OF PRODUCTION OF GOODS PRODUCED		2,72,500
Add : Selling & Distribution Overheads		
Carriage Outwards	9,500	
Travelling Expenses	12,000	
Advertisement	15,000	36,500
TOTAL COST/COST OF SALES		3,09,000

12.3.8 Treatment of Items of Expenses and Losses of Purely Financial Nature

It is important to note that there are certain items of expenses and losses which are of purely financial nature and are to be excluded from cost. These items are: cash discount allowed, interest paid, fines and penalties paid, income tax paid, dividend paid, obsolescence loss, loss on sale of fixed assets, loss on sale of investments, etc.

Illustration 4 : The following particulars have been obtained from the cost

records of P Manufacturing Company Limited for the month of August, 2018:

Output and Sales for the month	…….	10,000 Units
Stock of Raw Materials as on 1.8.2018		15,000
Stock of Raw Materials as on 31.8.2018	…….	20,000
Drawing Office Salaries	…….	9,000
Counting House Salaries	…….	6,000
Direct Wages paid	…….	58,000
Direct Expenses	…….	20,000
Purchase of Raw Materials	…….	92,000
Carnage Inwards	…….	3,000
Carriage Outwards	…….	4,500
Cash Discount allowed	…….	1,500
Power and Consumable Stores	…….	12,000
Indirect Wages	…….	15,000
Lighting of Factory	…….	5,500
Repairs to Plant & Machinery	…….	6,500
Depreciation on Plant & Machinery	…….	5,000
Debenture Interest	…….	10,000
Office Rent	…….	12,000
Directors' Fees	…….	6,000
Travelling Expenses	…….	7,500
Salesmen's Salaries and Commission	…….	18,000
Office Salaries	…….	9,000
General Charges	…….	7,000
Advertisement	…….	10,000
Outstanding Direct Wages	…….	2,000
Sale Proceeds of Factory Scrap	…….	3,000

You are required to prepare the Cost Sheet for the month of August, 2018 showing the various elements of cost per unit.

Solution :

Cost Sheet of P. Manufacturing Co. Ltd for the Month of August, 2018

			Output	10,000 Units
	Rs.	Rs.	Total Cost	Cost Per Unit
Cost of Raw Materials used		15,000	Rs.	Rs.
Add: Cost of Raw Materials purchased	92,000			

Add: Carriage Inwards	3,000	95,000		
Cost of Raw Materials available for use		1,10,000		
Less: Cost of Closing Stock of Raw Materials		20,000	90,000	9.00
Cost of Direct Labour		58,000		
Direct Wages paid		2,000	60,000	6.00
Add : Outstanding Direct Wages			20,000	
Cost of Direct Expenses				
			1,70,000	17.00
PRIME COST				
Add: Factory Overheads				
Drawing Office Salaries		9,000		
Power and Consumable Stores		12,000		
Indirect Wages		15,000		
Lighting of Factory		5,500		
Repairs to Plant & Machinery		6,500		
Depreciation on Plant & Machinery		5,000		
Less: Sale proceeds of Factory Scrap		53,000		
FACTORY/WORKS COST		3,000	50,000	5.00
Add : Office & Administrative Overheads			2,20,000	22.00
Counting House Salaries		6,000		
Office Rent		12,000		
Directors' Fees		6,000		
Office Salaries		9,000		
General Charges		7,000	40,000	4.00
COST OF PRODUCTION			2,60,000	26.00
Add : Selling & Distribution Overheads				
Carriage Outwards		4,500		
Travelling Expenses		7,000		
Salesmen's Salaries & Commission		18,000		
Advertisement		10,000	40,000	4.00
COST OF SALES			3,00,000	30.00

Note : Cash Discount allowed and Debenture Interest are items of purely financial nature and, as such, are excluded from cost.

12.4 PREPARATION OF PRODUCTION ACCOUNT

Production Account is another way of presentation of cost information. It is prepared in the form of a ledger account. No separate column is shown for cost per unit. All the possible break up of cost should be shown in stages in the manner shown below.

Illustration 5 : Based on data given in Illustration 4, prepare Production Account.

Solution :

Production Account of P. Manufacturing Co. Ltd. for the Month of August, 2018

Dr. Cr.

		Rs.		Rs.
To Opening Stock of Raw Materials		15,000	By Closing Stock of	20,000
To Raw Materials purchased		92,000	By Cost of Direct Materials used c/d	90,000
To Carriage Inwards		3,000		
		1,10,000		1,1,0000
To Cost of Direct Materials used b/d		90,000	By Prime Cost c/d	1,70,000
To Direct Wages	58,000			
Add: Outstanding Direct Wages	2,000	60,000		
To Cost of Direct Expenses		20,000		
		1,70,000		1,70,000
To Prime Cost b/d		1,70,000	By Factory/ Works Cost c/d	2,20,000
To Factory Overheads				
Drawing Office Salaries	9,000			
Power & Consumable Stores	12,000			
Lighting of Factory	5,500			
Indirect Wages	15,000			
Repairs of Plant & Machinery	6,500			
Depreciation on Plant & Machinery	5,000			
	53,000			
Less: Sales proceeds of Fact. Scrap	3,000	50,000		
		2,20,000		2,20,000
To Factory/Works Cost b/d		2,20,000	By Cost of Production c/d	2,60,000

To Office & Administration Overheads				
Counting House Salaries	6,000			
Office Rent	12,000			
Directors fees	6,000			
Office Salaries	9,000			
General charges	7,000	40,000		
		2,60,000		
To Cost of Production b/d		2,60,000		2,60,000
To Selling & Distribution Overheads			By Cost of Sales c/d	3,00,000
Carriage outward	4,500			
Travelling Expenses	7,500			
Salesmen's Salaries	18,000			
Advertisement	10,000	40,000		
		3,00,000		
To Cost Sales b/d		3,00,000		3,00,000

Note: If sales are given in the problem, the same should be shown on the credit side and the difference between Sales and Cost of Sales should be treated as profit/loss on sale.

Check Your Progress A

1) Fill up the blanks:
   a) Cost of Direct Material's Consumed ....
   b) Prime Cost = ...
   c) Cost of Sales .....
   d) Cost of Production = Factory Cost + ...
   e) Selling Price = Cost of Sales + ...

2) State whether each of the following equations are **True** or **False** and justify your answer.
   a) Factory Cost = Prime Cost + Office Overheads
   b) Prime Cost = Direct Cost
   c) Total Cost = Prime Cost + All Indirect Costs
   d) Cost of Production = Factory cost + Selling & Distribution Overheads
   e) Cost of Sales = Factory Cost + Selling & Distribution Overheads

3) Name the industries to which unit costing can be successfully applied.

12.5 SPECIAL POINTS TO BE NOTED

12.5.1 Value of Scrap/Wastage

Scrap refers to the incidental residue of certain types of manufacture or

defective products beyond any rectification. If there is any realisable value of such scrap, the same should reduce the cost of goods produced and, as such, it should be deducted from cost of materials consumed or factory overheads or factory cost/works cost.

12.5.2 Opening and Closing Work-in-Progress

Work-in-progress refer to partly finished or semi-finished goods. Work on such goods has already started but not completed till the end of particular period. The cost incurred in respect of closing work-in-progress must be deducted from factory/works cost in order to ascertain the works cost of the completed units (finished goods). It should be noted that the work-in-progress of the previous period is the opening work-in-progress in the current period which has been converted into finished goods in the current period. Hence, the cost of opening stock of work-in-progress should be added to the works cost of the current period. The reason why the cost of opting and closing work-in-progress is adjusted in the works cost is that it (cost of uncompleted units) includes only the cost of raw materials, direct labour and factory overheads.

If the cost of opening and closing stock of work-in-progress is given, the same should be adjusted after the factory overheads have been added to the Prime Cost in the following manner:

		Rs.
Cost of Direct Materials		……...
Cost of Direct Labour		…….....
Cost of Direct Expenses		……
PRIME COST		_____
Add : Factory Overheads	……..	……..
Less: Value of Scrap, if any	……..	……..
GROSS FACTORY/WORKS COST	_____	……..
Add : Cost of Opening Stock of Work-in-progress, if any		_____ ……..
Less: Cost of Closing Stock of Work-in-progress, if any		…….. _____
FACTORY/WORKS COST OF GOODS COMPLETED		…….. _____

It is important to note That, in such a situation, the calculation of cost per unit should be started after the stage of factory cost.

12.5.3 Opening and Costing Stocks of Finished Goods

It is unlikely that all the units of finished goods produced during a particular period will be sold in the same period. In fact, it is the management policy to keep some closing stock of finished goods so that sales for the next period remain uninterrupted. The cost of closing stock of finished goods should be deducted from the cost of production of goods produced in order to ascertain the cost of production of goods sold during the current period. Since the closing stock of finished goods of the preceding period i.e., the opening stock for the current period is likely to be sold during the current period (on

FIFO basis), the same should be added to the cost of production. Thus, the adjustments for opening and closing stocks of finished goods are made in the following manner:

	Rs.
Cost of Opening Stock of Finished Goods, if any	……..
Add: Cost of Production of Goods produced	……..
Cost of Production of Goods available for sale	……..
Less: Cost of Closing Stock of Finished Goods, if any	……..
Cost of Production of Goods Sold	.....

Illustration 6 : The following information has been obtained from the costing records of a manufacturing company for the month of October, 2018:

Cost of Raw Materials on 1-10-18	……..	75,000
Cost of Raw Materials purchased	……..	9,60,000
Carriage on Purchases	……..	15,000
Chargeable Expenses	……..	80,000
Direct Wages Paid	……..	4,20,000
Factory Overheads	……..	2,30,000
Cost of Work-in Progress 1-10-18	……..	60,000
Cost of Raw materials on 30-10-18	……..	90,000
Cost of work in progress on 31-10-18	……..	75,000
Cost of Stock of Finished Goods on 1-10-18	……..	1,50,000
Cost of Stock of Finished Goods on 31-10-18	……..	1,80,000
Office & Administrative Overheads	……..	1,25,000
Selling & Distribution Overheads	……..	1,30,000
Sales	……..	22,50,000

You are required to prepare

i) Cost Sheet showing the cost of production of goods produced, and

ii) Statement showing cost of sales and profit for the month of October, 2018

Solution:

Cost Sheet for the Month of October, 2018

			Rs.
Cost of Direct Materials used			
Opening Stock of Raw Materials		75,000	
Add: Raw Materials purchased	9,60,000		
Add: Carriage on Purchases	15,000	9,75,000	
		10,50,000	
Less: Closing Stock of Raw Materials		90,000	9,60,000
Cost of Direct Labour			4,20,000

Cost of Chargeable Expenses	80,000
	14,60,000
PRIME COST	
Add: Factory Overheads	2,30,000
GROSS FACTORY/WORKS COST	16,90,000
Add: Cost of Opening Stock of Work-in-Progress	60,000
	17,50,000
Less: Cost of closing stock of Work-in-progress	75,000
FACTORY/WORKS COST	16,75,000
Add: Office & Administrative Overheads	1,25,000
COST OF PRODUCTION OF GOODS PRODUCED	18,00,000

2) Statement Showing the cost of Sales and Profit for the Month of October, 2018

	Rs.
Cost of Opening Stock of Finished Goods	1,50,000
Add: Cost of Production of goods produced	18,00,000
Cost of Production of goods available for sale	19,50,000
Less: Cost of Closing Stock of Finished Goods	1,80,000
COST OF PRODUCTION OF GOODS SOLD	17,70,000
Add: Selling & Distribution Overheads	1,30,000
COST OF SALES	19,00,000
Profit (Balancing Figure)	3,50,000
SALES	22,50,000

Sometimes, the cost of closing stock of finished goods is not given. In that case, the same can be worked out by multiplying the number of units in stock by cost of production per unit as ascertained in the cost sheet. The cost of opening stock of finished goods is usually given. But, if the same is not given, it can also be worked out with the help of the cost of production per unit for the current period based on the assumption that cost of production per unit for the current period and that of the preceding period are the same.

It is considered desirable to include an additional column for the quantity of goods in the Statement of Cost of Sales and Profit. This facilitates the ascertainment of the quantity of goods sold or the quantity of goods in stock, as the case may be.

12.5.4 Selling and Distribution Overheads

Quite often, instead of giving the selling and distribution overheads in the cost data the rate of 'selling and distribution overheads per unit' is given. In such a situation, the amount of selling and distribution overheads should

be worked out by multiplying the number of units sold by the selling and distribution expenses per unit. It should be noted that *this rate is to be applied to the units sold and not to the units produced.*

12.5.5 Computation of Recovery Rates for Overheads

Sometimes, you are required to calculate overheads recovery rates based on the cost sheet prepared by you. Such rates are usually in respect of factory overheads and administration overheads. Factory overhead rate is usually calculated as a percentage of direct wages as follows:

$$\frac{Factory\ Overheads}{\text{Direct}Wages} \times 100$$

Administration Overhead rate is usually calculated as a percentage of works cost as follows:

$$\frac{Office\ Administration\ Overheads}{\text{Factory / Works}Cost} \times 100$$

Selling and distribution overheads rate may be computed either as a percentage of works cost or as a percentage of sales.

Illustration 7 : The following is the cost data relating to product D for the year ending December 31, 2018.

	Rs.
Purchase of Raw Materials	1,20,000
Factory Rent & Insurance	8,000
Carnage Inwards	1,440
Other Factory Overheads	40,000
Direct wages	60,000
Stock on 1-1-2018	
Raw Materials	20,000
Finished Goods (1,000 tons)	15,000
Administrative Overheads Sales	28,400
Stock on 31-12-2018	2,99,000
Raw Materials	22,240
Finished Goods (2,000 tons)	31,950

There was no stock of work-in-progress either at the beginning or at the end. Advertisings and other selling costs were Re. 1 per ton. During the year 16,000 tonnes of product D was produced. As certain (a) total the cost of production (b) the Cost of goods stock the cost of sales, and, (d) the net profit for the year; and work out (1) the percentage of factory overheads on direct wages (ii) the percentage of administration overheads on works cost, and (iii) the net profit per ton.

Solution

Cost sheet of Product D for the Year ending December 31, 2018

Output : 16,000 units

Cost of Direct Materials used		
Opening Stock of Raw Materials	20,000	
Raw Materials purchased	1,440	
Add : Carriage inwards	1,20,000	
Less: Closing Stock of Raw Materials	1,41,440	
Direct Wages	22,240	1,19,200
PRIME COST		60,000
Factory Overheads		1,79,200
Rent & Insurance		
Other Factory Overheads		
Works Cost	8,000	
Administrative Overheads	40,000	48,000
		2,27,200
		28,400
COST OF PRODUCTION		2,55,600

$$\text{Cost of Production per Unit} = \frac{2,55,600}{16,000} = \text{Rs.}15,975$$

Statement of Cost of Sales and Profit

	Quantity (Tons)	Amount (Rs.)
Opening Stock of Finished Goods	1,000	15,000
Add: Cost of Production	16,000	2,55,600
	17,000	2,70,000
Less: Closing Stock of Finished Goods	2,000	31,950
COST OF GOODS SOLD		2,38,650
Add: Selling & Distribution Overheads (15,000 Re.1)		15,000
COST OF SALES		2,53,650
Net Profit		45,350
SALES		2,99,000

i) **Percentage of Factory Overheads to Direct Wages**

$$= \frac{\text{Factory Overheads}}{\text{DirectWages}} \times 100$$

$$= \frac{48,000}{60,000} \times 100$$

$$= 80\%$$

ii) **Percentage of Administration Overheads to Works Cost**

$$= \frac{\text{Administrative Overheads}}{\text{WorksCost}} \times 100$$

$$= \frac{28,400}{2,27,200} \times 100$$

$$= 12.5\%$$

iii) **Net Profit per Unit**

$$= \frac{\text{Net Profit}}{\text{Numberof Units Sold}}$$

$$= \frac{45,350}{15,000}$$

= Rs. 3.02

Check Your Progress B

1) Fill up the blanks:

   a) Realisable value of factory scrap should be deducted from ……

   b) Percentage of factory overheads to cost of direct labour ……

   c) Opening and closing stock of work-in-progress should be adjusted after the factory overheads are added to the but before the stage of……

   d) Selling and distribution overheads are incurred only on……. and not on……

2) State whether each of the following statements is **True** or **False** and justify your answer.

   a) Closing stock of work-in-progress should be valued on the basis of prime cost.

   b) Closing stock of finished goods should be valued on the basis of cost of sales.

   c) Selling and distribution overheads are incurred on the cost of production of goods produced.

d) Office & Administrative overheads are recovered usually on the basis of percentage to factory cost.

e) Selling and distribution overheads are recovered on the basis of percentage of works cost or percentage of sales.

12.6 PREPARATION OF STATEMENT OF QUOTATION/ TENDERING PRICE

Sometimes, the prospective buyer invites quotations from a number of suppliers for some goods with certain specifications. The term 'Quotation' refers to quoting the minimum price for obtaining a specific order. Such a price is quoted before the commencement of actual production in anticipation of obtaining the particular order. In such a situation, first the cost of such specific order should be estimated and then a reasonable amount of profit should be added thereto in order to determine the price to be quoted. While quoting the price for such specific order, one has to be cautious about the fact that the price is neither too high nor too low. In case the price is too high, offer will be rejected outright. On the other hand, if the price is too low, it will result in either lower profit or loss. Therefore. it is important to estimate the cost as accurately as possible. Although, estimation of cost is primarily based on past performance, all future trends must also be taken into account.

Statement of quotation is prepared in the same manner as Cost Sheet as shown in Illustration 8.

Illustration 8 : X Manufacturing Co. Ltd. receives an enquiry for the supply of 20,000 units of its products.

The costs are estimated as follows:

Raw Materials 1,00,000 Kgs @ Rs. 2 per kg.

Direct Wages 10,000 hours @ Rs. 8 per hour

Variable Overheads :

Factory Rs. 4.80 per labour hour

Selling & Distribution Rs. 32,000

Fixed Overheads :

Factory Rs. 12,000

Office & Administration Rs. 1,00,000

Selling & Distribution Rs. 28,000

The company adds 20% to its cost as its margin of profit. Prepare a Statement of quotation showing the price to be quoted.

Solution :

Statement of Quotation Showing the Price to be Quoted per unit and for 20,000 Units

		Total	Per Unit
		Rs.	Rs.
Estimated Cost of Direct Materials		2,00,000	10.00
Estimated Cost of Direct Labour		80,000	4.00
Estimated Prime Cost		2,80,000	14.00
Add: Estimated Factory Overheads			
Variable	48,000		
Fixed	12,000		
Estimated Factory Cost		60,000	3.00
		3,40,000	17.00
Add: Estimated Office & Administrative Overheads			
Estimated Cost of Production		1,00,000	5.00
		4,40,000	22.00
Add: Estimated Selling & Distribution Overheads			
Variable	32,000		
Fixed	28,000		
		60,000	3.00
Estimated Cost of Sale		5,00,000	25.00
Add : Desired Profit @ 20% on Cost Price		1,00,000	5.00
Estimated Selling Price		6,00,000	30.00

Sometimes, cost records for a particular period are given and the estimated cost of materials and labour of a work order are provided for the purpose of ascertaining its selling price to be quoted. In such a situation, you should prepare the cost sheet first and ascertain the recovery rates for factory overheads as a percentage to direct wages for administrative overheads as a percentage of works costs, and for selling and distribution overheads as a percentage of cost of goods sold (or as suggested). These rates must be duly adjusted with the anticipated changes, if any, before preparing the statement of quotation. Look at Illustration 9 and study how the statement of Quotation for a work order is prepared with the help of a given cost data.

Illustration 9 : The following figures have been obtained from the cost records of a manufacturing company for the year 2018:

	Rs.
Cost of Materials	2,40,000
Wages for Direct Labour	2,00,000
Factory Overheads	1,20,000
Distribution Expenses	56,000
Administration Expenses	1,34,400
Selling Expenses	89,600
Profit	1,68,000

A work order was executed in 2018 and the following expenses were incurred:

	Rs.
Cost of Materials	32,000
Wages for labour	20,000

Assuming that in 2018 the rate for factory overheads went up by 20% distribution charges went down by 10% and selling and administration charges went up by 12½%, at what price should the product be quoted so as to earn the same rate of profit on the selling price as in 2018. Show the full workings.

Factory overheads are based on direct wages while administration, selling and distribution expenses are based on factory Cost.

Solution

Statement of Cost for the Year 2018

	Rs.
Cost of Direct Materials .	2.40.000
Direct Wages	2,00,000
PRIME COST	4,40,000
Factory Overheads	1,20,000
WORK COST	5,60,000
Administration Overheads	1,34,400
COST OF PRODUCTION	6,94.400
Selling, Overheads	89.600
Distribution Overheads	56,000
COST OF SALES	8,40,000
Profit	1,68,000
SALES	10,08,000

Factory" Overheads Rate $= \frac{\text{Factory Overheads}}{\text{DirectWages}} \times 100$

$= \frac{1,20,000}{2,00,000} \times 100$

$= 60\%$

Administration Overheads Rate $= \frac{\text{Admn. Overheads}}{\text{WorksCost}} \times 100$

$= \frac{1,34,400}{5,60,000} \times 100$

$= 24\%$

Selling Overheads Rate $= \frac{\text{Selling Overheads}}{\text{WorksCost}} \times 100$

$= \frac{89,600}{5,60,000} \times 100$

$=16\%$

Distribution Overheads Rate $= \frac{\text{Distt. Overheads}}{\text{Works Cost}} \times 100$

$= \frac{56,000}{5,60,000} \times 100$

$= 10\%$

Rate of Profit $= \frac{1,68,000}{8,40,000} \times 100$

$=20\%$ of cost of sales

Statement of Quotation for a Work Order

	Rs.
Cost of Direct Materials	32,000
Direct Wages	20,000
PRIME COST	52,000
Factory Overheads (60% of wages plus 20% thereof i.e., 72% of wages)	14,400
WORK COST	66,400
Administration Overheads (24% of works cost plus $12\frac{1}{2}\%$ thereof i.e., 27% of works cost)	17,928
COST OF PRODUCTION	84,238
Selling Overheads (16% of works cost plus 10 thereof i.e., 18% of works cost)	11,952
Distribution Overheads (10% of works cost plus 10 thereof i.e., 9% of works cost)	5,976
COST OF SALES	1,02,256
Profit (12% of cost of sales)	20,451
ESTIMATED SELLING PRICE	1,22,707

12.7 COMPREHENSIVE ILLUSTRATIONS

Illustration 10 : The following particulars relating to the year 2018 have been taken from the books of a Chemical Works manufacturing and selling a chemical mixture:

	Kg.	Rs.
Stock on 1st January, 2018		
Raw Materials	2,000	2,000
Finished Mixture	500	1,750
Factory Stores		7,250
Purchases		
Raw Materials	1,60,000	1,80,000
Factory Stores		24,250
Sales		
Finished Mixture	1,53,050	9,18,000
Factory Scrap		8,170
Factory Wages		1,78.650
Power		30,400
Depreciation on Machinery		18,000
Salaries		
Factory		72,220
Office		37,220
Selling		41,500
Expenses		
Direct		
Office		
Selling		
Stock on 31st December, 2018		
Raw Materials		
Finished Mixture	1,200	?
Factory Stores	450	?
		5,500

The stock of finished mixture at the end of 2018 is to be valued at the factory cost of the mixture for that year. The purchase price of raw materials remained unchanged throughout the year. Prepare a statement giving the maximum possible information about cost and its break up for the year 2018.

Solution:

Cost Sheet of a Chemical Works for the year 2018

Output : 1,53,000 Kg

		Total Cost Rs.	Cost per unit Rs.
Cost of Direct Material used			
Cost of Opening stock of raw materials	2,000		
Add : Cost of Raw Materials purchased	1,80,000		
	1,82,000		
Less : Cost of Closing Stock of Raw Materials	1,350	1,80,650	1.181
Cost of Direct Labour		1,78,650	1.168
Cost of Direct Expenses		18,500	0.121
PRIME COST		3,77,800	2.470
Factory Overheads			
Cost of Factory Stores consumed :			
Opening Stock 7,250			
Add: Purchases 24,250			
31,500			
Less : Closing Stock 5,550	25,950		
Power	30,400		
Depreciation of Machinery	18,000		
Factory Salaries	72,220		
	1,46,570		
Less : Sale of Factory Scrap	8,170	1,38,400	0.904
WORKS COST		5,16,200	3,374
Office & Admn. Overheads			
Office Salaries	37,220		
Office Expenses	18,200	55,420	0.362
COST OF PRODUCTION		5,71,620	3,736

Statement Showing Cost of Sales and Profit for Year 2018

		Rs.
Cost of Opening Stock of Finished Mixture (500 kg.)		1,750
Add : Cost of production of Finished Mixture (1,53,000 kg.)		5,71,620
		5,73,370
Less: Cost of Closing stock of Finished Mixture (450 kg.)		1,518
COST OF GOODS SOLD (1,53,050 kg)		5,71,852
Selling & Distribution Overheads		
Salaries	41,500	

Selling Expenses	18,000	59,500
COST OF SALES (1,53,050 Kg.)		6.31.352
Profit (Balancing figure)		2,86,648
Sales (1,53,050 Kg. finished mixture)		9,18,000

Working Notes

1) Production during the year = Goods Sold + Closing Stock - Opening Stock = (1,53,050 + 450 – 500)

= 1,53,050 Kg.

Value of Closing Stock of Raw Materials $= \frac{1,80,000}{1,60,000} \times 1,200 = Rs.1,350$

Value of Closing Stock of Finished Mixture $= Rs.\frac{5,16,200}{1,53,000} \times 450 = Rs.1,518$

Illustration 11

Work out in Cost Sheet form the unit cost of production per ton of Special Paper manufactured by a paper mill in March, 2018 from the following data:

Direct Materials

Paper Pulp 500 tons @ Rs. 50 per ton

Other Materials 100 tons @ Rs. 30 per ton

Direct Labour

80 Skilled men @ Rs. 3 per day for 25 days

40 Unskilled men @ Ks. 2 per day for 25 days

Direct Expenses

Special Equipment Rs. 3,000

Special Dyes Rs. 1,000

Works Overheads

Variable @ 100% and Fixed @ 60% on Direct Wages

Administrative Overheads @ 10%

Selling and Distribution Overheads @ 15% on Works Cost

Forty tons of special paper was manufactured and Rs. 800 was realised by the sale of waste material during the course of manufacture. The scrap value of the special equipment after utilisation in manufacture is nil.

Solution

Cost Sheet of a Paper Mill for the Month of March, 2018

Output : 400 Ton

		Total Cost	Cost per Ton
		Rs.	Rs.
Cost of Direct Materials used			
Paper Pulp = 500 Rs. 50 =	25,000		
Other Materials = 100 Rs, 30 =	3,000		

	28,000		
Less: Sale of Waste Materials	800	27,200	68.00
Cost of Direct Labour			
Skilled Men = 80 × Rs. 3 × 25	6,000		
Unskilled Men = 40 × Rs. 2 × 25	2,000	8,000	20.00
Cost of Direct Expenses			
Special Equipment	3,000		
Special Dyes	1,000	4,000	10.00
PRIME COST			
Works Overheads			
Variable (100% on direct wages)	8,000		
Fixed (60% on direct wages)	4,800	12,800	32.00
WORKS COST		52,000	130.00
Administrative or Overheads (10% on Work Cost)		5,200	13.00
COST OF PRODUCTION		57,200	143.00
Selling & Distribution Overheads (15% on Works Cost)		7,800	19.50
COST OF SALES		65,000	162.50

Illustration 12 : Cooling Ltd. manufactured and sold 1,000 refrigerators in the year ending 31st March, 2018. The summarised Trading and Profit & Loss Account is set out below:

	Rs.		Rs.
To Cost of Materials	8,00,000	By Sales	40,00,000
To Direct Wages	12,00,000		
To Other Manufacturing Cost	5,00,000		
To Gross Profit c/d	15,00,000		
	40,00,000		40,00,000
To Management and Staff Salaries	6,00,000	By Gross Profit b/d	15,00,000
To Rent, Rates and Insurance	1,00,000		
To Selling Expenses	3,00,000		
To General Expenses	2,00,000		
To Net Profit	3,00,000		
	15,00,000		15,00,000

For the year ending 31st March 2019, it is estimated that—

a) Output and Sales will be 1,200 refrigerators.

b) Prices of Material will go up by 20% on the level of previous year.

c) Wages will rise by 5%.

d) Manufacturing costs will rise in proportion to the combined cost of Material and wages.

e) Selling cost per unit will remain unaffected.

f) Other expenses will also remain constant.

You are required to submit a statement to the Board of Directors showing the price at which the refrigerators should be marketed so as to show profit of 10% on selling price.

Solution :

Statement showing Estimated Selling Price of Refrigerators for the year ending 31st March, 2018

Output : 1,200

	Total Cost	Per Unit
Cost of Direct Materials	11,52,000	960
Cost of Direct Labour	15,12,000	1,260
PRIME COST	26,64,000	2,220
Add : Factory Overheads	6,66,000	555
FACTORY COST	33,30,000	2,775
Add : Office & Administrative Overheads	9,00,000	750
COST OF PRODUCTION	42,30,000	3,525
Add: Selling & Distribution Overheads	3,60,000	300
COST OF SALES	45,90,000	3,825
Add: Profit @ 10% on Selling Price i.e., 1/9 on Cost of Sales	5,10,000	425
Estimated Selling Price	51,00,000	4,250

Working Notes :

1) For the sake of convenience, it is desirable that the cost sheet for the last year is prepared as follows :

Cost Sheet of Cooling Ltd for the year ended 31.3.2018

	Total Cost	Cost Per Unit
Cost of Direct Materials	8,00,000	800
Cost of Direct Labour	12,00,000	1,260
PRIME COST	20,00,000	2,000
Add : Factory Overheads (Other Manufacturing Costs)	5,00,000	555
FACTORY COST	25,00,000	2,775
Add : Office & Administrative Overheads	9,00,000	750
Management & Staff Salaries 6,00,000		
Rent, Rates & Insurance 1,00,000		
General Expenses 2,00,000	9,00,000	900
COST OF PRODUCTION	34,00,000	3,400
Add: Selling & Distribution Overheads	3,00,000	300
COST OF SALES	37,00,000	3,700

2) It is important to note he that the cost of all variable items should be determined per unit and the same should be multiplied by the output for the next year. Thus, increase in the volume of output will be automatically taken care of.

3) Cost of direct material per unit for the next year

$$= 800 + \left(\frac{20}{100} \times 800\right) = 800 + 160 = \text{Rs.}960$$

4) Cost of direct labour per unit for the next year

$$= 1,200 + \left(\frac{5}{100} \times 1,200\right) = 1,200 + 60 = \text{Rs.}1,260$$

5) Increase in combined cost of material and labour i.e., Prime Cost

$$= \left(\frac{2,220 - 2,000}{2,000}\right) \times 100 = \frac{220}{2,000} \times 100 = 11\%$$

∴ Manufacturing cost per unit for the next year….

$$= 500 + \left(\frac{11}{100} \times 500\right) = 500 \times 55 = \text{Rs.}555$$

12.8 LET US SUM UP

Unit costing is a method of costing used in those industries which are engaged in mass production of homogeneous/identical products. This method of costing is applied in a large number of industries like automobiles, electronics, collieries, quarries, brick making, etc.

A Statement of Cost/Cost Sheet is prepared at periodical intervals showing the total cost and cost per unit of each element of cost side by side. The cost per Unit 5 arrived at by dividing the total cost incurred by the total number of units produced. An alternative way of presentation of this cost information is in the form of a ledger account called 'Production Account'

Sometimes, a statement of quotations is required to be prepared in order to find out the price to be quoted to the prospective buyer for obtaining a specific order. While preparing this statement, cost for the specific order should be estimated first and, thereafter, a reasonable amount of profit should be added to the estimated cost. The resultant figure shall represent the selling price to be quoted.

12.9 KEY WORDS

Chargeable Expenses: Other direct expenses.

Cost of Production of Goods Sold : Cost of opening stock of finished goods plus cost of production of goods produced minus cost of closing stock of finished goods.

Cost of Production of Goods Produced : Total of factory/works cost and office and administrative overheads.

Cost of Sales : Total of cost of production of goods sold and selling & distribution overheads.

Factory/Works Cost : Total of prime cost and factory overheads.

Production Account: Statement of cost prepared in the form a ledger account. It is similar to Manufacturing Account prepared in financial accounts.

Prime Cost: Direct cost i.e., total of cost incurred on direct materials, direct labour and direct expenses.

Selling Price/Price of Tender: Total of cost of sales and desired amount of profit.

Work-in-Progress: Semi-finished goods.

12.10 ANSWERS TO CHECK YOUR PROGRESS

A) 1. a) Cost of opening stock of raw materials + Cost of raw materials purchased - Cost of closing stock of raw materials.

b) Cost of direct materials + Cost of direct labour + Cost of direct expenses.

c) Cost of production of goods sold ÷ Selling & Distribution overheads.

d) Office & Administrative overheads.

e) Profit.

2) a) False, b) True, c) True, d) False, e) False.

3) Automobiles, Electronics, Collieries, Quarries, Brick making etc.

1) a) Factory Overheads, c) prime Cost, factory Cost,

d) goods sold, goods produced.

2) a) False, b) False, c) False, d) True, e) True.

12.11 TERMINAL QUESTIONS/EXERCISES

Questions:

1) Define Unit Costing. Mention the industries to which this method of costing is applicable.

2) What is a cost sheet? In what respect does it differ from a Production Account?

3) Describe in brief the various components of Total Cost.

Exercises:

1) Prepare a Cost Sheet from the following data to find out profit and cost per unit :

	Rs.
Raw Materials consumed	Rs. 1,60,000

Direct Wages	Rs.80,000
Factory Overheads	20% of Direct Wages
Administrative Overheads	10% of Factory Cost
Selling Overheads	Rs. 12,000
Units produced	4,000
Units sold	Rs. 100 per unit
Selling Price	Rs. 100 per unit

(**Answer:** Prime Cost: Rs. 2,40,000; Factory Cost: Rs. 2,56,000; Cost of production of goods produced : Rs. 2,81,600; Cost of Sales: Rs. 2,65,440; and Profit : Rs. 94,560)

2) You are the chief of the Cost Accounting Department of Leather Products India Ltd. Your organisation manufactures shoes. The following figures have been extracted from the account books relating to the production of shoes for the year 2018.

	Rs.
Raw Materials consumed (including abnormal wastage of Rs. 10,000)	5,10,000
Direct Wages paid	4,00,000
Factory Overheads	1,00,000
Tools consumed	10,000
Depreciation of Machines (Factory)	5,000
Machines imported	1,00,000
Work Expenses (Misc.)	50,000
Office Expenses	25,000
Overheads for Office	40,000
Managing Director's Salary	50,000
Stationery & Printing (Office)	5,000
Depreciation of Machines (Office)	1,000
Selling and Distribution Expenses	25,000
Entertainment of customers	20,000
Advertising	30,000
Dividend paid	1,00,000

Prepare a cost analysis statement after considering the following

i) The profit rate is 20% on sales.

ii) Wages outstanding Rs. 25,000.

Hint : Abnormal wastage of raw materials should be treated separately and as such, it should not form part of cost.

(Answer: Cost of raw materials consumed; Rs. 5,00,000, Cost of direct labour: Rs. 4,25,000; Prime Cost: Rs. 9,25.000; Factory Overheads :

Rs.1 ,65,000 Factory Cost: Rs. 10,90,000; Administrative Overheads : Rs. 1,21,000; Cost of production of goods produced : Rs. 12,11,000; Selling & Distribution Overheads: Rs. 75,000; Cost of Sales :Rs. 12,86,000; Profit: Rs. 3,21,500 & Sales: Rs. 16,07,500)

3) The following details have been obtained from the cost records of Comet Paints Limited:

	Rs.
Stock of Raw Materials on 1st September, 2018	75,000
Stock of Raw Materials on 31st September, 2018	91,500
Direct Wages	52,500
Indirect Wages	2,750
Sales	2,11,000
Work-in-progress on 1st September, 2018	28,000
Work-in-progress on 30th September, 2018	35,000
Purchase of Raw Materials	66,000
Factory Rent, Rates and Power	15,000
Depreciation of Plant and Machinery	3,500
Expenses on Purchases	1,500
Carriage Outwards	2,500
Advertising	3,500
Office Rent & Taxes	2,500
Travellers' Wages and Commission	6,500
Stock of Finished Goods on 1st September, 2018	54,000
Stock of Finished Goods on 30th September, 2018	31,000

Prepare a Production Account giving the maximum possible break up of costs and profit.

(**Answer:** Cost of Raw Materials consumed: Rs. 51,000; Prime Cost:

Rs. 1,03,500; Factory Overheads : Rs. 21,250; Factory Cost: Rs. 1,17,750; Cost of Production of goods produced : Rs. 1,20,250; Cost of Production of Goods Sold: Rs. 1,43,250; Selling & Distribution overheads: Rs. 12,500; Cost of Sales: Rs. 1,55,750; and Profit : Rs. 55,250)

4) A company makes two distinct types of vehicles A and B. The total expenses during a period as shown by the books for assembly of 600 of A and 800 of B are as under:

	Rs.
Material	1,98,000
Wages	12,000
Stores Overheads	19,800
Running Expenses of Machine	4,400
Depreciation	2,200
Labour Amenities	1,500
Works General Expenses	30,000
Administration and Selling Expenses	26,790

Other Data available to you are	A:B
Material Cost Ratio per Unit	1:2

Direct Labour Ratio per Unit	2:3
Machine Utilization Ratio per Unit	1:2

Calculate the cost of each vehicle per unit giving reasons for the basis of apportionment adopted by you.

Hint: a) Calculate the effective ratio by taking into account the total output of two vehicles as follows:

Effective Material Ratio	=	1 600 : 2 800
	=	600: 1600=3: 8
Effective Labour Ratio	=	2 600: 3 800
	=	1200:2400=1:2
Effective Machine Utilisation Ratio	=	1 600 : 2 800
	=	600: 1600=3:8

b) Apportion Material and Stores overhead in Material ratio, Direct wages, Labour amenities and Works general expenses in Labour ratio, Running expenses of Machine and Depreciation in Machine utilization ratio and Administrative & selling expenses in the ratio of works cost.

(**Answer:** Prime Cost : A - Rs. 58,000/Rs. 96.67, B - Rs. 1,52,000/Rs. 190.00;

Factory Overheads : A - Rs. 17,700/Rs. 29.50; B-Rs. 40,200/Rs. 50.25; Works Cost: A - Rs. 75,700/Rs. 126.17; B - Rs. 1,92,200/Rs. 24025; Total Cost/Cost of Sales; A - Rs. 83,270/Rs. 138.79,

B - Rs. 2,11,420/- Rs. 264.28)

5) From the following information prepare the Cost Sheet of Pig Iron showing cost of Pig Iron produced and Cost per tonne of each item of expenditure:

	Stock on 1st August, 2018	Purchases during the month of August, 2018	Stock on 31st August, 2018
	Rs.	Rs.	Rs.
Iron Ore	10,800	56,000	10,200
Lime Stone	4,500	15,000	4,800
Coal	94,000	70,000	47,000
Coke	10,500	59,000	7,200
Sundries	6,500	24,000	7,500
Wages Paid		Rs. 66,000	
Works Charges		Rs. 44,500	
Sale of Slag during the month was		Rs. 8,500	

Production of Pig Iron during the
month was 1,000 Tonnes

(**Answer:** Cost of Direct Materials used: Rs. 2,73,600; Factory Cost/Cost of Production: Rs. 3,75,600; Cost per tonne: Rs. 375.60)

6) The following particulars have been made available from the Cost Ledger of a company:

The company is required to submit a tender for a large machine The Cost Department estimates that the materials will costs. 40.000 and wages to fabricate the machine Rs. 24.000. The tender is to be made at a net profit of 20% on selling price.

Prepare a statement showing a) Cost of materials used, b) total cost, c) percentage of factory overheads to direct wages, and d) percentage of office overheads to works cost. Also prepare a statement of quotation showing the price at which the tender of the machine can be submitted. (**Answer:** Cost of materials used : Rs. 5,82,400; Total cost Rs. 11,38,520;

Percentage of Factory Overheads to Direct Wages 22%; Percentage of Office Overheads to Works Cost 6.65%; Price to be quoted in tender: Rs. 92,360.)

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

SOME USEFUL BOOKS

Arora, M.N. 1988. A Text Book of *Cost Accountancy*, Vikas Publishing ouse Pvt. Ltd.: New Delhi. (Chapters 14, 15, 16, 17, 19)

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Owner, L.W.J. and J.L. Brown, 1984. Wheldon's *Cost Accounting*, ELBS :

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UNIT 13 JOB COSTING

Structure

13.0 Objectives

13.1 Introduction

13.2 Job Costing

13.2.1 Definition and Characteristics

13.2.2 Applicability

13.2.3 Procedure

13.2.4 Evaluation

13.2.5 Practical Problems

13.4 Let Us Sum Up

13.5 Key Words

13.6 Answers to Check Your Progress

13.7 Terminal Questions/Exercises

13.0 OBJECTIVES

After studying this unit, you should be able to:

- define job costing and describe its special features;
- explain the procedure adopted for costing purposes in case of job costing;
- evaluate job costing as a method of cost ascertainment; and
- prepare a job cost sheet;

13.1 INTRODUCTION

If a firm is engaged in producing homogeneous product, it uses unit costing method about which you studied in Unit 2. But, where a firm is engaged in undertaking small jobs involving different amount of material, labour and overhead costs such as automobile repair shop, interior decorators, furniture makers, etc., unit costing method cannot be applied. The method of costing used by them is known as 'job costing' which treats each job as a separate unit of cost. Under this method, costs are accumulated and analysed job-wise. When, however, a firm undertakes big jobs like constructing a building, road, bridge, etc., which involve huge sums and long duration, it stops contract costing method of ascertaining cost and profit. The special feature of such jobs is that they may remain incomplete by the end of the accounting year. Hence, ascertainment of profit or loss has many complexities. In this unit, you will learn about both the methods in detail and study how cost and profit of small jobs are ascertained. To be more specific, you will learn about the preparation of Job Cost Sheet.

13.2 JOB COSTING

Job Costing refers to the method of ascertaining costs where product is manufactured or service is provided against specific order, as distinct from continuous production for stock and sale. Under this method, costs are collected and recorded for each job, or a batch of similar jobs, under a separate production order number. Each job has its own characteristics and needs special treatment. Take the example of a machine tool manufacturer or an automobile repair shop. Each order of machine or each repair job involves different amount of materials, labour and overheads. Hence, it is necessary to accumulate the costs for each order or job so that its total cost can be determined and proper' matching of costs and revenues can be made.

13.2.1 Definition and Characteristics

The ICMA Terminology provides an excellent description of job costing which defines it as "that form of specific order costing which applies where work is undertaken to customers' special requirements and each order is of comparatively short duration. The work is usually carried out within a factory or work shop and moves through processes and operations as a continuously identifiable unit".

Thus, the special features relating to production and cost ascertainment in industries where job costing can be applied are:

i) Each job is unique, specific and dissimilar.

ii) Each job is undertaken to customer's special requirements and not for stock.

iii) Each job is comparatively of a short duration.

iv) Each job is capable of identification at all stages of production.

v) Each job order is separately identified by a job order number.

vi) There is no uniformity in the flow of production from department to department.

vii) Direct costs of labour, materials and expenses are booked directly against the job order.

viii) Overheads are charged on the basis of predetermined rates.

13.2.2 Applicability

Keeping in view the above features, job costing may be usefully employed in the following organisations:

Printing Press: Each item to be printed, whether it is a handout, a book or an advertising flyer, is a separate job.

Garage : Each car to be repaired or tuned up becomes a separate job.

Furniture Manufacturer: Each order for furniture is treated as an individual job. For example, several units of one style of chairs will be produced in one batch.

Service Organisation stations : A firm of Chartered Accountants is an example of a service Organisation. Each work-order assigned by the client is treated as a separate job and fees charged accordingly.

Construction Companies: Each building is a separate job because each building has different covered area and a different design.

13.2.3 Procedure

Job Costing involves considerable amount of recording and analysis. It requires reliable production control records which must show material issued to various jobs, labour time spent on different jobs and the appropriate allocation of overheads as work on each job passes through production cost centres. A concern using job costing usually adopts the following procedure for costing purposes.

1) **Estimating the job costs:** Estimating is an essential requirement of a job costing procedure. It is useful for submission of tenders and price quotations. The Costing Department has to prepare an estimate of the total cost for each job before it is undertaken. This forms the basis for quoting the price to the customer.

2) **Allocating job order number:** As soon as an order is received and accepted, it must be assigned a separate job order number. This facilitates reference for production as well as for costing purposes.

3) **Preparing production order:** If the job is accepted, a production order is made out by the Planning Department in the form as shown in Figure 13.1.

A production order refers to the work order or job order that constitutes a written authority to factory proceed with a job. It stipulates all essential details of the order to be executed. In fact, it serves as the authority for accounting costs assigned to a job.

Figure 13.1 Form of Production Order

<table>
<tr><td colspan="3">Name of Customer……..
Date of Commencement…….
Date of Completion……..
Special instructions……...</td><td>Job No…….
Date……..

Bill of Material No…...
Drawing Attached Yes/NO</td></tr>
<tr><td>Quantity</td><td>Description</td><td>Machines to be used</td><td>Tools required</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

4) **Collecting and recording costs :** The costs are collected and recorded for separately. A job cost sheet as shown in Figure 13.2 is used for recording and summarising the cost of materials, labour and overheads applicable to each job. A job cost sheet is often referred to as the basic document of job costing. It is used the Work-in-progress Control Account when a job is completed and also to the profit or loss on each job.

Figure 13.2 : Form of Job Cost Sheet

Job Cost Sheet

Customer……. Job No……..

Date of Commencement…….. Date of completion……

Material Cost				Labour Cost					Factory Overhead (Absorbed)			
Date	Material Req. no.	Amount Rs.		Date	Hours	Rate Rs.	Amt. Rs.		Dept.	Hours	Rate Rs.	Amt. Rs.
Total				Total					Total			

Profit/Loss		Cost Summary	
	Rs.		Rs.
Price Quoted ……..		Material	
Less : Cost …….		Labour	
		Factory Overhead	
		Administration Overhead	
		Selling Overhead	
Profit or Loss …….			
		Total Cost	

The sources for collection of job costs are:

a) **Materials :** Material Requisition Slip, Materials Abstract or Materials Issue Analysis Sheet.

b) **Wages:** Job Card or Labour Abstract (Wages Analysis Sheet)

c) **Direct Expenses:** Vouchers pertaining to direct expenses

d) **Overheads :** Charged on the basis of pre-determined rates based on the method of absorption used.

5) **Comparing actual costs with estimated costs:** On completion of a job, a completion report is sent by the Production Shop to the Costing Department. The Costing Department, then, prepares the job cost sheet and ascertains the actual cost and profit on the job. Thereafter, a comparison is made with estimates to find out any variance and suggest future course of action.

13.2.4 Evaluation

The main purpose of job costing is to determine the profit or loss on each job. This serves as a check on the accuracy of the estimates on the basis of which the prices are quoted. Comparison of actual costs with the estimated

costs, or with the cost of similar jobs completed in the past, helps to bring to light any inefficiencies that might have occurred in the course of production. Thus, job costing separates profitable jobs from unprofitable ones, provides a check on past estimates, and serves as a basis for estimating costs for similar work in future. This method is also used when contracts are accepted on a 'cost plus' basis i.e., actual costs plus an agreed percentage of profit.

The main drawback of job costing relates to the expenditure involved in the paper work in estimating costs, and designing and scheduling of production. It should, therefore, be used when absolutely necessary.

Check Your Progress A

1. List four features of job costing.
2. Name four industries in which job costing is considered a suitable method of ascertaining costs.
3. Fill in the blanks.
   i) Job costing is applied where can be ……measured in terms of completed jobs.
   ii) Under job costing, each job is assigned a……number.
   iii) Each job order is capable of ……at all stages.
   iv) A job order is the ……of costing under job costing.
   v) A job cost sheet is used to ……..job costs.
4. State whether the following statements are **True** or **False** and justify your answer.
   i) Job Costing routine involves little clerical work.
   ii) A Production order constitutes the authority for work.
   iii) The main purpose of job costing is to determine the profit made on each job.
   iv) The overhead rate should be used for accumulating costs for accounting purposes and not for estimating the cost of job.
   v) Each job is comparatively of a short duration.

13.2.5 Practical Problems

You have learnt that a job cost sheet is prepared for recording and summarising the Cost of materials, labour and overheads pertaining to each job and ascertains the profit or loss made on each job. On going through its format as given in Figure 13.2. you might have observed that it is very much similar to the cost sheet prepared under unit costing for ascertaining the total cost and profit of a product.

Under job costing, the practical problems mostly involve the preparation of cost estimates and the ascertainment of price to be quoted. You learnt about this aspect also under unit costing (refer to Unit 10, Section 10.5) wherein you were required to prepare a statement of quotation based on cost estimates where overheads were included on the basis of recovery rates. More or less, the same practice is followed under job costing as shown by various illustrations worked out as follows:

Illustration 1: The estimated material cost of job D-2 is Rs. 5,000 and

direct labour cost is likely to be Rs. 1,000. In the machine shop it will require machining by Machine No. 8 for 20 hours and by Machine No. 11 for 6 hours. Machine hour rates for Machine No. 8 and Machine No. 11 are Rs. 10 and Rs. 15 respectively. Last year, the direct wages amounted to Rs. 80,000 and factory overheads (excluding those related to Machine No. 8 and 11) amounted to Rs. 48,000. Similarly, the factory cost of all jobs last year amounted to Rs. 2,50,000 and office expenses Rs. 37,500. Prepare a statement of quotation which provides for 20% profit used on selling price.

Statement of Quotation for job Number D-2

Direct Materials	5,000
Direct Wages	1,000
PRIME COST	6,000
Machine Expenses	
Machine 8:20 10 = Rs. 200	
Machine 11 : 6 15 = Rs. 90	290
Other Factory Overheads	
(60% of wages)	600
FACTORY COST	6,890
Office Overheads	
(15% of factory cost)	1,034
TOTAL COST	7,924
PROFIT (20% on selling price)	1,981
SELLING PRICE	9,905

Working Notes :

1) Factory overheads rate has been worked out as 60% of wages as under:

$$= \frac{\text{Factory Overheads}}{\text{Direct Wages}} \times 100$$

$$= \frac{48,000}{40,000} \times 100$$

$$= 60\%$$

2) Office overhead rate has been worked out as 15% of factory cost as under:

$$= \frac{\text{Office Overheads}}{\text{Factory Cost}} \times 100$$

$$= \frac{37,500}{2,50,000} \times 100$$

$$= 15\%$$

Illustration 2 : A shop floor supervisor of a small factory presented the following cost data for job No. 42.

	Per Unit
	Rs.
Materials	70
Direct Wages (18 hours @ Rs. 2.50)	45
(Deptt. X-8 hrs., Deptt. Y-6, hrs., Deptt. Z-4 hrs.)	
Chargeable Expenses (special stores items)	5
PRIME COST	120
Add : 33 % of prime cost for expenses	40
TOTAL COST	160

Analysis of the Profit and Loss Account of 2018 shows the following:

Dr.			Cr
	Rs.		Rs.
Materials used	1,50,000	Sales	2,50,000
Direct Wages:			
Deptt. X 10,000			
Deptt. Y 12,000			
Deptt Z 8,000			
	30,000		
Special Stores Items	4,000		
Overheads:			
Deptt. X 5,000			
Deptt. Y 9,000			
Deptt. Z 2,000			
	16,000		
Gross Profit c/d	50,000		
	2,50,000		2,50,000
Selling Expenses	20,000	Gross Profit b/d	50,000
Net Profit	30,000		
	50,000		50,000

It is also noted that the hourly wage rate for the three departments X, Y and Z is same. You are required to:.

1) Draw up a job cost sheet.

2) Calculate revised cost using 2018 figures as the base.

3) Add 20% of total cost to determine the selling price.

Solution :

Job Cost Sheet

Job No. 42 Date of Commencement……

Description …… Date of Completion…...……

Particulars	Rate	Quantity	Amount
			Rs.
Materials			70.00
Direct Wages:			
Deptt. X	Rs. 2.50	8 hrs	20.00
Deptt Y	Rs. 2.50	6 hrs	15.00
Deptt Z	Rs. 2.50	4 hrs	10.00
Chargeable Expenses			5.00
		PRIME COST	120.00
Add: Overheads:			
Deptt. X	Rs. 1.250	8 hrs	10.00
Deptt Y	Rs. 1.875	6 hrs	10.00
Deptt Z	Rs. 0.625	4 hrs	2.50
		TOTAL COST	143.75
Add: Profit (20% of total Cost)			28.75
		SELLING PRICE	172.50

Working Notes:

1) The number of working hours has been ascertained by dividing the direct wages in each department by the labour hour rate.

$$\text{Overhead Rate} = \frac{\text{Overheads}}{\text{No. of hours}}$$

$$\text{Deptt. X} = \frac{\text{Rs.5,000}}{\text{4,000hrs}} = \text{Rs.1,250 per hour}$$

$$\text{Deptt. Y} = \frac{\text{Rs.9,000}}{\text{4,800hrs}} = \text{Rs.1,875 per hour}$$

$$\text{Deptt. X} = \frac{\text{Rs.2,000}}{\text{3,200hrs}} = \text{Rs. 0.625per hour}$$

Illustration 3 : A factory uses job costing. The following data is obtained from its books for the year ended 31st December, 2018:

	Rs.		Rs.
Direct Materials	90,000	Selling and Distribution Overheads	52,500
Direct Wages	75,000	Administration Overheads	42,000
Profit	60,900	Factory Overheads	45,000

a) Prepare a Job Cost Sheet indicating the Prime Cost, Works Cost, Cost of Production, Cost of Sales and Sales Value.

b) In 2018, the factory received an order for a number of jobs. It was estimated that direct materials required would be for Rs. 1,20,000 and direct labour would cost Rs. 75,000. What should be the price for these jobs if factory intends to earn the same rate of profit on sales as in 2018, assuming that the selling and distribution overheads had gone up by 15%? The factory recovers factory overheads as a percentage of direct wages and administration and selling and distribution overheads as a percentage of works cost.

Solution

Job Cost Sheet for the Year ended 31-12-2018

		Rs.
Direct Materials		90,000
Direct Wages		75,000
	PRIME COST	1,65,000
Factory Overheads		45,000
	WORKS COST	2,10,000
Administration Overheads		42,000
	COST OF PRODUCTION	2,52,000
Selling and Distribution Overheads		52,500
	COST OF SALES	3,04,500
Profit		60,900
	SALES VALUE	3,65,400

Overhead Recovery Rates

1) Percentage of Factory Overheads to Direct Wages

$$= \frac{45,000}{75,000} \times 100 = 60\%$$

2) Percentage of Admin. Overheads to Works Cost

$$= \frac{42,000}{2,10,000} \times 100 = 20\%$$

3) Percentage of Selling & Distribution Overheads to Works Cost

$$= \frac{52,500}{2,10,000} \times 100 = 25\%$$

4) Percentage of Profit to Sales

$$= \frac{60,900}{3,65,000} \times 100 = 16.67\%$$

Estimate Job Cost Sheet for 2018

	Rs.
Direct Materials	1,20,000
Direct Wages	75,000
PRIME COST	1,95,000
Add: Factory Overheads (60% of direct wages)	45,000
WORKS COST	2,40,000
Add: Administration Overheads (20% of works cost)	48,000
COST OF PRODUCTION	2,88,000
Add: Selling & Distribution Overheads (25% of works cost + 15% thereof)	69,000
COST OF SALES	3,57,000
Add: Profit (16.67% of sales or 20% of cost of sales)	71,400
SALES	4,28,000

Illustration 4 : The following information for the year ended December 31, 2018 is obtained from the books and records of a job order factory:

	Completed jobs	Work-in-progress
	Rs.	Rs.
Raw Materials supplied from stores	90,000	30,000
Wages	1,00,000	40,000
Chargeable Expenses	10,000	4,000
Materials transferred to work-in-progress	2,000	2,000
Materials returned to stores	1,000	---

Factory Overheads are 80% of wages and office overheads are 25% of Factory Cost. The price of the executed Contracts during 2018 was Rs. 4,10,000. Prepare (i) Consolidated Completed Jobs Account showing the profit made or loss incurred, and also Consolidated Work-in-progress Account.

Solution

Consolidated Completed Jobs Account for the Year ending 31-12-2018

Dr. Cr.

		Rs.		Rs.
To Materials	90,000		By Sales	4,10,000
Less Transfer to W.I.P. 2,000				
Returned to stores 1,000	3,000	87,000		
To Wages		1,00,000		
To Chargeable Expenses		10,000		
PRIME COST		1,97,000		
To Factory Overheads (80% of wages)		80,000		
FACTORY COST		2,77,000		
To Office Overheads (25% of factory cost)		69,250		
COST OF PRODUCTION		3,46,250		
To Net Profit		63,750		
		4,10,000		4,10,000

Consolidated Work-in-progress Accounting for the year ending 31-12-2018

Dr. Cr.

		Rs.		Rs.
To Materials	30,000		By Balance c/d	1,35,000
Add : Transfer to W.I.P.	2,000	32,000		
To Wages		40,000		
To Chargeable Expenses		4,000		
PRIME COST		76,000		
To Factory Overheads (80% of wages)		32,000		
FACTORY COST		1,08,000		
TO Office Overheads (25% of factory cost)		27,000		
COST OF PRODUCTION		1,35,000		
To balance b/d		1,35,000		1,35,000

13.4 LET US SUM UP

Job costing is the method of ascertaining costs where work is undertaken to customers' special requirement and which is in the form of small jobs. Thus, this method is used for jobs like car repairs, painting and decorating, printing, furniture making, etc. Under this method, each job is treated as a separate cost unit and a Job Cost Sheet is prepared to ascertain the cost and profit on each job. The Job Cost Sheet can also be used for estimating the cost of a job to be undertaken and for submitting the quotation therefor.

13.5 KEY WORDS

Bill of Materials: The document contains a complete list of materials required for a given job.

Job Costing: Specific order costing involving accumulation of costs relating to a single cost unit-the 'job' - when each order is of comparatively short duration. It is also called job order costing.

Job Cost Sheet : A statement showing cost and profit relating to a specific job a batch or a contract.

Production Order: A document prepared by the Planning Department authorising and stipulating the details of the work to be done on the job undertaken.

13.6 ANSWERS TO CHECK YOUR PROGRESS

A) 3. i) output, ii) job order, iii) identification, iv) unit, v) summarise

4. i) False, ii) True, iii) True, iv) False, v) True

13.7 TERMINAL QUESTION/EXERCISES

1) Define job costing and describe its special features.

2) Explain different steps adopted fro costing purposes. Name a few organizations where job costing method is prepared.

3) How can job costing method be evaluated ? What are the practical problems involved in the preparation of cost estimates ? Support your answer with an appropriate illustration.

4) Explain the use of a production order and give its specimen.

Exercises

1) The following direct costs were incurred on Job No. 415 of standard Radio Company:

	Rs.
Materials	**4,010**

Wages:

Deptt. A-60 hours @ Rs. 3 per hour

Deptt. B-40 hours @ Rs. 2 per hour

Deptt. C-20 hours @ Rs. 5 per hour

Overheads expenses for these three departments were estimated as follows:

Variable Overheads:

Deptt. A Rs. 5000 for 5,000 labour hours

Deptt B Rs. 3000 for 1,500 labour hours

Deptt C Rs. 2,000 for 500 labour hours

Fixed overheads: Estimated at Rs. 20,000 for 10,000 normal working hours.

You are required to calculate the cost of job No. 415 and calculate the price to earn profit of 25% on selling price.

(**Answer :** Total Cost : Rs. 4,830; Sales Price: Rs. 6,440)

2) A company is engaged in job work. It has completed all jobs in hand except Job No.44 on December 30, 2018. The cost sheet on December 30 showed direct material and direct labour costs of Rs. 40,000 and Rs. 30,000 respectively as having been incurred on Job No. 44.

The costs incurred by the business on 31st December, 2018. the last day of the accounting year, were as follows:

	Rs.
Direct Materials (Job 44)	2,000
Direct Labour(Job 44)	8,000
Indirect Labour	2,000
Miscellaneous Factory Overheads	3,000

It is the practice of business to charge factory overheads to the jobs on the basis of 120 per cent of direct labour cost. Calculate the cost of work-in-progress of Job No. 44 on 31st December, 2018.

(**Answer:** Rs. 1,25,600)

Hints: The cost of indirect labour and miscellaneous factory overheads is not to be included, as the factory overheads have been included on the basis of recovery rate.

3) A company of civil engineers proposes to make tenders for the construction of an auditorium and estimate their direct cost at Rs. 1,12,500 as follows.

	Rs.
Material	45,000
Wages	47,250
Cost of transport of men and materials to site	12,750
Other Direct Expenses	7,500

Existing commitments of the company are involving a total overheads of Rs. 6,37,875 for various projects and direct labour cost of Rs. 4,25,250.

Assuming all the overheads as variable, calculate the estimated value of tender keeping in view the following:

1) Necessary overheads,
2) 5% interest on total capital outlay, and
3) 10% margin on total cost.

(Answer: Estimated value of tender: Rs. 2,11,798)

$$\text{Overheads} = \frac{47,250}{4,25,250} \times 6,37,875 \text{ or } 150\% \text{ wages;}$$

5% interest on capital outlay to be computed on total cost of Rs. 1,83,875)

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

SOME USEFUL BOOKS

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. 2018. *Cost Accounting: Methods and Problems*, Academic Publishers : Calcutta.

Maheshwari, S.N. and S.N. Mittal, 2018. *Cost Accounting: Theory and Problems*, Shree Mahavir Book Depot: Delhi. (Chapters 6, 7, 8, 11)

Nigam B.M.L. and G.L. Sharma, 2018. *Theory and Techniques of Cost Accounting*,

Himalaya Publishing House: Bombay. (Chapters 11, 12, 14, 17)

Owner, L.W.J. and J.L. Brown, 1984. Wheldon's *Cost Accounting*, ELBS : London. (Chapters 17, 18)

UNIT 14 CONTRACT COSTING

Structure

14.0 Objectives
14.1 Introduction
14.2 Contract Costing
14.2.1 Definition and Characteristics
14.2.2 Difference between Job and Contract Costing
14.2.3 The Procedure
14.2.4 Treatment of Important Items
14.2.5 Profit on Uncompleted Contracts
14.2.6 Contractee's Account
14.2.7 Work-in-Progress
14.3 Let Us Sum Up
14.4 Key Words
14.5 Answers to Check Your Progress
14.6 Terminal Questions /Exercises

14.0 OBJECTIVES

- define contract costing and describe its special features;
- prepare contract account and ascertain the notional profit on uncompleted contracts;
- explain bow profit taken to profit and loss account is determined; and
- explain how work in progress is shown in balance sheet.

14.1 INTRODUCTION

In the previous unit, you studied about job costing which is used by the firms engaged in undertaking small jobs. When, however, a firm undertakes big jobs like constructing a building, a road, bridge, etc. which involves huge sums and long duration, job costing method is not suitable, instead a special method of accounting known as "Contract Costing" or "terminal costing" has been developed for ascertaining cost and profit on such jobs.

In this Unit, you will learn characteristic features of contract costing method and how it is different from job costing methods.

14.2 CONTRACT COSTING

Contract costing is a special form of job costing used for ascertaining cost and profit on contracts undertaken for big jobs like constructing a building, a road, a bridge or a ship. Such jobs mainly comprise activities outside the contrator's premises and involve huge amount. They take long time to complete so much so that the work may extend over more than one accounting year. This means that the cost and profit may have to be worked out even on incomplete work as at the end of an accounting year. Hence, a special method of accounting known as 'contract costing' or 'terminal costing' has been developed for ascertaining cost and profit on such jobs.

14.2.1 Definition and Characteristics

Contract costing has been defined as "that form of specific order costing which applies, where work is undertaken to customer's special requirements and each order is of long Job and Contract Costing duration (compared with those to which job costing is applied). The work is usually of constructional nature. In general, the method is similar to job costing, although it has certain distinctive features".

The distinguishing features of contract are as follows:

Features regarding Production

i) The work is undertaken to customer's specific requirements.

ii) The work will be of a relatively long duration and involves large amount.

iii) The work is usually site based.

iv) The work is frequently of a constructional nature.

v) Plant and equipment may be purchased or hired for the duration of the contract.

vi) The completion date is fixed in advance, and penalties follow delays

vii) Certain aspects of the work are assigned to sub-contractors.

Features regarding Cost

i) The cost unit in contract costing is a contract.

ii) A separate account is prepared for each contract to ascertain the profit or loss on each contract.

iii) Most of the items of cost can be classified as direct since they can be easily identified with a specific contract.

iv) Indirect costs are normally restricted to Head Office expenses and storage costs. These are allocated to various contracts on which work is carried out during the year.

v) The contract price is often fixed in advance and payment is received at various stages of completion based on architect's certificate.

vi) A separate contract ledger is maintained for recording costs when the number of contracts is large.

14.2.2 Difference between Job and Contract Costing

There is a great deal of similarity between job and contract costing because a contract is nothing but a job, though large in size. In both cases, the unit of cost collection, cost determination and cost control is the job itself. Contract costing, more or less, follows the same principles as job costing. However, there are certain points of difference between the two. These can be summarised as follows:

1) Jobs are generally performed within the factory premises while contracts are usually location-bound, making site-operation an important element in contract costing.

2) Many expenses which are treated as indirect costs in job costing, are often treated as direct costs in contract costing. Thus, the cost of

supervision and indirect labour regarded as overheads in case of job costing is charged as a direct cost to the contract.

3) Overheads constitute a substantial portion of the total cost of a job. This creates problems of over or under absorption of expenses. Under contract costing, overheads form only a small part of the total cost and so over or under absorption of overhead costs is negligible.

4) In Job Costing, no profit is computed on work-in-progress. But, as contracts may run for long periods, profit or loss may have to be ascertained even on contracts that are incomplete at the end of the accounting year.

5) Job Costing is applicable to repair shops, printing presses, machine tools manufacturing units and foundries. But contract costing is used by ship-builders. civil engineering contractors, constructional and mechanical engineering firms, etc.

Check Your Progress A

1) What is meant by contract costing?

2) Give four examples of industries for which contract costing is considered appropriate.

3) State whether the following statements are **True** or **False** and justify your answer.

   i) Contract costing follows the same principles as jobs costing.

   ii) Contract costing applies to small job whereas job costing is used for big jobs.

   iii) The price for which the contractor agrees to carry out the work is called contract price or the tender price.

   iv) Many contracts require several years for completion.

   v) General overheads form a substantial proportion of the total cost of a contract.

   vi) The costs of sub-contracting are charge as direct expenses of the contract.

14.2.3 The Procedure

There are two parties to a contract : i) The contractor, and ii) the contractee. Contractor is a person (or an organisation) who undertakes to do the job. Contractee is the person (or an oraganisation/a government agency) who assigns the job to the contractor. The contractor usually engages an architect who prepares the plans, structural designs, detailed drawings the tender documents, and also undertakes to supervise the complete contract. The tractor submits the tender to the contractee and, when it is approved, an agreement is signed by both the parties including the contract price and the terms of payment. It may provide for an 'escalation clause' to compensate the contractor for an unwarranted increase in prices and for other contingencies.

Since, the contract involves a large amount and a long period, payment is made at various stages of completion based on the architect's certificate. The contractee usually retains a certain percentage of the amount recommended for payment by the architect. This is called 'retention money'. It is in the form of security against defective work and penalties chargeable for delay in completion of the work. It is retained for a shod period (called warranty

period) even after the completion of the contract. Thus, it is released to the contractor only after the warranty period is over.

14.2.4 Treatment of Important Items

The contractor usually maintains a Contract Ledger in which a separate account is opened for each contract. It is a common practice to allot a distinguishing number to each contract, and all costs and revenues relating to a particular contract must be shown against the appropriate contract number.

Let us take some important items of contract costing and study their treatment in detail.

Materials

i) **Direct Materials :** Most of the materials like bricks, cement, steel, etc. are delivered direct to the site. Their costs will be debited to the contract account.

ii) **Stores materials :** Some materials are received through material requisitions from store. The cost of the same should also be debited to the respective contract account

iii) **Materials on site :**At the end of an accounting year, the cost of materials on site is carried forward to the next year.

iv) **Materials returned to the stores:** The materials found surplus on site are returned to the stores. Their cost should either be deducted from materials issued (shown on the debit side) or credited to the contract account.

v) **Materials stolen or destroyed:** The cost of materials stolen or destroyed is treated abnormal loss. Hence the same should be transferred to the Profit and Loss Account and credited to the contract account.

Labour

i) All labour employed at the contract site should be regarded as direct labour and charged direct to the contract account.

ii) As far as possible a separate wage sheet should be prepared for each contract.

iii) Wages accrued or outstanding at the end of the year should appear on the debit side of the contract account.

iv) Wages of labour employed at Head Office and Central Stores are considered as overhead cost. Hence, these should be allocated to all contracts on some equitable basis.

Direct Expenses

All expenses other than material and wages are charged to individual contracts as and when they are incurred. Direct expenses may include i) cost of special tools, jigs etc., ii) cost of designs, and iii) cost of hiring plant and machinery for the contract.

Overheads

i) **Direct allocation:** Most of the expenses incurred in connection with a contract can be directly identified with each contract, e.g., supervisory salaries, staff amenities, repairs and maintenance of machinery, etc. These are directly allocated to the contract concerned.

ii) **Apportionment:** It is only the Head Office expenses which will require an apportionment to various contracts on some equitable basis. Labour hour rate is the most common method used for this purpose. However, the overhead costs can also be apportioned in the ratio of wages or total expenses incurred on the respective contracts. The amount thus allocated to a contract must be debited to contract account.

Plant and Machinery

This includes cranes, trucks, excavators, bulldozers, mixers and lorries, etc. The plant and equipment may be taken on lease or purchased specifically for a contract. When it is taken on lease or hire, the leasing charges or the hire will be charged to the contract account. If the plant or equipment has been specially purchased for a particular contract, there are two ways of showing it in the contract account:

i) Contract account may be debited with the cost of plant sent to the site and then credited with its depreciated value when it is moved to another site. The difference between the cost and the depreciated value represents the depreciation charge. Similarly, at the end of the accounting period, an uncompleted contract is credited with the depreciated value which is later debited to the contract account at the beginning of the next year.

ii) Alternatively, depreciation may be calculated based on the period for which the plant has been used for the contract during the accounting year and debited to the contract account. Other plant costs such as maintenance, insurance, fuel, oil, etc. should also be debited to the contract account.

Sub-contracting

Sometimes, a sub-contractor is engaged for a special work connected with the main contract. For instance, in constructing a house, the jobs like painting, plumbing, special flooring, carpentry, etc. may be given to different sub-contractors. The cost of such jobs must be charged to the main contract.

Value of Work Certified

As stated earlier, part payment is made to the contractor at each stage of completion based on architect's certificate. These stages usually are: plinth level, wails, roofing. plastering, flooring, etc. On completion of each stage, the contractor submits his bills to the architect for certification, who, after verification of the quantities and rates, certifies the value of work done. It is called 'work certified' or 'value of work certified'. This amount is credited to the contract account.

Progress Payments

The payments due to the contractor at each stage of completion, is termed as 'progress payments'. The amount of progress payment due at each stage is calculated as follows:

Value of Work Certified	……
Less: Retention Money	……
Total Payment Due	……

Less:	Payments made to date	.....
	Progress Payment Due	.....

The total amount of progress payment made up to the end of the accounting year is termed as 'cash received'. This stands debited to the Contractee's personal account. **It is not shown anywhere in the contract account.**

Cost of Work Uncertified

It is quite possible that at the end of an accounting year, certain amount of work remains uncertified. For example, the accounting year of a contract ends on 31st March, 1991. The work done up to 15th February, 1991 having reached a stipulated stage, had been duly certified. Apparently, the work done from 16th February to 31st March, 1991 remains uncertified. The costs incurred in relation to the contract during this period of six weeks shall be ascertained and shown as 'cost of work uncertified'. It is like closing stock of finished goods. Hence, it is credited to contract account at the end of the accounting year and then debited to the contract account at the beginning of the next accounting year.

Extras

Sometimes, the contractor may be asked to do some work which is not included in the original contract. This becomes necessary on account of some additions/alterations which are suggested later on. The contractor is usually entitled to charge extra amount for such work. This amount is called 'extras'. These charges are treated as income for the contractor and is credited to the contract account in his books.

14.2.5 Profit on Uncompleted Contracts

If the work on a contract is started and finished during the same accounting year, its profit or loss can be easily calculated and transferred to Profit and. I.ess Account. But, in case of contracts which extend to more than one accounting year, the question arises whether any profit or loss should be accounted for during the accounting year or years when they are still in progress and, if so, how? It is agreed that if profit is computed only on the competition of the contract, there will be heavy fluctuation in the amount of profit from year to year. This will result not only in distorted profit pattern but also higher tax liability during the year of completion of the contract because the tax will have to be paid at higher rates. At the same time, if profit is computed on the uncompleted contracts and taken to Profit and Loss Account, there is a possibility of other unforeseen contingencies. Hence**, it is an accepted principle that profit on uncompleted contracts must be taken into account in respect of the work certified only after providing adequate reserve for future contingencies.** This is usually based on the formula

$$2/3 \times \text{Notional Profit} \times \frac{\text{Cash Received}}{\text{Work Certified}}$$

However, after ascertaining the profit in respect of the work certified (called notional profit), the amount to be taken to Profit and Loss Account is determined on the basis of the following rules:

1) In case the **work on the contract has not reasonably advanced**, say,

the value of work certified is less than one-fourth of the contract price, the whole amount of the notional profit should be kept in reserve. In other words, in such a situation, no profit should be taken to Profit and Loss Account.

2) In case the **work on the contract has reasonably advanced,** say, up to one-fourth of the contract, then

a) If the value of work certified is one-fourth or more but less than half of the contract price, the amount of profit to be taken to Profit, and Loss Account is determined as follows:

$$1/3 \times \text{Notional Profit} \times \frac{\text{Cash Received}}{\text{Work Certified}}$$

b) If the value of work certified is half or more than half of the contract price, the Job and Contract Cost it amount of profit to be taken to Profit and Loss Account is determined as follows:

$$2/3 \times \text{Notional Profit} \times \frac{\text{Cash Received}}{\text{Work Certified}}$$

Look at Illustration 1 and see how profit taken to Profit and Loss Account has been worked at.

Illustration 1 : The total contract price in respect of a contract was Rs. 5,00,000. On 31st March, 2018, the of work certified was Rs. 3,00,000, and the cost of work certified (total cost incurred date minus cost of work uncertified) was Rs. 2,55,000. The cash received was Rs. 2,40,000.

You are required to determine the amount of profit to be taken to the Profit and Loss Account for the year ending 31st March, 2018.

Solution :

Value of Work Certified	3,00,000
Less: Cost of Work Certified	2,55,000
Notional Profit	45,000

Profit taken to Profit and Loss Account

$$2/3 \times \text{Notional Profit} \times \frac{\text{Cash Received}}{\text{Work Certified}}$$

$$= \frac{2}{3} \times 45,000 \times \frac{2,40,000}{3,00,000}$$

$$= \text{Rs. } 24,0000$$

3) **In case the work on the contract is nearing completion,** the basis of taking profit to Profit and Loss Account is the total estimated profit on complete contract, and not the notional profit. Hence, you will have to work out first the total profit expected on the complete contract. For this purpose, further expenditure to be incurred on the remaining part of the contract is estimated and added to the costs incurred to date so as to arrive at the total cost, on the contract. By deducting this amount from the contract price, you will arrive at the total estimated profit. Thus

Total Estimated Profit = Contract Price - (Expenditure incurred to date + Additional Expenditure)

Having arrived at the total estimated profit as per the above equation, the profit to be taken to the Profit and Loss Account is determined as follows:

$$\text{Total Estimated profit} \times \frac{\text{Work Certified}}{\text{Contract Price}} \times \frac{\text{Cash Received}}{\text{Work Certified}}$$

Alternatively

$$\text{Total estimated profit} \times \frac{\text{Work Certified}}{\text{Contract Price}}$$

The alternative formula may be used if the amount of cash received cannot be ascertained.

Loot at Illustration 2 and see how profit taken to Profit and Loss Account has been worked where the work on contract is nearing completion.

Illustration 2 : The Contract price in respect of a project was Rs. 5,00,000. On 31st March, 2018, 90% of the work had been completed and certified by the architects. The costs incurred up to 31st 2018 on this project amounted to Rs. 4,00,000. It was estimated that another Rs. 20,000 would have to be spent further to complete the project. The contractee paid 80% of the value of work certified:

Complete the profit to be taken to Profit and Loss Account for the year ending 31st March, 2018.

Solution

		Rs.
Contract Price		5,00,000
Less: Total Estimated cost		
Cost to date	4,00,000	
Costs to be incurred	20,000	4,20,000
Total Estimated Profit		80,000

Profit to be taken to Profit & Loss Account

$$\text{Total estimated profit} \times \frac{\text{Work Certified}}{\text{Contract Price}} \times \frac{\text{Cash Received}}{\text{Work Certified}}$$

$$= 80,000 \times \frac{4,50,000}{5,00,000} \times \frac{3,60,000}{4,50,000}$$

= Rs.57,600

Working Note

Cash received being 80% of the work certified is

$$= \frac{80}{100} \times 4,50,000$$

=Rs.3,60,000

Illustration 3 : On 3rd January, 2018 Beas construction Ltd. started work on the construction of an office block at a contracted price of Rs. 7,50,000. The construction company's financial year ended on 31st October, 2018 and

on that date the accounts pertaining to the contract contained the following balances:

	Rs.
Materials issued to site	1,61,000
Materials returned from Supervisory Staff Direct site	14,000
Wages paid	68,000
Own Plant in use on site (at Cost)	96,000
Hire of Plant and Scaffolding	72,000
Supervisory Direct	11,000
Indirect	12,000
Head office Charges allocated to the contract	63,000
Value of Work Certified to 31.10.2018	4,00,000
Cost of Work Completed but not yet Certified	40,000
Cash Received on Work Certified	3,30,000

Depreciation on own plant is to be provided at the rate of 12½% per annum on cost; Rs. 2,000 is owning for wages: Estimated value of materials on site Rs. 24,000. You are required to prepare the Contract Account for the period ended 31st October, 2018 showing the amount to be included in the construction company's Profit and Loss Account.

Solution :

Beas Construction Ltd.
Contract Account for the Year ending 31-10-2018

Dr. Cr.

	Rs.		Rs.
To Materials issued	1,61,000	By Materials returned	14,000
To Wages paid	68,000	By Plant on hand (Depreciation value)	86,000
To Plant at cost	96,000	By Materials on site	24,000
To Plant Hire	72,000	By Cost of Work-in-progress c/d	3,61,000
To Supervision: Direct	11,000		
Indirect	12,000		
To Head Office Charges	63,000		
To Wages	2,000		
	4,85,000		4,85,000
To Cost of Work-in-progress b/d	3,61,000	By Value of Work Certified	4,00,000
		By Cost of Work Uncertified c/d	40,000

To Notional Profit P & L A/c	43,450			
Reserve	35,550	79,000		
		4,40,000		4,40,000

Working **Notes**

1) Depreciated value of plant on hand Rs.

Plant at cost	96,000
Less: Dep. at 12 for 10 months	10,000
Depreciated value	86,000

2) Profit to be credited to Profit & Loss Account

$$= \frac{2}{3} \times \text{Notional Profit} \times \frac{\text{Cash Received}}{\text{Work Certified}}$$

$$= 79,000 \times \frac{2}{3} \times \frac{3,30,000}{4,00,000} = \text{Rs. } 43,450$$

Illustration 4 : A firm of building contractors started its business on 1-4-2018. Following was the expenditure on the contract for Rs. 3.00,000.

	Rs.
Materials issued to Contract	51,000
Plant issued for contract	15,000
Wages incurred	81,000
Other Expenses incurred	5, 000

Cash received on account up to 31-3-2018 amounted to Rs. 1,28,000 being 80% of the work certified. Of the plant and materials charged to the contract, plant which cost Rs.3,000 and materials which cost Rs. 2,500 were lost. On 31.3.2018 plant which cost Rs. 2,000 was returned to stores. The cost of work done but uncertified was Rs. 1.000 and material costing Rs. 2,300 were in hand on site.

Charge 15% depreciation on plant and take to the Profit & Loss Account 2/3rd of the profit received. Prepare the necessary Contract Account from the above particulars.

Solution:

Contract Account for the Year ending 31-3-2018

Dr. Cr.

	Rs.			Rs.
To Materials issued	51,000	By Profit & Loss A/c		
To Wages	81,000	Plant Lost	3,000	
		Materials Lost	2,500	5,500
To Plant issued	15,000	By Plant returned to store		
		(2,000 – 300)		1,700
To Other Expenses	5,000	By Materials on hand		2,300
		By Plant on site		
		(10,000 – 1,500)		8,500

			By Cost of Work-in progress c/d	1,34,000
		1,52,000		1,52,000
To Cost of Work-in-progress b/d		1,34,000	By Value of Work Certified	1,60,000
To Notional Profit			By Cost of Work uncertified	1,000
P & L A/c	14,400			
Reserve	12,600	27,000		
		1,61,000		1,61,000

Working Notes

1) Value of Work Certified: Cash received is Rs. 1,28,000 representing 80% of the work certified, hence the $(1,28,000 \times \frac{100}{80})$

2) Profit to be taken to Profit and Loss Account : It has been worked out as follows:

$$= \frac{2}{3} \times \text{Notional Profit} \times \frac{\text{Cash Received}}{\text{Work Certified}}$$

$$= \frac{2}{3} \times 27,000 \times \frac{1,28,000}{1,60,000} = \text{Rs.}14,400$$

Illustration 5 : The following is a summary of entries in a Contract ledger as on 31st December, 2018 in respect of Contract No. 27.

	Rs.
Direct Materials	30,000
Materials from stores	6,500
Wages	17,210
Direct Expenses	6,710
Establishment Charges	8,000
Plant	34,200
Sale of Scrap	1,820
Sub-contract Cost	7,210

The following further information is made available to you:

a) Accrued as on 31st December, 2018 were:
Wages Rs 800 and Direct Expenses Rs. 1,120

b) Depreciation of plant up to 31st December, 2018 was Rs. 8,550

c) Included in the above summary of entries were : Wages Rs. 1,000, Other Expenses Rs. 1,500 and Materials Rs. 2,080. These expenses were incurred after certification.

d) Materials on site on 31st December, 2018 cost Rs. 10,000

e) Rs. 62,500 worth of work had been certified up to 31st December, 2018 when three eighth of the contract remained uncompleted.

f) The total contract price was Rs. 1,00,000.

You are required to show what profit or loss would be taken into the accounts for the year ended 31st December, 2018 in respect of this contract.

Solution :

Contract Account for 2018

Dr. Cr.

		Rs.		Rs.
To Materials			By Sale of Scrap	1,820
Direct	30,000			
From stores	6,500	36,500		
To Wages	17,210		By Materials on hand	10,000
Add: Outstanding	800	18,010		
To Establishment Charges		8,000	By Plant on hand (34,200 – 8,550)	25,650
To Plant at Cost		34.200	By Cost of Work Uncertified	4,580
To Direct Expenses	6,710		By Value of Work Certified	62,500
Add : Outstanding	1,120	7,830		
To Sub-contracting cost		7,210	By Loss (transferred to P & L A/c)	7,200
		1,11,750		1,11,750

Notes:

1) Cost of work certified has been given indirectly by stating the cost of materials, labour and other expenses incurred after certification. Hence, it has been worked Out by adding these amounts.

2) The cost of work-in-progress has not been worked out, as the value of work certified has been shown in the first part of the Contract Account itself and so also the loss. This is an alternative method of preparing Contract Account.

3) The contract has shown loss. As per rules, the whole amount of loss has to be transferred to Profit and Loss Account.

14.2.6 Contractee's Account

Contractee's Account is a personal account of the contractee. This account is credited as and when the cash is received from the contractee. No amount is debited to this account till the contract is completed. Thus, it will continue to show a credit balance so long as the work on the contract is in progress. Since the amount is received from the contractee against the value of work certified, the balance in his account is not treated as a liability and, therefore, it should not be shown on the liabilities side of the Balance Sheet. The common practice is to deduct it from the work-in-progress shown on the assets side of the Balance Sheet.

14.2.7 Work-in-Progress

In Contract Account you must have noted that all costs incurred on the uncompleted contract are shown as the cost of work-in-progress. The cost of work-in-progress consists of the cost of work certified, as well as the cost of

work uncertified. Hence, if you have to work out the cost of work certified, deduct the cost of work uncertified from the total cost of work-in-progress. While showing it in the Balance Sheet, however, the profit transferred to Profit and Loss Account is also added thereto. Thus, it will include: a) the cost of work certified, b) the cost of work uncertified, and c) the profit taken to Profit and Loss Account.

You have also learnt that the credit balance in the Contractee's Account (being cash received) is deducted from the work-in-progress shown in the Balance Sheet. Thus, the work-in-progress is shown on the assets side of the Balance Sheet in one of the following two ways:

Work-in-progress	Rs.
Cost of Work Certified	…….
Cost of Work Uncertified	…….
Cost to date	…….
Add: Profit taken to P & L A/c	……..
Less: Cash received	……..
Alternatively	……..
Work-in-progress	……..
Value of Work Certified	
Cost of Work Uncertified	……..
Less: Reserve	……..
Less: Cash Received	

If we were to show work-in-progress in the Balance Sheet of Beas Construction Ltd. as per data given in Illustration 3, it will appear as follows:

	Rs.
Work-in-progress	
Cost to date	3,61,000
Add: Profit taken to P & I A/c	43,450
Less: Cash received	4,04,450
	3,30,000
Alternatively	74,450
Work-in-progress	Rs.
Value of work certified	4,40,000
Cost of work uncertified	40,000
	4,40,000
Less: Reserve	35,550
	4,04,450
Less: Cash received	3,30,000
	74,450

The second alternative is most commonly used by the accountants. It should be noted that while showing work-in-progress, there is no need to make any adjustment for loss taken to Profit and Loss Account when second alternative is used.

14.2.8 Comprehensive Illustrations

Illustration 6 : Alcon Construction Co. Ltd., commenced its business on 1st January, 2018. The following data has been extracted from its books in relation to a contract.

	Rs.
Cash received from Contractee	1,20,000
Materials	40,000
Direct labour	55,000
Expenses at site	2,000
Plant& Equipments (at cost)	30,000
Fuel and Power	2,500

The contract price was Rs. 3,00,000 and the work certified Rs. 1,50,000. The work completed, since certification had been estimated at Rs. 1,000 (at cost). Machinery costing Rs. 2,000 was returned to stores at the end of the year. Stock of materials at site on 31-12-2018 was worth Rs. 5,000 and wages outstanding were Rs. 200. Depreciation on Machinery was to be charged at 10%. You are required to calculate the profit on the contract and show how the work-in-progress will appear in the 'Balance Sheet as on 31.12.2018. Also prepare the Contractee's Account.

Solution :

Alcon Construction Company Ltd.
Contract Account 2018

Dr. Cr.

	Rs.		Rs.
To Materials	40,000	By Materials at site	5,000
To Direct Labour	55,000	By Machinery at site 25,200	
		at stores 1,800	27,000
To Expenses at site	2,000	By Value of work certified	1,50,000
To Fuel & Power	2,500	By Cost of work uncertified	1,000
To Machinery at site	30,000		
To Notional Profit c/d	53,300		
	1,83,000		1,83,000
To Profit & Loss A/c	28,427	By Notional Profits b/d	53,300
To Balance c/d (Reserve)	24,873		
	53,300		53,300

Workings : Profit taken to Profit & Loss Account

$$= \text{Notional Profit} \times \frac{2}{3} \times \frac{\text{Cash Received}}{\text{Work Certified}}$$

$$= 53,300 \times \frac{2}{3} \times \frac{1,20,000}{1,50,000} = \text{Rs.}28,427$$

Balance sheet as on 31.12.2018 (Extracts)

Assets	Rs.	
Work-in-progress		
Work certified	1,50,000	
Work Uncertified	1,000	
	1,51,000	
Less: Reserve	24,873	
	1,26,127	
Less: Cash received from Contractee	1,20,000	
		6,127

Contractee's Account

Dr.			Cr.
To Balance c/d	Rs. 1,20,000	By Bank	Rs. 1,20,000
		By Balance b/d	1,20.000

Illustration 7 : The following particulars relate to a contract for Rs. 40 lakhs:

	2016	2017	2018
	Rs.	Rs.	Rs.
Materials	4,50,000	7,00,000	6,00,000
Wages	4,30,000	6,00,000	5,00,000
Expenses	20,000	50,000	16,000
Carriage	20,000	60,000	50,000
Work Certified	9,00,000	30,00,000	40,00,000
Work Uncertified	10,000	50,000	--

Plant costing Rs. 1,00,000 was bought in the beginning of 1988, and depreciation was charged at 25% to per annum. The contractee was to pay 80% of the work certified every year and settle the account in 2018. Draw Contract Account for three years and also write Contractee's Account and Work-in-progress Account in the books of the contractor.

Solution :

Contract Account for 2016

Dr.			Cr.
	Rs.		Rs.
To Materials	4,50,000	By Plant on hand (1,00,000-25,000)	75,000
To Wages	4,30,000	By Work certified	9,00,000
To Expenses	20,000	By Work uncertified	10,000
To Carriage	20,000	By P &L A/c (Loss transferred)	35,000
To Plant at cost	1,00,000		
	10,20,000		10,20,000

Contract Account for 2017

To Work-in- progress		By Work Certified	30,00,000
Work Certified	9,00,000		
Work Uncertified	10,000		
	9,10,000	By Work Uncertified	50,000
To Plant on site	75,000	By Plant on hand	
To Materials	7,00,000	(75,000 – 18750)	56,250
To Wages	6,00,000		
To Expenses	50,000		
To Carriage	60,000		
To P &L A/c	3,79,333		
To Balance c/d	3,31,971		
	31,06,250		31,06,250

Contract Account for 2018

To work-in-progress	30,00,000	By Plant on hand (56,250-14,062)	42,188
Work certified	50,000	By Contractee's (contact price)	40,00,000
Work uncertified	30,50,000		
Less: Reserve	3,31,917		
	27,18,083		
To Plant on site	56,250		
To Materials	6,00,000		
To Wages	5,00,000		
To Expenses	16,000		
To Carriage	50,000		
To P& L A/c	1,01,855		
	40,42,188		40,42,188

Contractee's Account

		Rs.			Rs.
2016	To Balance c/d	7,20,000	2016	By Bank	7,20,000
		7,20,000			7,20,000
2017	To Balance c/d	31,20,000	2017	By Balance b/d	7,20,000
				By Bank	24,00,000
		31,20,000			31,20,000
2018	To Contract A/c	40,00,000	2018	By Balance b/d	31,20,000
				By Bank	8,80,000
		40,00,000			40,00,000

Work-in-Progress Account

		Rs.			Rs.
1988	To Contact A/c	9,10,000	1988	By Balance c/d	9,10,000
		9,10,000			9,10,000
2018	To Balance b/d	9,10,000	2018	By Contract A/c (transfer)	9,10,000
	To Contract A/c	30,50,000		By Contract A/c (reserve)	3,31,917
				By Balance c/d	27,18,083
		39,60,000			39,60,000
2018	To Balance b/d	27,18,083	2018	By Contract A/c (transfer)	27,18,083
		27,18,083			27,18,083

Working Notes

1) Profit taken to P & L A/c in 2018

$$= \frac{2}{3} \times 7,11,250 \times \frac{80}{100} = \text{Rs.}3,79,333$$

2) Depreciation has been charged on the basis of diminishing balance method.

Check Your Progress B

1) Why does contractee retain certain percentage of the amount due to the contractor ?

2) What do you mean by 'extras?

3) Fill in the blanks.

   i) If, value of work certified is not given, the same can be worked out with the help of ……clause.

   ii) While determining profit on uncompleted contract taken to P & L A/c, a provision must be made for ……... contingencies.

   iii) Cost of work certified can be ascertained by deducting cost of …… from the cost to date.

   iv) An abnormal loss of materials or equipment should be …….. to Contract Account.

   v) While showing work in progress in Balance Sheet, cash received from the contractee must be…….therefrom.

   vi) No profit on uncompleted contract shall be taken to Profit and Loss Account if the value of work-in-progress is less than ……of the contract price.

   vii) If plant issued to contract has been debited at cost to the Contract Account, the plant on hand at the end of the accounting 'year should be credited to Contract Account at ……..

   viii) The terms of a contract may include an …….under which the contract price can be enhanced.

14.3 LET US SUM UP

Contract costing is a special form of job costing used for ascertaining the cost and profit on big projects called contracts. The contract work usually involves huge cost, require long time to complete, and comprises activities outside the factory premises. This applies to most civil engineering jobs like construction of buildings, roads, bridges, etc.

The peculiarity of contract costing lies in ascertaining year-wise cost and profit on projects extending to more than one accounting year. In this regard, the basic principle follows that no profit should be taken on an uncompleted contract unless the work on the project has reasonably advanced. Even then, only a conservative sum may be taken into account. This is usually based on the formula:

$$= \frac{2}{3} \times \text{Notional Profit} \times \frac{\text{Cash Received}}{\text{Work Certified}}$$

of course, if the Contract Account shows some loss it should be fully accounted for.

The work-in-progress is shown in the Balance Sheet as follows:

Value of Work Certified	x x x
Cost of Work Uncertified	x x x
	xxx
Less: Reserve	x x x
Less: Cash Received	x x x
	x xx

14.4 KEY WORDS

Contractor: The person or the organisation that agrees to undertake the contract.

Contractee : The person or the organisation for whom the job is done.

Contract Costing : A special form, of job costing applicable to big rojects like construction of a building, construction of a bridge, etc. which involve huge cost to complete, and is usually site-based.

Contract Price: The price at which the contractor has agreed to undertake.

Escalation Clause: A provision made in the agreement to compensate the contractor for an unwarranted increase in prices and for other contingencies.

Extras: Extra amount charged by the contractor for additions/alterations suggested later on.

Notional (or Attributable) Profit: Value of work certified minus cost of work certified.

Progress Payments: Payments made to the contractor at various stages of the work or at agreed intervals.

Retention Money: Amount of payment withheld as a security against defective work and penalties chargeable for delay in completion of work.

Sub-contracting: Assigning special work relating to the main contract to a sub-contractor.

Work Certified: Work approved by the Contractee's architect or surveyor.

Work Uncertified : Work done from the date of certification to the last date of the accounting year and which still remains to be approved.

14.5 ANSWERS TO CHECK YOUR PROGRESS

A) 3. i) True, ii) False, iii) True, iv) True, v) False, vi) True

B) 3. i) retention. ii) future, iii) uncertified work,
iv) credited, v) deducted. vi) one-fourth,
vii) depreciated value, viii) escalation clause

14.6 TERMINAL QUESTION/EXERCISES

1) How does contract costing differ from job costing?

2) Indicate how you would deal with the following items in Contract Account.
   a) Plant and machinery specially purchased for a contract
   b) Loss of materials stolen or destroyed
   c) Sub-contracting

3) State how you would ascertain the actual profit on an incomplete contract. How far such profit is taken to Profit and Loss Account?

4) How is progress payment due at a specific stage computed?

Exercises

1) The following figures are available at the end of a financial year relating to a contract.

Total cost of work done to date	1,10,350
Cost of Work Uncertified	8,300
Contract Price	5,80,000
Value of Work Certified	1,40,280

Determine the amount of profit to be taken to Profit and Loss Account.

(**Answer:** Notional Profit: Rs. 38,230; Profit taken to P & L A/c; NIL
(Value of work certified is less than one-fourth of the contract price.)

2) A construction company took a contract in 2018 for road construction. The contract price was Rs. 5,00,000 and its estimated cost of completion would be Rs. 4,60,000. At the end of 2018, the company had received Rs. 1,80,000 representing 90 per cent of work certified. Work not yet certified had cost Rs. 5,000. Expenditure incurred on the contract during 2018 was as follows:

	Rs.
Materials	25,000
Labour	1,50,000
Plant	10,000

Materials costing Rs. 2,500 were damaged and had to be disposed off for Rs. 500. Plant was considered as having depreciated by 25 per cent. Prepare Contract Account for 2018 in the books of the construction company. Also show the amount of profit that can be reasonably credited to Profit and Loss Account in respect of the, contract.

(Answer: Notional Profit : Rs. 30,000; Profit taken to P & L A/c :

Rs. 9,000. Since the value of work certified is more than one-fourth of the contract price but less their half, the formula used is:

$$= \frac{2}{3} \times \text{Notional Profit} \times \frac{\text{Cash Received}}{\text{Work Certified}}$$

3) A contractor has obtained a contract for construction of a bridge. The value of a contract is Rs. 12 lakh, and the work commenced on 1st October, 2017.

The following details are shown in their books for the year ended 31st Sept., 2018:

	Rs.
Plant purchased	60,000
Wages paid	3,40,000
Materials issued to site	3,36,000
Direct Expenses	8,000
General Overheads allocated	32,000
Wages accrued as on 30.9.2018	2,800
Materials at site as on 30.9.2018	4,000
Direct Expenses accrued as on 30.9.2018	1,200
Work not yet Certified at cost	14,000
Cash Received being 80% of Work Certified 6.00.000	6,00,000

Life on plant purchased is 5 years and scrap value is nil.

1) Prepare the contract account, for the year ended 30th Sept., 2018,

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)

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

4) 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 31.12.2018.

	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 31.12.2018	1,883
Wages accrued on 31.12.2018	2,400
Direct Expenditure accrued on 31.12.2018	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; WI.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 and verify the answers given with the content. But do not submit your answers to the University. These are for your practice only.

SOME USEFUL BOOKS

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. 2018. *Cost Accounting: Methods and Problems*, Academic Publishers : Calcutta.

Maheshwari, S.N. and S.N. Mittal, 2018. *Cost Accounting: Theory and Problems*, Shree Mahavir Book Depot: Delhi. (Chapters 6, 7, 8, 11) Nigam B.M.L. and G.L. Sharma, 2018.

Theory and Techniques of *Cost Accounting*,

Himalaya Publishing House: Bombay. (Chapters 11, 12, 14, 17)

Owner, L.W.J. and J.L. Brown, 1984. Wheldon's *Cost Accounting*, ELBS : London. (Chapters 17, 18)

UNIT 15 PROCESS COSTING

Structure

15.0 Objectives
15.1 Introduction
15.2 Meaning and Application
15.3 Difference between Job Costing and Process Costing
15.4 Main Characteristics
15.5 Costing Procedure
15.6 Process Losses
15.6.1 Normal Process Loss
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15.8 Comprehensive Illustrations
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15.11 Answers to Check Your Progress
15.12 Terminal Questions/Exercises

15.0 OBJECTIVES

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; and
- prepare abnormal loss and abnormal gain accounts.

15.1 INTRODUCTION

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 suitablefor 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.

15.2 MEANING AND APPLICATION

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	Distillaries	Textile mills	Sugar works
Soap-making	Paper mills	Food processing	Paint manufacturing
Breweries	Oil refineries	Canning factories	Milk dairy

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

15.4 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?

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

3) State whether the following statements are **True** or **False** and justify your answer.

   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 prix 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.

15.5 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 15.1 which shows the proforma of a process account.

Figure 15.1 Proforma of Process Account.

Process Account I

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 pr 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	**Process B**	**Process C**
	Rs.	Rs.	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	Qty. (units)	Amount	Particulars	Qty. (units)	Amount
		Rs.			Rs.
To Direct Materials		2,000	By Transfer to		6,050
To 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		6050	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 Overhead (8/30)		1,200			
		10,900			10,900

$$\text{Cost Per unit Output} = \frac{10,900}{1,000} = \text{Rs.}10.90$$

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 3lst March, 2018:

Purchase of 500 tonnes Copra Rs. 2,00,000

	Crushing	**Refining**	**Finishing**
	Rs.	**Rs.**	**Rs.**
Cost of Labour	2,500	1,000	1,500
Electric Power	600	360	240
Sundry Materials	100	2,000	--
Stream	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	Particulars	Units	Amount
		Rs.			Rs.
To Copra used	500	2,00,000	By Loss in Weight	25	--
To Labour		2,500	By Sales of Copra Residue	175	11,000
To Electric Power		600	By Sales of Copra Sacks	--	400
To Sundry Materials		100	To Transfer to Refining process A/c	300	1,94,000
To Repairs to Machinery		280		500	2,05,400
To Steam		600			
To Factory Expenses		1,320			
	500	2,05,400		500	2,05,400

$$\text{Cost Per unit Crude Oil} = \frac{1,94,000}{300} = \text{Rs.}646.67$$

Refining Process Account

Dr. Cr.

Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			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			
To Sundry Materials		2,000	To Transfer to Finishing Process A/c	250	1,92,050
To Repairs to Machinery		450			
To Steam		330			
To Factory Expenses		660			
	500	1,98,800		300	1,98,800

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

Finishing Process Account

Dr. Cr.

Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Transfer from Crushing 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 Stream		450			
To Repairs to Machinery		140			
To Factory expenses		220			
To Cost of Casks		7,500			
	250	2,02,100		250	2,02,100

$$\text{Cost Per unit Crude Oil} = \frac{2,02,100}{248} = \text{Rs.}814.92$$

15.6 PROCESS LOSS

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.

15.6.1 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

$$\text{Cost Per Unit of Output} = \frac{8,500}{450} = \text{Rs. 19 per tonne}$$

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.

15.6.2 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 substandard 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 g.ood 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 alongwith 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
		Rs.			Rs.
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
			By Cost of Production tr. to next Process	900	13,320
	1,200	15,000		1,200	15,000

$$\text{Cost of Production Per Unit} = \frac{\text{Cost of Production}}{\text{Normal Output}}$$

$$= \frac{14,800}{1,000} = \text{Rs. } 14.80 \text{ per unit}$$

Abnormal Loss Account

Dr. Cr.

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

2) Cost of Production
= Total Expenditure – Scrape Value of Normal Loss Units
= 15,000 -200
= 14,800

3) Abnormal Loss Units = Normal Output - Actual Output
= 1000 – 900
= 100 units

4) Cost of Abnormal Loss = Abnormal Loss Units Cost of Production Per unit
= 100 = Rs. 1,480

15.7 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 Lain'. 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
		Rs.			Rs.
To Material	1,200	12,000	By Normal Loss	200	200
To Expenses	--	3,000	By Cost of Production tr. To next Process	1,050	15,540
To Abnormal Gain	50	740			
	1,250	15,740		1,250	15,740

$$\text{Cost of Production per Unit of Output} = \frac{\text{Cost of Production}}{\text{NormalOutput}}$$

$$= \frac{14,800}{1,000} = \text{Rs.}14.80 \text{ per unit}$$

Abnormal Gain Account

Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Normal Loss A/c (unrealized scrap value)	50	50	By Process A/c	50	740
To P &L A/c		690			
	50	740		50	740

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 Effectiveness =Actual Output -Normal Output
= 1,050-1,000
= 50 Units

4) 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.

15.8 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 2018, 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 (1) Process Accounts, and (ii) a statement of Profit and Loss of the firm for April, 2018, assuming there

were no opening stocks of any type.

Process A Account

Dr. Cr

Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Material	10,000	60,000	By Normal Loss (5% of 10,000)	500	--
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
	10,000	76,000		10,000	76,000

Process B Account

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

Statement of Profit and Loss for April, 2018

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 : Selling and Distribution Expenses	16,000
	23,260

Note : The valuation of unsold stock has been ignored.

Working Notes:

1) **Normal Output** = Total Output − 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 units

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

$$\text{In Process A} = \frac{76,000}{9,500} = \text{Rs. 8per unit}$$

$$\text{In Process B} = \frac{9,140}{9,114} = \text{Rs.10 per unit}$$

4) **Normal Loss Unit** = Normal Output - Actual Output
= 9,500 - 9,300 = 200 units

5) **Cost of Abnormal Loss** = Ab. Loss Units Cost Per Unit
= Ab. Loss Units Cost per Unit
= 2008=Rs.1,600

6) **Abnormal Gain Units** =Actual Output – Normal Output
= 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, 2018:

Items	Total	Processes		
	Rs.	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	--	--	--

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
		Rs.			Rs.
To Units introduced	1,000	3,000	By Normal Loss (5% of 1,000)	50	100
To Direct Materials		2,600	By Transfer to Process II	950	9500
To Direct Wages		2,000			
To Production Overheads		2,000			
	1,000	9,600		1,000	9,600

Process II Account

Dr. Cr.

Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Transfer from Process I	950	9500	By Normal Loss	95	380
To Direct Materials		1,980	By Abnormal loss	15	300
To Direct Wages		3,000	By Transfer to Process II	840	16,800
To Production Overheads		3,000			
	950	17,480		950	17,480

Process III Account

Dr. **Cr.**

Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Transfer from Process II	840	16,800	By Normal Loss (15% of 840)	126	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			
	876	29,130		876	29,130

Normal Loss Account

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
	271	1,110		271	1,110

Abnormal Loss Account

Dr. Cr.

Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Process A/c	15	300	By Cash A/c	15	60
			By Profit & Loss A/c		240
	15	300		15	300

Abnormal Gain Account

Dr. Cr.

Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Normal Loss A/c (unrealized scrap)	36	180	By Process III A/c	36	1,368
To Profit & Loss A/c (gain)		1,188			
	36	1,368		36	1,368

Working Notes:

1) **Cost of Production** = 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.27,13

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

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

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

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

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	5,230
Output in tonnes	830	780

Process P Account

Dr. Cr.

Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			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

$$\text{Cost of Output per tonne} = \frac{\text{Co Cost of Production}}{\text{NormalOutput}} = \frac{1,53,000}{850} = \text{Rs.180per tonne}$$

Process Q Account

Dr. Cr.

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

$$\text{Cost of Output per tonne} = \frac{\text{Co Cost of Production}}{\text{Normal Output}} = \frac{1,53,000}{850}$$

$$= \text{Rs. 210 per tonne}$$

Working Notes :

1) Normal Loss Unit = Normal Output - Actual Output
   In Process P = 850 - 830= 20 tonne
1) Cost of Abnormal Loss = Ab. Loss Units × Cost per unit
   In Process P = 20 × 180 = Rs. 3,600
3) Abnormal Gain Unit = Actual Output – Normal Output
   In Process Q = 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
Material (in tonnes)	100	140	1,348
Cost of Material 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
		Rs.			Rs.
To Material	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
	100	42,800		100	42,800

Cost of Production per tonne = $\frac{41,800}{88}$ = Rs.475 per unit

Process B Account

Dr. Cr.

Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Transfer from Process C	66	31,350	By Loss in Weight	4	--
To Material	134	26,800	By Scrap	20	2,000
To Mft Exp.		24,810	By Transfer to stores for sale	88	41,480
			By Transfer to Process C	88	41,480
	200	82,960		200	82,960

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

Process C Account

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 Material	1,312	1,04,960	By Scrap	140	28,800
To Mft Exp.	--	1,864	By Transfer to finished stock	1,232	1,19,504
	1,400	1,48,304		1,400	1,48,304

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

15.9 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.

15.10 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 effectives'.

By-Product : A product of relatively small value produced incidentally 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.

Process Costing : A method of ascertaining the cost of a product at each stage or process of manufacture.

15.11 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

15.12 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:	1,500	1,500	1,500
Fuel	1,500	1,500	1,500
Carriage inwards	1,170	3,240	1,125
Factory Expenses			

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, 2018, 6,000 tonnes of raw material A costing Rs. 150 per tonne were produced through process No. 3 for the manufacture of solvant X.

The total operating cost of the process for the month was Rs. 12,50,000. 0% of the input was wasted and was disposed off at Rs. 25 per tonne.

Prepare the Process 3 Account for the month of March, 2018 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. 340; 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

a) Last Process Account

b) Normal Wastage Account

c) 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.

6) 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 Rs.	Process B 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, 2018:

	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 and verify with the content. But do not submit your answers to the University. These are for your practice only.

SOME USEFUL BOOKS

Arora, M.N. 1988. A Text Book of *Cost Accountancy*, Vikas Publishing House Pvt. Ltd.: New Delhi. (Chapters 14, 15, 16, 17, 19)

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UNIT 16 JOINT PRODUCTS AND BY-PRODUCTS

Structure

16.0 Objectives
16.1 Introduction
16.2 Meaning of Joint Products and By-Products
16.3 Difference between Joint Products and By-Products
16.4 Difficulties in Costing of Joint Products and By-Products
16.5 Methods of Apportionment of the Joint Production Costs
16.5.1 Market or Sales Value Method
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16.5.3 Physical Unit Method
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16.5.5 Survey Method
16.6 Methods of Costing By-Products
16.7 Comprehensive Illustrations
16.8 Let Us Sum Up
16.9 Key Words
16.10 Answers to Check Your Progress
16.11 Terminal Questions and Exercises

16.0 OBJECTIVES

After Studying this unit you will be able to :-

- explain the meaning and differences between costing joint products and by products;
- describe the various methods of apportionment of Joint Costs to Joint Products and by-products.
- Prepare the statement of cost of main product, joint and by-products using different methods of costing.

16.1 INTROUDCTION

In last units, process cost accounting was described, where raw material passes from one process to another till the final product comes out. Losses and gains, (normal or abnormal) along with scrap and defectives were explained. Now, we will study the situation where from the same raw material and same process, a multitude of products are produced.

Chemical companies, Coke manufacturers, refineries, flour mills, coal mines, gas companies, dairies, canners, meal packers etc produce in their manufacturing or conversion process a multitude of products.

For example, in case of edible **oils extraction oil cake**, molasses and bagasse in extraction of sugar, in flour mill, with white flour, brown flour, animal

feeding staff, in petrol extraction diesel, kerosene, *naptha,* etc. Multiple products may be classified as by- products, and joint products. It is to be noticed that the classification is not rigid because a by-product in one concern may be termed joint product in another concern. The joint products and by-products may be equal or unequal importance. The assignment of costs to various products help the management with data for planning estimated and actual profit.

16.2 MEANING OF JOINT PRODUCTS AND BY - PRODUCT

Meaning

Joint products are produced simultaneously along with the main product and same raw material by a common process or series of processes, with each product possessing almost equal value in the form it is produced. These products are having equal importance. For example, in petrol extraction, diesel and kerosene are Joint Products.

A Joint product cost is the cost that arises from common processing or manufacturing of products produced from a common raw material. When two or more different products are made from a single cost factor, a joint product cost results. A joint cost is incurred before the point at which separately identifiable products produced from the same process. In some cases, Joint products may incur further costs after their point of separation.

In the process of manufacturing main product, other products of relatively small value which are unavoidably and incidentally produced are termed By-products. The sale value of these products is very less as compared to the main product or joint products.

By products are of two categories (a) those sold in their original form without need of further processing (b) those which require for the processing in order to be saleable. For example, in extraction of sugar molasses is by-product.

16.3 DIFFERENCE BETWEEN JOINT PROUDCTS AND BY- PRODUCTS

The difference between the joint product and by-product is depending on the relative sale value. As discussed above, by and large joint products are of equal importance (value) where as by-products are significantly lesser importance (value). Secondly, joint products are main products produced as part of manufacturing plan. But by-products are unwanted and incidentally produced in the processes of manufacturing the main and joint products. However, it may be noted that the distinction is not rigid and depending upon the situations.

16.4 DIFFICULTIES IN COSTING OF JOINT PRODUCTS AND BY PRODUCTS

By-products and joint products are difficult to cost because a true joint cost is indivisible e.g. are joint product and they are be separated by split off. The cost accumulated to the split off point must be borne by the difference between selling price and cost to complete and sell each after split of point.

Joint costs should not be confused with common costs. A joint cost is indivisible and common costs are divisible. Common costs are allocable among products or services because each of the products or services could have been obtained separately. Any shared costs can be allocated on the basis of relative usage of facilities. Indivisibility of a joint cost is not easy to know, because in some cases of joint cost can be divided among joint products to common cost causing characteristics.

Due to indivisibility of joint cost, cost allocation and apportionment procedures are not perfect but are arbitrary. The cost of joint products and by products give rise to problem of assigning cost due to use of equipment, share of raw materials, share of labour costs and other facilities cannot be truly determined. Whatever methods of allocation are used, total profit or loss figure is not affected provided these are not beginning or ending inventories. However, the validity of splitting a joint cost to determine fair regulated prices for joint products is debatable issue.

The main characteristics of joint product, is that the cost of these several different products is incurred in indivisible amount for all products, rather than individual amount for each product. In the total cost of production cost of many products involve identified with the individual product. Generally, there is no need of allocation. But the Joint Production needs allocation or apportionment to the individual products.

16.5 METHODS OF APPORTIONMENT OF THE JOINT PRODUCTION COSTS

The apportionment of the joint production cost incurred upto the split off point can be made by :

1) Market or sales value method
2) Reverse Cost Method
3) Physical unit method
4) Average unit cost method
5) Survey method

1.1.1 Market or Sales Value Method

Under this method the total market value is ascertained on the basis of market value of each product. It is more scientific method. The method is really a weighted market value basis using the total market value or sale value of each unit/quantity sold. Under this method, joint costs are apportioned on two basis (i) On the basis of sale price per unit or (ii) on the basis of total sale value.

i) **On the basis of sale price per unit:** In this method, joint costs are apportioned to each product in the ratio of sale price per unit of joint products without considering the quantities produced. This approach is suitable when the production of all joint products are equal.

ii) **On the basis of total sale value :** Under this type, apportionment is done based on the ratio of weighted sale value (number of units) produced selling price per unit. It considers the quantities of joint products produced.

Illustration 1:

The Joint Products A,B,C, and D are produced at a total joint production costs of Rs. 1,20,000. Quantities produced are A 20,000 units, B 15,000 units, C 10,000 units and D 15,000 units. Product A sells for Rs. 16; B Rs. 4; C Rs. 8 and D for Rs. 4. These figures are at the split off point.

Required to show the apportionment of joint costs by using.

(a) Sale price per unit method and (b) Total sale value method

Solution :

Apportionment of Joint Cost by Sales Price per unit Method

Product	Selling Price per unit	Apportionment of costs ratio (16:4:8:4)	Apportionment of Joint Costs Rs.
A	Rs.16	$\frac{16}{32}\times 1,20,000$	= 60,000
B	Rs. 4	$\frac{4}{32}\times 1,20,000$	= 15,000
C	Rs.8	$\frac{8}{32}\times 1,20,000$	= 30,000
D	Rs.4	$\frac{4}{32}\times 1,20,000$	= 15,000
		Total Joint Costs	Rs. 1,20,000 rounded off

Apportionment of Joint Cost by Total Sale Value Method

$$\text{Formula} = \frac{\text{Total Sale Value of each Product}}{\text{Total Sale value of all products}} \times \text{Joint Costs}$$

Joint Products	Units Produced (*a*)	Market Value per unit (Rs.) (b)	Total Market Value (b)	Calculations	Apportionment of product their costs Rs.
A	20,000	16	3,20,000		73,846
B	15,000	4	60,000		13,846
C	10,000	8	80,000		18,462
D	15,000	4	60,000		13,846
Total	60,000		Rs.5,20,000		Rs. 1,20,000

Ratio of Product value to total market value

A: B:C:D

16:4:8:4

16.5.2 Reverse Cost Method

This method of apportionment of Joint Costs, generally followed when products are not sold at the split off stage from the main product but further processing is required to sell. Under this method, Joint costs are apportioned based on the net value of each product. Thus it is also called Net Realisable

Value Method. The net value of each individual product is ascertained as follows:

	Rs.
Sale Value	xxx
Less : Estimated Profit on Sales	x
Less : Selling and Distribution Costs, if any	x
Estimated total Joint Costs	xxx
Less : Total Processing Costs incurred after split off stage (Total Subsequent costs)	xx
Joint Costs apportioned	xxx

Since the net values are calculated backward from sale value, it is termed as reverse cost method. In the above calculation, you may notice that the joint costs are apportioned on the basis of the net values of individual products obtained.

The following illustration will explain you the calculation of this method.

Illustration 2: At the initial processing of raw material, A, B and C joint products are produced with the following joint manufacturing expenses:

Particulars	Rs.
Material	20,000
Labour	16,000
Overheads	18,000
Total	54,000

After Split off processing costs as follows:

Particulars	A (Rs.)	B (Rs.)	C (Rs.)
Material	4,000	3,200	3,600
Labour	5,000	2,800	2,400
Overheads	5,000	2,000	4,000
Total	14,000	8,000	10,000
Sales value	84,000	40,000	36,000
Estimated Profit on Sales	50%	50%	33

Apportion the joint manufacturing costs to A, B and C products by Reverse Cost Method.

Solution :

Apportionment of Joint Costs using Reverse Cost Method

	Products		
Particulars	A (Rs.)	B (Rs.)	C (Rs.)
Sales Value	84,000	40,000	36,000
Less : Estimated Profit	42,000	20,000	12,000
Estimated Total Cost	42,000	20,000	24,000
Less : After Split Off processing Costs (Material + Labour + Overheads)	14,000	8,000	10,000
	28,000	12,000	14,000

A = 3.125%

16.5.3 Physical Unit Method

The total joint cost, under this method, are distributed on the basis of relative quantity, weight, volume, units measurement. The Joint products must be measureable by basic measurement unit. This method is suitable only where the products are capable of being expressed in same physical unit. If this is not possible, the joint costs must be converted to a denominator common to all units produced. For example, in the manufacturer of Coke, products such as coal tar, benzol, sulfate of ammonia and gas are measured in different units. The yield of these recovered units are measured on the basis of the quantity of product extracted per ton of coal. The method assumes that production of all joint products are equally desirable and suitable.

Illustration 2 : A Coke manufacturing company produces the following products by using 800 tons of coal.

	(in tons)
Coke	500
Coal tar	200
Benzol	10
Sulphate ammonia	50
Gas	40
Total	800

Price of Coal Rs. 2,000, Direct Labour Cost Rs. 1,000 and overheads Rs. 1,500 respectively per ton of coal at the stage of split-off products.

Apportion the joint cost to each joint product using physical unit method of apportionment.

Solution:

Apportionment of Joint Costs based on Physical Unit Method.

Joint Products	Production in tons	% of production to total production	Apportionment of Costs			Total
			Coal Rs.	Direct Labour Rs.	Overheads Rs.	
Coke	500	62.50	10,00,000	5,000	75,000	10,80,000
Coal Tar	200	25.00	4,00,000	2,000	30,000	4,32,000
Benzol	10	1.25	20,000	100	1,500	21,600
Sulphate Ammonia	50	6.25	1,00,000	500	7,500	1,08,000
Gas	40	5.00	80,000	400	6,000	86,400
Total	800	100.00	16,00,000	8,000	1,20,000	17,28,000

16.5.4 Average Units Cost Method

Under this method the total production cost to the various products are apportioned on the basis of average unit cost. The unit cost is ascertained by dividing the total joint costs by the total number of units produced of all products. Thus, the average cost per unit of all the product is same. The following illustration explain the application.

Illustration 3:

Using the figures of Illustration No 1 method is shown below :

$$\frac{\text{Total Joint Proudction Cost}}{\text{Total Number of units proudced}} = \text{Rs.}\frac{1,20,000}{60,000} = \text{Rs.2per unit}$$

Product	Units	Average Cost	Apportionment of Joint Costs (Rs.)
	(1)	(2)	(1×2)
A	20,000	2	40,000
B	15,000	2	30,000
C	10,000	2	20,000
D	15,000	2	30,000
	Total		1,20,000

You can also compare with the apportionment by market or sale value method.

16.5.5 Survey Method

This method is adopted after a technical survey of all factors involved in production and distribution of products. Percentage or weightage is assigned to each product to show its relative importance. Next weighted quantities are to be obtained by multiplying the assigned weights with their respective production of products and joint costs are apportioned on the basis of the ratio of weighted quantities.

The percentages or weightage is computed arbitrating by management. The method is also similar to weighted average method. It is also known as point value method. The percentages or weights can be used for a period, but it becomes necessary to compute new schedule necessitated by changes in quantities used, the time taken, the type of labour used, selling prices etc. The following illustration help you to understand the apportionment of costs under this method.

Illustration 4 : A factory produces A, B and C products of 4,000, 600 and 1,000 units respectively. The joint cost of these three products are Rs.90,000 based on the survey and technical assessment, the weights allotted to A, B and C are 4.6, 6 and 8 per unit respectively. You are required to apportion the joint cost.

Solution:

Apportionment of Joints using Survey Method

Products	Production units	Weights Alloted	Weighted Units	Apportionment of Costs (Rs.)*
	(1)	(2)	(3) (1	
A	4,000	4.6	18,400	55,200
B	600	6	3,600	10,800
C	1,000	8	8,000	24,000
			30,000	90,000

* Ratio of weighted units are 46:9:20

$$\text{Joint Cost per unit} = \frac{\text{Joint Cost}}{\text{Total No. of weighted units}} = \frac{90,000}{30,000} = \text{Rs.3}$$

Check Your Progress A

1) Name three industries in which both joint product and by product are manufactured.

2) What is "split off point"? What are the various methods of apportionment of joint products.

3) State whether following statements are **"True"** or **"False"** and justify your answer.

   (a) The Joint Products and by products are produced in same ratio

   (b) By Product has a residual value.

   (c) Joint Costs and Common Costs are Same.

   (d) Cost Apportionment produces are not perfect.

   (e) Common Costs are divisible.

16.6 METHODS OF COSTING BY-PROUDCTS

As discussed earlier, the products which generally and unavoidable produced during the process of producing the main products. These products are relatively very less value when compare with the main or joint products. For example, oil cake while producing edible oils, molasses and baggasse while producing sugar. Such products are having very less value when compare with the edible oil and sugar respectively. These by-products may be saleable without further processing or required further process for saleable. The decision in this regard will be taken the management by comparing the additional increased cost and excepted revenue on further process after split-off point. The same concept is applicable in case of joint products also. The following illustration will explain clearly whether to proceed for further process after split-off stage or not.

Illustration 5: In the course of producing the main product, two joint/by-products 'X' and 'Y' are also produced, 200 units and 80 units respectively. The saleable value of these products at the split-off point at Rs. 100 and Rs. 250 per unit respectively. In these two products are further processed after split-off point for improving their quality at the costs of Rs. 000 and Rs. 000 respectively, the saleable value is Rs. 280 and Rs.390 respectively. Suggest whether the management decides to proceed for further process after split-off stage or sale at split-off stage only.

Solution :

Statement of Incremental Profit/Loss

Details	Product X	Product Y
Output (units)	200	80
Incremental Revenue after split-off process:		
Product X : (Rs.280-Rs.100) 200 units Rs.	36,000	--
Product Y : (Rs.390-Rs.250) 80 units Rs.	--	11,200
Less: Additional Costs if proceeds for further process (Rs.)	25,000	14,000
Incremental Profit/Loss	11,000	(-) 2,800

Suggest : It is suggested that product 'X' should be processed further as it gives incremental profit and Product 'Y' should be sold at split-off stage as there is an incremental loss it proceed further process.

1) **Total Value of the by-product is insignificant :** In case the total value of the by-product is small or insignificant and cannot be considered practicable to apportion, the net income realised in respect of the sale of by-product is to be treated either i) as miscellaneous income and credited to costing profit and loss Account or credited to the respective process account from where the by-product is produced. This method avoids, the unwanted expenditure of maintaining the records of by-product.

   In order to ascertain the net income by-product, the following are to be deducted from the total sale value of the by-product:

   i) Selling and Distribution expense incurred in sale of by-product, and

   ii) All other expenses incurred for further processes after the split-off stage to make the by product saleable.

2) **Total value of by by-product is considerable:** It is appropriate to apportion the joint costs to by-products like joint products, if the total value of the by-products are of significant value. After ascertainment of the cost of by-product through apportionment, it is debited to the by product account and credited to the main product account or the respective process account. The costs incurred after split-off point for further processing of the by-product is debited and the sale value of the by-product is credited to its account. Further, any Profit/ Loss of this account is transferred to Costing Profit/Loss Account. Apportionment of joint costs to the by-products can be done using any of the methods discussed in this the unit under section 17.4 in case of costing of joint products such as sale value, physical unit, average unit cost, survey methods. The accounting procedure for apportionment is same as of joint products costs to by-products.

3) **By-products Require further processing after split-off point:** Now it is clear to you that if the by-product value is insignificant the accounting treatment is as per the method (1) explained above. If the value of by-product is considerable, the accounting treatment is as per the method (2) explained above.

Under the situation when it is decided for further processing of by-product after split-off point, the share of joint costs of by-product has to be ascertained by using the **Reserve Cost Method.** This method is explained earlier under section 17.4 in this unit. It is explained earlier under section 17.4 in this unit. It is clear that the accounting treatment for ascertaining the joints costs of by products is same as of joint products that is to subtract the estimated profit, selling & distribution expenses, processing costs incurred after split-off point of the by products from sale value or realisable value of the by-products.

Study the following illustration to understand the procedure:

Illustration 6 : 'X' and 'Y' are the by-products of Product 'A' the joint cost upto split off point is Rs. 1,31,600/ The following information is obtained from Costing Department:

Particulars	Main Product	By-products	
		X	Y
1) Sales (Rs.)	2,00,000	80,000	50,000
2) Expenses after Split off point (Rs.)	--	10,000	8,000
3) Estimated Selling Expenses on sales		15%	10%
4) Estimates Profit on Sales		20%	25%

You are required to i) show how joint costs are apportioned to by-production and ii) Cost of production of the main Product 'A'

Solution :

i) Cost Statement of By-products X and Y

Details	By Product	
	X (Rs.)	Y (Rs.)
Sales	80,000	50,000
Less : Estimated Profit	16,000	12,500
	64,000	37,500
Less: After split off costs	12,000	5,000
Estimated Selling Expenses		
Manufacturing Costs	10,000	8,000
Joint Cost apportioned	42,000	24,500

ii) Cost statement of 'Main Product 'A'

		Rs.
Total Joint Cost		1,31,600
Less : Joint Cost apportional to 'X'	42,000	
Joint Cost apportional to 'Y'	24,500	66,500
Cost of Production		65,100

Study the following illustration 7. The solution is present in different format but the concept of accounting procedure is same as illustration 6.

Illustration 7: From the following information prepare a statement sharing units cost of main product and by-product

		Main Product	**By-Product**
Units Produced	Rs.	40,000	5,000
Total			
Raw materials	50,000		
Wages	70,000		
Overhead	40,000	Rs. 1,60,000	

Estimated cost of production after split off			
Material	1,000		
Wages	1,200		
Overhead	300		Rs. 2,500
Market Value of (5,000 Units @ Rs. 1.80 per unit)			Rs. 9,000
Estimated Gross Profit Consisting of (20% of selling price, assumed)			
Selling and Administrative expenses (5% of selling price)	---	---	

Statement Showing Cost of Main Product and By Product

Particulars	Main Product Rs.	By Product Rs.	Rs.
(1) (a) Raw Materials	50,000		
(b) Wages	70,000		
(c) Overheads	40,000		
Total Production Cost (40,000 units)	1,60,000		
(2) Market Value (5,000 units @ Rs. 1.80)			9,000
(3) Less : Estimated Gross Profit consisting of (20% of selling price assumed)		1,800	
(4) Less : Selling and Administrative expenses (5% of selling price)		450	2,250
(5) Less : Estimated Cost offer Split off:			
(a) Raw Materials		1,000	
(b) Wages		1,200	
(c) Overheads		300	2,500
(6) Share of Joint Cost of By-Product			
(7) Less : Joint Cost of product from main product cost	4,250		4,250
Cost of Production of Main Product	1,55,750		
(8) Add product cost of by-product after split off			2,500
Total			6,750
(9) Total Number of Units	40,000		5,000
(10) Cost per unit	3.894		1.35

16.7 COMPREHENSIVE ILLUSTRATIONS

Illustration 8: In a manufacturing company 10,000 kiloliters of A is processed to produce 6,000 kilo liters as of "B" and 4,000 kiloliters of "C'. The Joint Cost before separation point came to an amount of Rs. 24,000. From following particulars, calculate the apportionment of joint Cost and the profit of each product under (a) Physical measurement (b) Market Value of separation point and (c) Market Value after further processing.

	B Rs.	C Rs.
Unit selling price at separation point	5,000	3.75
Unit selling price after further processing	7.00	7.50
Further processing cost after separation	5,000	7,500

Solution :

(a) **Statement of Cost and Profit (Physical Measurement)**

Costs	Product A	Product B	Product C
Output in kiloliters	6,000	4,000	24,000
Joint Cost (apportioned in 6:4 ratio)	14,400	9,600	24,000
Further Processing cost	5,000	7,500	12,500
Total Cost	19,400	17,100	36,500
Profit	22,600	12,900	35,500
Sale @ Rs. 7 and 7.50	42,100	30,000	72,000

(b) **Market Value at separation point**

	B Rs.	C Rs.	Total Rs.
Sales Value (B 6000 × Rs. 5), (C × 4000 Rs. 3.75)	30,000	15,000	45,000
Less: Joint Cost (apportioned in the ratio of Sales Value 2:1)	16,000	8,000	24,000
Profit	14,000	7,000	21,000

(c) **Market Value after further processing**

Sales Value	B Rs.	C Rs.	Total Rs.
B 6,000 Rs. 7 × C 4000 ×Rs. 7.50	42,000	30,000	45,000
Less additional processing cost Equivalent value at the point of separation	5,000	7,500	12,500
	37,000	22,500	59,500
Joint Cost Apportioned on the basis of equivalent sales value	14,924	9,075	24,000
Additional Processing Cost	5,000	7,500	12,500
Total Cost	19,924	16,575	36,500
Profit	22,076	13,424	35,500
Sales	42,000	30,000	72,000

Illustration 9: X limited manufactures Product A which yields two By-products B and C in a period. The amount spent upto the point of separation was Rs. 20,600. Subsequent expenses were : -

	A Rs.	B Rs.	C Rs.
Materials	300	200	150
Direct Expenses	400	300	200
Overheads	300	270	280
	1000	770	630

Gross sales value of A, B and C was Rs. 15,000, B Rs. 10,000 and C Rs. 5,000 respectively. It was estimated that the net profit as percentage of sales in case of B and C would be 25% and 20% respectively. Calculate the profit earned on A.

Solution :

Statement of Cost and Profit of Product A

	Rs.	Rs.
Joint Cost Before Split Off		10,500*
Material	300	
Direct Labour	400	
Overheads	300	1000
	Total Cost	11,500
	Profit (balance)	3,500
	Sales	15,000

(a) **Calculation of Share of B and C in Joint Costs**

	Rs. B	Rs. C
Sales Value	10,000	5,000
Less Profit B @ 25% C @20%	2,500	1,000
	7,500	4,000
Less Subsequent expenses	770	630
	6,730	3,370

(b) **Calculation of Product A Joint Costs**

	Rs.	
Total Joint Cost		20,600
Less Cost Share of B	6,730	
Less Cost Share of C	3,370	10,100
*	Share of A in Joint Cost	10,500

Illustration 10:

A factory is engaged in the production of a chemical called "BOMEX" and in the course of manufactures, a by-product called "BRUCIL" is produced, which after further processing has a commercial value. For one month the following are the summarized cost data

	Joint Expenses	BOMEXS	BRUCIL
Materials	1,00,000	6,000	11,000
Direct Labour	50,000	20,000	18,000
Overheads	30,000	10,000	6,000
Selling Price Per Unit		98	34
Estimated Profit per unit on a sale of BRUCIL Rs. 4		Units 2,000	Units, 2,000

The factory uses "Reverse Cost Method" of accounting for by-products whereby sales value of by-products, after deduction of estimated profit, post split off cost and selling and distribution expenses relating to the By-products is credited to the joint process cost account. You are required to prepare statement showing : -

(a) The Joint Cost allocable to "BOMEX"

(b) The product wise and overall profitability of the factory for the month.

Solution :

	Rs.
Sales value of By product "BRUCIL" = 2,000 × Rs. 34	68,000
Less Profit @ Rs. 4 per unit	8,000
Cost of Sales	60,000
Less : Separate expenses	28,000
Cost at the point of Split Off	32,000

(A) **Statement of Joint Cost allocable to "BOMEX"**

Joint Expenses	Rs.	
Materials	1,00,000	
Direct Labour	50,000	
Overheads	30,000	1,80,000
Less Share of Joint Allocable to "BRUCIL"		32,000
Share of Joint Cost Allocable to "BOMEX"		1,48,000

(B) **Statement of Product wise and overall profitability**

	BOMEX	BRUCIL	Total
	Rs.	Rs.	Rs.
Joint Cost	1,48,000	32,000	1,80,000
Separate expenses	36,000	28,000	64,000
Cost of Production	1,84,000	60,000	2,44,000
Selling and Distribution Expenses	--	--	--
Cost of Sales	1,84,000	60,000	2,44,000
Profit	12,000	8,000	20,000
Sales	1,96,000	68,000	2,64,000

Illustration 11: In manufacturing the main product Aa company processes waste material in two by-products X and Y. Using the working back method from sales value to an estimated cost, you are required to prepare comparative profit and loss account for three products from the following data:

(i) Total cost upto separation point was Rs. 1,36,000

		A	X	Y
(ii)	Sales (all products)	3,28,000	32,000	48,000
(iii)	Cost after separation Rs.	__--	9,600	14,400
(iv)	Estimated net profit percentage to sales value	--	20%	3%
(v)	Estimated selling expenses as a percentage of sales value	20%	20%	20%

Solution:

Comparative Profit and Loss Account

	A Rs.	X Rs.	Y Rs.
Joint Cost	1,36,000	--	--
Less Cost charged to by-products*	19,200	9,600	9,600
	1,16,800		
Cost after separation	--	9,600	14,400
Selling Expenses (20% of sales)	65,600	64,00	96,00
Total Cost	182,400	25,600	33,600
Profit	1,45,600	6,400	1,44,000
Sales Value	3,28,000	32,000	48,000

*** Working Details:**

	X Rs.	Y Rs.	Total Rs.
Sales (A)	32,000	48,000	
Less : Estimated Profit	6,400	14,400	
Selling Expenses	6,400	9,600	
After separation Cost	9,600	14,400	
Total (B)	22,400	38,400	
A – B (share in Joint Costs)	9,600	9,600	19,200

16.8 LET US SUM UP

In many processing industries, more than one product may be produced. They are classified as joint products and By-products, though classification is not rigid. A By product of one concern may be joint product in another

concern. Joint products are produced simultaneously by a common process. A By-product means one or more products of small total value. It has a residual value. The left over may be scrap or wastage.

There are difficulties in costing By products and joint products because joint cost, is indivisible. In joint cost, cost allocation and procedures are not perfect, but are arbitrary. There are five methods of apportionment of joint production costs (i) market or sales value method, (ii) reverse cost method, (iii) physical unit method, (iv) average unit cost method, and (v) survey method. The method of costing of By-product are three. They are i) where by-products are of insignificant value, ii) where by-products are of considerable value and iii) where by-products require further processing. Manufacturing companies may use different format to prepare the cost statements of joint or by-products, but the principles of the methods are same.

16.9 KEY WORDS

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

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

Common Costs : Common costs are allocable among products or services.

Joint Costs : A Joint Cost is indivisible. Sometimes may be a divided according to common costs.

Split Off Point : The stage of process where the joint or by-products are separated from main product.

16.10 ANSWERS TO CHECK YOUR PROGRESS

A) 3. (a) False (b) True (c) False (d) True (e) False (f) True

16.11 TERMINAL QUESTIONS / EXERCISES

1) (a) Distinguish between Joint products and By products

   (b) Briefly describe the two acceptable methods of accounting for By products in the determination of cost of main product.

2) (a) Does the showing of income from By product in Profit and Loss Account influence the unit cost of the main product.

   (b) What is the Chief difference between quantitative unit method and average unit cost method of joint cost allocation?

3) Discuss four methods for apportionment the total Joint production and cost to Joint products.

4) Explain the various methods of accounting for by-products.

5) RIL Ltd produces four joint products A, B, C and D all of which came from the processing of one raw material. The detailed data is as follows :

Production for the period

Joint Product	Number of units	Selling price per unit Rs.
A	1000	36.00
B	1800	16.00
C	800	8.00
D	400	22.00

The Company budgets for a profit of 10% of sales value the other estimated costs are :-

	Rs.
Cartage	2,000
Direct Wages	6,000
Manufacturing overhead	4,000
Administrative overhead	10% of sales value

Prepare a comprehensive cost statement for a each of the products, allocating the material and other costs on the basis of (a) number of units (b) sales value

6) AMUL manufactures one main product and two By product X and Y. The details are:

	Main Product	By Product X	By Product Y
Sales	Rs. 1,50,000	Rs. 12,000	Rs. 7,000
Before separation manufacturing cost	Rs. 75,000	--	--
After separation manufacturing cost	Rs. 23,000	Rs. 2,200	Rs. 1,800
Selling and administrative expenses	Rs. 12,000	Rs. 1500	Rs. 1,100

Required : Using reversal cost method for By-products assuming 15% profit for By product X and 12% profit for By- product Y. There is no beginning of ending inventories.

7) Kanodia Mills manufactures three products A, B and C from a Joint process. The Joint Cost total Rs. 60,000. Other information is as follows:

Product	Unit Produced	Market value of split-off Rs.	Additional Cost Rs.	Market Value Rs.
A	6,000	40,000	9,000	55,000
B	4,000	35,000	7,000	45,000
C	2,000	25,000	5,000	30,000

You are required to show Total Cost for each product, using market value method.

8) Using the data of question no . 5, you are required to show total cost for each product, using average unit cost method.

9) Calculate the estimated cost of product A and B at the point of separation from main product.

	By Product A	By Product B
Selling price per unit	Rs. 120	Rs. 240
Cost per unit after separation from the main product	Rs. 30	Rs. 50
Unit produced	5,000	2,000

Selling expenses amount to 25% of total works cost i.e., including both pre separation and post separation works cost, selling prices are arrived at by adding 20% of total cost i.e., the total of works cost and selling expenses.

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

SOME USEFUL BOOKS

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UNIT 17 VALUATION OF WORKING-IN-PROGRESS

Structure

17.0 Objectives
17.1 Introduction
17.2 Computation of Equivalent Production
17.3 Calculation of Equivalent production of Work-in-Progress
17.4 Procedure for Valuation of Equivalent Production
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17.0 OBJECTIVES

After studying this unit you will be able to :

- explain the meaning of equivalent production;
- describe the calculation of equivalent production;
- understand the calculation of equivalent production of work-in-progress; and
- explain the procedure for valuation of "equivalent production".

17.1 INTRODUCTION

In process costing, if there are no inventories, unit costs can be easily determined by dividing the cost by number of units finished. But when opening and/or closing inventories are there, calculations are not so simple. Materials are added at different stages of production : at the start of processing and at the end of processing i.e. as production progress. If materials additions increase the number of units, there is a change in the unit cost. When there is continuous process there is always incomplete work at the opening and closing period of each process. Ignoring incomplete units will not represent the correct cost, since, the work-in progress cannot bear the cost of completed units. The work-in-progress is required to be converted into their equivalent of completed units. It is called Equivalent Production or Finished equivalent. Wheldon defines "equivalent production as the production of a process in terms of completed units". The equivalent production represents the output of a process expressed in terms of completed units. This is done on the basis of an estimate or a percentage of degree of completion in respect of materials consumed, machine or labour hours etc.,

Let us study the following illustration to understand the alternative calculations of equivalent production.

17.2 COMPUTATION OF EQUIVALENT PRODUCTION

Illustration 1:

Opening Work-in-Progress 8,000 units 40% complete

Units introduced in process	60,000
Units completed	64,000

Closing work-in-progress 4000 units, 60% complete. Calculate equivalent production.

Solution :

Calculation of Equivalent Production

Following are three ways of computation of "Equivalent production"	Rs.
Opening work-in-progress works required to be completed (8,000 × 60%)	4,800
Add: Units introduced and completed during the period (60,000 – 4000)	56,000
Add: Closing work-in-progress (i.e., 60% of 4000)	2,400
Completed equivalent production	63,200
Alternatively I	
Units completed during the year	64,000
Add: Closing Stock (work done i.e., 60% of 4,000)	2,400
	66,400
Less: Opening Work-in-progress (percentage of work done in the previous period) 8,000 40%)	3,200
Complete equivalent production	63,200
Alternatively II	
Opening Inventory of work incomplete (8,000 × 60%)	4,800
Add: Units introduced in process	60,000
	64,800
Less: Closing work-in progress incomplete (4,000 × 40%)	1,600
Completed equivalent production	63,200

Note : Study the formulae in above cases carefully

Procedure of Computation

The above example does not consider work-in-progress at the beginning and also any losses arising in the process. The following procedure is followed when both opening work-in-progress and closing work-in progress and losses or gains in process are involved for computation of "equivalent production".

a) Find out "equivalent production" after taking into consideration the percentage of degree of completion in respect of opening stock of work-in-progress e.g., opening stock of work-in-progress is 8,000, 30% complete in previous process, so 70% of the job is to be left over in the process then equivalent production would be 70% of 8,000 i.e., 5600 units. It means that the cost of 5600 units are to be increased in the process for completion.

b) Find the number of units introduced in the process deduct closing work-in-progress.

c) Convert the equivalent production of closing work-in-progress and add to the above no. (b)

d) Find out the net process costs according to element wise i.e., materials, direct labour and overheads, after taking into account process losses.

e) Ascertain the cost per unit of equivalent production for each element by dividing the cost of each element by the number of equivalent production.

f) Find the value of output of finished product and transferred products and also work-in-progress

The above steps will help to you prepare following three statements :

1) The statement of equivalent production

2) Statement of Cost

3) Statement of evaluation

Illustration 2:

From the following details, you are required to prepare (a) statement of equivalent production (b) Statement of cost (c) Statement of Evaluation

Opening work-in progress (50% complete) 10,000 units	Rs.22,480
Direct Materials	Rs. 60,000
Direct Labour	Rs. 45,000
Overhead	Rs. 45,000
Units introduced in process	Rs. 76,000
Units finished and transfer to store	Rs. 78,000
Closing Work-in-progress (25% complete)	8,000

Solution

Statement of Equivalent Production

Input	Output	Units	Equivalent Production					
			Materials		Direct Labour		Overheads	
			Unit	%	Unit	%	Unit	%
10,000	Opening W/p	10,000	5,000	50	5000	50	5000	50
78,000	Finished Product	68,000	68,000	100	68000	100	68000	100
8,000	Closing W/p	8000	2,000	25	2000	25	2000	25
86,000		86,000	75,000		75,000		75,000	

Statement of Cost

Element	Cost Rs.	Equivalent production	Cost per unit Rs.
Materials	60,000	75,000	0.80
Direct Labour	45,000	75,000	0.60
Overheads	45,000	75,000	0.60
	75,000		Rs. 2.00

Statement of Evaluation

Opening Work in progress	Materials	5,000 @ Rs. 0.80	Rs. 4,000	
	Direct Labour	5,000 @ Rs. 0.60	Rs. 3,000	
	Overhead	5,000 @ Rs. 0.60	Rs. 3,000	Rs. 10,000 (total)
Finished Product	Materials	68,000 @ Rs. 0.80	Rs. 54,400	
	Direct Labour	68,000 @ Rs. 0.60	Rs. 40,800	
	Overhead	68,000 @ Rs. 0.60	Rs. 40,800	Rs. 1,36,000 (total)
Closing Work in progress	Materials	2,000 @ Rs. 0.80	Rs. 4,000	
	Direct Labour	2,000 @ Rs. 0.60	Rs. 3,000	
	Overhead	2,000 @ Rs. 0.60	Rs. 3,000	Rs. 4,000 (total)
				Rs.1,50,000

17.3 CALCULATION OF EQUIVALENT PRODUCTION OF WORK-IN-PROGRESS

When there is a beginning inventory of work-in-progress, the production that is completed comes from different batches, some from units partially completed in a previous period and some from new units put in the current period. Since costs vary from period to period, each batch may have different unit costs. The differences in costs also depend upon method of costing. Two methods of costing are usually used. (1) Average Costing (2) First-in First out (FIFO) costing. The procedure for calculating equivalent production of work-in-progress depends upon which of these two methods is used. Let us discuss them.

Under the **average method of costing** work-in-process at the beginning of the period (both units and costs) is merged with new production started in the current period (both units and cost) and average cost per unit is determined. All units completed in a given period are assigned the same cost, irrespective when they were started. No consideration is given to the fact that some part of processing was completed in previous period at a cost that might be different from the current period.

The **FIFO method of costing** is based on presumption that units in progress at the beginning are to be completed first. Costing under this method is more complex that using average costs. The costs are recorded in a chronological order, starting with costs brought forward from the preceding period as work-in progress inventory and adding thereto the costs incurred in its completion to determine the final completed cost. In practice, the FIFO method is not carried to its logical conclusion. Costs are separated by batches only within batches and then are transferred from work-in-progress to the finished production. It is actually FIFO is a hybrid method.

Study the following illustration 3 for understanding the procedure:

Illustration 3 : The following are details of production and cost data for the month of February, 2019 the second month of operation:-

Production

Units in progress January, 2019 – all materials issued 2,000 units, 25% complete for conversion cost.

New units starting in progress	8,000
Total units the production details are :-	10,000

The production details are

Units completed	7,000
Units in progress – all materials issued, 1/3rd complete conversion cost	3,000
Units lost in progress	NIL

Cost record

Work-in-progress Inventory, January 31, 2019

	Rs.	
Materials	600	
Conversion Cost	100	700

Costs for February, 2019

Materials issued	Rs. 2,560
Conversion Cost	Rs. 1,500
Total Cost to be accounted	Rs. 4,760

You are required to prepare

a) Equivalent production

b) Cost per unit using (i) average method and (ii) FIFO method

Solution :

a) **Equivalent production for February, 2019 – Average Costing**

	Actual No of units	Materials Cost		Conversion Cost	
		Stage of Completion	Equivalent Production	Stage of Completion	Equivalent Production
Units Completed	7,000	100%	7,000	100%	7,000
Units in progress	3,000	100%	3,000	1/3rd	1,000
	10,000		10,000		8,000

Under average method, the stage of completion of beginning inventory of work-in-progress is ignored. No distinction has been made between units partially completed in January and units started and completed in February.

b) **(i) Unit Cost – Average Method for February, 2019**

	Materials	Conversion Cost
Cost from January in Work-in-progress of January, 31	Rs. 600	Rs. 100
Cost recorded in February	2560	1500
Total Cost	3160	1600
Units completed in Equivalent Production	10,000	8,000
Unit Cost	Rs. 0.316	Rs. 0.20

c) (ii) FIFO Method Cost Distribution

	Materials	Conversion
Units Completed in February	7,000	7,000
Add: Units in progress at February, 28	3,000	1,000
Total Number of units processed	10,000	8,000
Less: Units at January, 31	2,000	500
Units Completed in February	8,000	7,500

Units costs are determined by dividing the cost recorded in the current period by equivalent production for the period. For February it will be : -

Material Cost Rs. 2,500 ÷ 8,000 units Rs. 0.32

Conversion Costs Rs. 1,500 ÷ 7,500 Rs. 0.20

Equivalent Production for February

To determine the cost to complete work-in-progress, it is necessary to find the equivalent production at the beginning of the period with actual number of units in process. For February, it will as under :-

	Material	Conversion
Actual number of units in progress at January, 31	2,000	2,000
Deduct equivalent production at January, 31:-		
100 % of 2000 units	2000	
25% of 2000 units		500

Equivalent production for February

0% × 2000 0

75% × 200 1,500

It must be noted in passing is the difference created by the point of issue of material. If in process added material at the end of processing, the equivalent production used in completing the beginning work-in-progress would be 100%or 2000 units. In making the cost distribution for February, the 7,000 units completed are divided into 2000 units from opening inventory of work-in-progress and 5,000 from new production.

When there is no process loss.

Illustration 4: From the following data, find out 'Equivalent production' by using average method and FIFO method, assuming that there is no process loss.

Opening work-in-process	2000 units
Materials	80%
Direct Labour	60%
Overhead	60%
Units introduced	3000 units
Completed as to : -	
Materials	80%
Direct labour	60%
Overheads	60%

Solution :

Average Method – Computation of Equivalent Production

		Material		Labour		Overhead	
	Total units	units	%	units	%	units	%
Completed	7,000	7,000	100	7,000	100	7000	100
Not Completed	3,000	2,400	80	1,800	60	1800	60
	10,000	9,400		8,800		8,800	

FIFO Method – Computation of Equivalent Production

	Total units	Material	%	Labour	%	Overhead	%
Opening Work-in-progress	2,000	400	20	800	40	800	40
Introduced and Completed	5,000	5,000	100	5,000	100	5,000	100
Closing Work-in-progress	3,000	2,400	80	1,800	60	1,800	60
	10,000	7,800		7,600		7,600	

When There is Process Loss – Average Method

Illustration 5 : The product process through two processes. The entire material is placed in the process at the beginning of the first process. The following data relates to the first process. You are required to work out the value of closing inventory and value of materials transferred to the second process.

Process I

	Rs.
Opening Inventory	10,000
Materials	27,500
Direct Labour	50,000
Overheads	40,000
	Kilograms
Opening inventory (25% complete)	4,000

Put into process	12,000
Transferred to second process	10,000
Closing inventory (20% complete)	5,000
Loss during process normal	

Solution:

Statement of "Equivalent Production" (units)

	Output Kg	Material		Labour		Overhead	
		Qty	0%	Qty	0%	Qty	0%
Opening inventory processed	4,000	3,000	75%	3,000	75%	3,000	75%
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	
	16,000	10,000		10,000		10,000	

Process Account I

	Kg	Amount Rs.		Kg	Amount Rs
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
Overheads		40,000			
	16,000	1,27,500		16,000	1,27,500

Note: The cost per unit will be as under for equivalent production of 10,000 units.

	Rs.		Rs.
Material	27,500 ÷ 10,000	=	2.75
Labour	50,000 ÷ 10,000	=	5.00
Overheads	40,000 ÷ 10,000	=	4.00
			11.75

Note: Equivalent Units are 10,000

When there is a process Loss – FIFO Method

Illustration 6: The manufacturing details of two processes of a factory product are given below:-

Opening work-in progress 500 units @ Rs. 6 per unit

Transfer from process No I 15,000 units Rs. 32,175

Direct Materials added in process No: 2 Rs. 10,350

Direct Wages Rs. 27,200

Overheads Rs. 21,845

Units Scrapped = 800

Normal Loss = 5% of production

Transfer to process No. 3 - 1,32,000 units

Closing inventory 1,500 units

Degree of completion

	Opening Inventory	Scarp	Closing Inventory
Materials	80%	100%	60%
Labour	50%	80%	40%
Overhead	50%	80%	40%

Units scrapped sold for Rs. 2 per unit

You are required

a) To prepared statement of equivalent production

b) Statement of Cost

Solution :

Statement of Equivalent Production

Input	Output	Units	Material I		Material II		Labour		Overhead	
500	Opening WIP Inventory	500	--	--	20%	100	50%	250	50%	250
15,000	Normal loss	700	--	--	--	--	--	--	--	--
	Abnormal Loss	1000	100%	100	100%	100	80%	80	80%	80
	Finished WIP	12,700	100%	700	100%	12,700	100%	12,700	100%	12,700
	Closing Inventory	1,500	100%	1,500	60%	900	40%	600	40%	600
15,500		15,500		14,300		13,800		13,630		13,630

Statement of Cost

Element	Cost Rs.	Equivalent Production units	Cost Per Unit Rs
Materials transferred from Process I	32,175		
Less Scrap	1,400		
	30350	14,300	2.152
Add in Process II	10,350	13,800	0.743
Labour	27,200	13,630	2.000
Overhead	21,845	13,630	1.602
	Rs.90,230		Rs. 6.497

Check Your Progress A

1) Define Equivalent Production. When it is calculated ?

2) Name the three statements that are to be prepared

3) Explain the Average method and First-in-First out methods of Costing.

4) State whether following statements are "**True"** or **"False"** and justify your answer.

   a) When there is continuous process there may be incomplete units at the beginning and closing period of each process.

   b) In computation of "Equivalent Production" closing stock need not be added.

   c) cost of conversion means cost of direct labour and overheads

   d) FIFO method of costing is more complex that Average method of costing

   e) Scrapped units have no value and is a total waste

17.4 PROCEDURE FOR EVALUATION OF EQUIVALENT PRODUCTION

The procedure for Evaluation of 'Equivalent production can be grouped into four groups:-

a) When there is only closing stock with no process losses

b) When there is only closing stock with process losses

c) When there is opening and closing work-in-process with no process losses

d) When there is opening and closing stock work-in-progress with process losses/abnormal gain.

In unit 15 of this course the meaning of normal loss, abnormal loss and abnormal gain are explained.

The procedure consists of three steps (a) prepare statement of equivalent production, (b) prepare statement of cost and (c) statement of valuation. The above groups are illustrated one by one.

a) **Closing Work-in-Progress with No Process Loss**

Illustration 6 : Prepare statement of equivalent statement of cost and statement of Evaluation from the following information:

Units introduced 7,600 output (units) 600 process cost:-

Material Rs. 14,560

Labour Rs. 21,360

Overhead Rs. 12,240

Degree of completion for closing work-in-progress

Materials 80%, Labour 70% Overhead 7%

Solution:

Statement of Equivalent Production

Input	Output	Units	Material I		Labour		Overhead	
7,600	Completed	6000	6,000	100%	6000	100%	6000	100%
	WIP (Closing)	1600	1,280	80%	1120	70%	1120	70%
7,600		7,600	7,280	--	7,120	--	7,120	--

Statement of Cost

Element of Cost	Cost Rs.	Equivalent production	Cost Per Unit Rs.
Material	14,500	7,280	2
Labour	21,360	7,120	3
Overheads	14,240	7,120	2
	50,100		7

Statement of Evaluation

	Rs.
Output transferred 6,000 × 7	42,000
Work-in-Progress	
Materials 1,280 × Rs. 2 = Rs. 2,500	
Labour 1,120 × Rs.3 = Rs. 3,360	
Overhead 1,120 × Rs.2 = Rs. 2,240	8,160
	50,160

b) **Closing Work in process with Process Loss**

Illustration 7 : Tata Engineering company is engaged in making grills during a month 4000 units were introduced in process I. The normal loss is estimated at 5% on input. At the end of the month, 2,800 units had been produced and transferred to the next process. 920 units were uncompleted and 280 units had been scrapped. It was estimated that incompleted units had reached a stage in production as follows:

Materials	75% completed
Labour	50% completed
Overhead	50% completed

The cost of 4,000 units was Rs. 11,600.

Direct material introduced during the process amounted toRs. 2,880. Direct wages amounted to Rs. 6,680 Production overheads incurred were Rs. 3,340. Units scrapped realised Re.1 each units scrapped passed through the process so were 100% completed as regards material, labour and overhead. Show the statement of equivalent production, statement of cost per unit and statement of valuation.

Solution :

Statement of Equivalent Production

Input	Output	Units	Equivalent Production					
			Material		Labour		Overheads	
			Units	%	Units	%	Units	%
4,000	Normal Loss	200	--	--	--	--	--	--
	Abnormal Loss	80	80	100	80	100	80	100

	Finished Production	2800	2800	100	2800	100	2800	100
	Work-in-progress	920	690	75	460	50	460	50
4,000		4,000	3,570		3,340	3,340		

Statement of Cost

Element of Cost	Cost Rs.	Equivalent Production	Cost Rs.
Materials	11,600		
Cost of units	2,880		
	14,480		
Less Scrap Value	200		
	14,280	3,570	4
Direct Wages	6,680	3,340	2
Overheads	3,340	3,340	1
	24,300		7

Statement of Evaluation

Production	Element of Cost	Equivalent Production	Cost per unit Rs.	Rs.	Total Rs.
Abnormal Loss	Material	80	4	320	560
	Labour	80	2	160	
	Overheads	80	1	80	
Finished Production	Material	2800	4	11200	19600
	Labour	2800	2	5600	
	Overheads	2800	1	2800	
Work-in-Progress	Material	690	4	2760	4140
	Labour	460	2	920	
	Overheads	460	1	460	
				Total	Rs. 24,300

Note: Scrap value 280-80 = 200 @ Re 1.

c) Opening and Closing Work-in-Progress with no process loss

Illustration 8 : Anuprav International Ltd gives following figures relating to a single industrial process. Quantity of the work-in-process at commencement : 16,000 units

	Rs.
Cost of work in process at the beginning	
Materials	59,200
Wages	13,200
Overheads	11,600

During the period, additional 64,000 units were put in with following costs :

	Rs.
Materials	2,24,800
Wages	66,800
Overheads	60,400

At the end of the period, 5600 units were fully processed and 24,000 units remained in the process. The closing stock was complete as regards material cost and one-third complete as regards wages and overheads. Use average method of valuation, prepare necessary statements.

Statement of Equivalent Production

Input	Output	Units	Material		Labour		Overheads	
			%	Units	%	Units	%	Units
16,000	Opening WIP	16,000	100	16,000	100	16,000	100	16,000
40,000	Finished and transferred	40,000	100	40,000	100	40,000	100	40,000
24,000	Closing WIP	24,000	100	24,000	33/13	8,000	33/13	8,000
80,000		80,000		80,000		64,000		64,000

Statement of Cost

Elements	**Cost**	**Equivalent Production**	**Cost per unit**
Materials:-	Rs.		
Opening Stock	59,200		
Additional Stock Cost	2,24,800		
	2,84,000	80,000	3.55
Labour :-			
Opening Stock	13,200		
Current Cost	66,800		
	80,000	64,000	1.25
Overheads:-			
Opening Stock	11,600		
Current Cost	60,400		
	72,000	64,000	1.125
	4,36,000		5.925

Statement of Evaluation

Finished and transferred 56,000 units @ Rs. 5.925 = 3,31,800

Work in progress

Materials	24,000	@ 3.55=	Rs. 85,200
Wages	8,000	@ 1.25=	Rs. 10,000
Overheads	8,000	@ Rs. 1.125 =	Rs. 9,000
		Total	Rs. 1,042,00
			Rs. 4,36,000

d) Opening and Closing Work-in-Progress with process losses

Illustration 9 : BIRLA Company gives the following information from which you are required to prepare necessary statements

Opening Stock 1200 units Rs. 21,00

Degree of Completion

Materials 80%

Labour 60%

Overheads 60%

Transfer from Process I, 22,000 units At Rs. 11,000

Transfer to process III : 17,600

Direct materials added to Process II Rs. 4,820

Direct Labour Rs. 14,310

Production Overhead Rs. 19,080

Units Scrapped : 2000

Degree of Completion :

Material 100%

Labour 70%

Overheads 70%

Closing stock 3200 units

Degree of completion : - Materials 70%, Labour 60%, Overhead 60%

There was a normal loss in the process of 10% of production units scrapped realised Re 0.50 per units

Solution:

Element of Cost	Cost Rs.	Equivalent production	Cost per Unit Rs.
Materials : -			
Form Process I	11,000		
Less: Scrap (2000 Rs. 0.50)	1,000		
	10,000	20,000	0.50
Materials Added	4820	19280	0.25
Labour	14310	19.080	0.75
Overheads	19080	19080	1.00
	48,210		2.50

Statement of Equivalent Production

Input	Units	Output	Units	Equivalent Production							
				Material I		Material II		Labour		Overheads	
				Units	%	Units	%	Units	%	Units	%
Opening stock	1200	Opening stock	1200	--	--	240	20	480	40	480	40
Process I	22,000	Normal Loss	2000	--	--	--	--	--	--	--	--
4,000		Abnormal Loss	400	400	100	400	100	280	70	280	70
		Completed Production	16,400	16400	100	16,400	100	16,400	100	16,400	100
		Closing Stock	3,200	3200	100	2,240	70	1920	60	1920	60
4,000	23,200		23,200	20000		19,280		19,080	3,340	19,080	

Evaluation of Equivalent Production

Particulars	Element of cost	Equivalent Production	Cost Per unit Rs.	Cost Rs.	Total Cost
Opening Stock	Material I	--	--	--	--
	Material II	240	0.25	60.00	
	Labour	480	0.75	360.00	
	Overheads	480	1.00	480.00	900
Abnormal Loss	Material I	400	0.50	200	790
	Material II	400	0.25	100	
	Labour	280	0.75	210	
	Overheads	280	1.00	280	
Finished Production	Material I	16400	0.50	8200	41000
	Material II	16400	0.25	4100	
	Labour	16400	0.75	12300	
	Overheads	16400	1.00	16400	
Closing Stock	Material I	3200	0.50	1600	5520
	Material II	2400	0.25	560	
	Labour	1920	0.75	1440	
	Overheads	1920	1.00	1920	
					48,210

(d) (ii) Opening & closing stock with abnormal gain.

Illustration 9: (abnormal gain)

The following information is obtained in respect of process No. 2 for a month. Prepare necessary statements.

Opening stock 4,000 units Rs. 8,000

Degree of completion : -

Materials 80%

Labour 50%

Overhead 40%

Transfer from Process No I 24,000 units Rs. 1,00,400

Transfer to Process No. 3 = 20,000 units

Direct material (added in process No. 2) = Rs. 62,400

Direct Labour Rs. 42,800, Overhead Rs. 65,400

Units Scrapped 2,000

Degree of completion:-

Material 100%, Labour 80% Overhead 80%

Closing stock 6000 units

Degree of completion:-

Material 70%, Labour 60%, Overhead 60%

Normal Loss 10% of production, scrap sold Rs. 12 per unit

Solution:

Input	Output	Units	Equivalent Production							
			Material I		Material II		Labour		Overheads	
			%	Units	%	Units	%	Units	%	Units
4,000	Opening stock	4000	--	--	20	800	50	2000	60	2400
24,000	Normal Loss	2200	--	--	--	--	--	--	--	--
	Processed	16,000	100	16,000	100	16,000	100	16,000	100	16,000
	Closing stock	6,000	100	6000	70	4200	60	3600	60	3600
		14,100		22000		21000		21600		22000
	Abnormal gain	200	100	200		200		200	100	200
28,000		28,000		21,800		10400				21800

Statement of Cost

Elements	Cost Rs.	Equivalent production	Cost per unit Rs.
Materials			
Transfer from Process I	10,0400		
Less Scrap Sales	13,200		
	87,200	21,800	4
Added in Process 2	62,400	20,800	3
Labour	42,800	21,400	2
Overhead	65,400	21,800	3
Total Cost	2,57,800		12

Statement of Evaluation

Opening Stock		Rs.	Rs.
Material I	--		
Material II	800 units @ Rs. 3	2,400	
Labour	2400 units @ Rs. 2	4,000	
Overhead	2400 units @ Rs. 3	7,200	13,600
Processed			
Material I	16000 units @ Rs. 4	64,000	
Material II	16000 units @ Rs. 3	48,000	
Labour	16000 units @ Rs. 2	32,000	
Overhead	16000 units @ Rs. 3	48,000	1,92,000
Abnormal Gain			

Material I	200 units @ Rs. 4	800	
Material II	200 units @ Rs. 3	600	
Labour	200 units @ Rs. 2	400	*
Overhead	200 units @ Rs. 3	600	2400
Closing Stock			
Material I	6000 units @ Rs. 4	24,000	
Material II	4200 units @ Rs. 3	12,600	
Labour	3600 units @ Rs. 2	7,200	
Overhead	3600 units @ Rs. 3	10,800	54,600
		Total Cost	2,60,200
		Less Abnormal Gain	2,400
			2,57,800

- Since the units scrapped are 2000 only abnormal gain is 200 units. These units are deemed to be completely processed. Hence the percentage of completion given in the problem for scrap will not be considered. In the total cost shown Rs, 2,60,200 normal gain of Rs. 2400 has not been added.

17.5 COMPREHENSIVE ILLUSTRATIONS

Illustration 10:

The following data are available of process I for March 2019

Opening Work-in-progress	900 units at Rs. 4,500
Degree of completion:- Overheads 10%	Materials 100%, Labour 6% ,
Input of materials	9100 units at Rs. 27,300
Direct Wages	Rs. 82,00
Production Overheads	Rs. 16,400
Units Scrapped	1200 units
Degree of Completion overheads 80%	Material 100%, Labour 80% and
Units transferred to next process	7,800 units

Normal loss is 10% of total input (opening stock plus units put in) and scrap value is Rs. 3 per unit. You are required to follow FIFO method. Show (a) Equivalent production (b) Cost per equivalent units for each element (c) Cost of abnormal loss (d) Closing work-in-progress

Solution :

Statement of Equivalent Production

Input	Output	Units	Material			Labour		Overheads		
				%	Units	%	Units	%	Units	
900	Opening WIP	900	--		--	40	360	40	360	
	Normal loss	1,000		--	--	---	--	--	--	
	Abnormal Loss	200		100	200	70	140	70	140	
9100	Finished and transferred	6,900		100	6900	100	6900	100	6900	
	Closing WIP	1,000		100	1000	80	800	80	800	
10,000		10,000			8100		8200		8200	

Statement of Cost

Elements	Cost	Rs.	Equivalent Production	Cost per unit
Materials	27,300			
Less Scrap (1,000 units @ Rs. 3)	3,000	24,300	8100	3
Labour		8200	8200	2
Overheads		16,400	8200	1
		48,900		6

Statement of Evaluation

		Rs.	Rs.
7,800 units transferred			
Cost of opening WIP (900 units)			4,500
Cost incurred on WIP Opening			
Material	NIL		
Labour	360 units @ Rs. 1 per units	360	
Overhead	360 units @ Rs. 2 per unit	720	1,080
Cost of completing 6,900 units :			
Materials of 6,900 units @ Rs. 3 per unit		20,700	
Labour 6,900 units @ Re 1 per unit		6,900	
Overhead 6,900 units @ Rs. 2 per unit		13,800	41,400
		Total	46,980

Abnormal Loss

Materials	200 units @ Rs. 3 per unit	600
Labour	140 units @ Rs. 1 per unit	140
Overhead	140 units @ Rs. 2 per unit	280
		Rs. 1,020

Closing Work-in progress		
Materials 1,000 units @ Rs. 3 per unit	3,000	
Labour 800 units @ Rs. 1 per unit	800	
Overhead 800 units @ Rs. 2 per unit	1,600	Rs. 5,400
	Total	Rs. 53,400

Illustration 11: The following information has been extracted from the records of RAUNAK company Ltd engaged in the manufactures of a single product.

Opening Work-in-progress	Quantity	16,000 units
	Materials	Rs.1,48,000
	Wages	Rs.33,000
	Overhead	Rs.29,000
Added during the year	Quantity	64,000 units
	Materials	Rs.5,62,000
	Wages	Rs.1,67,000
	Overhead	Rs.1,51,00
Finished during the year	Quantity	56,000 units
Closing Work-in-progress	Quantity	24,000 units
	Materials	Complete
	Labour	1/3 complete
	Overhead	

Tabulate production and cost figures to give quantities, units value and total value for completed and value of each element of cost of closing stock work-in-progress. Use average method of valuation.

Statement of Equivalent units

		Materials		Labour and Overhead	
	Units	Qty	%	Qty	%
Completed and transferred to next process	56,000	56,000	100	56,000	100
closing WIP	24,000	24,000	100	8,000	331/3
	80,000	80,000		64,000	

Statement of Apportionment of Cost

Element	Work-in-progress Opening Rs.	Put in process Rs.	Total Cost Rs.	Average Cost per unit	Equivalent Production in units
Material	1,48,000	5,62,000	7,10,000	8.876	80,000
Wages	33,000	1,67,000	2,00,000	3.1250	64,000
Overhead	20,000	1,51,000	1,80,000	2.8125	64,000
Total	2,10,000	8,80,000	10,90,000	14.8135	

	Equivalent Units	Cost per unit Rs.	Total Rs.
Materials	24,000	8.875	2,13,000
Labour	8,000	3.125	25,000
Overheads	8,000	2.8125	22,500
		Total	2,60,500

17.6 LET US SUM UP

In process costing, where there are opening and closing inventories, calculation of unit cost are not so simple, When there is continuous process, there is always incomplete work at the opening and closing represent the correct cost. Since work-in-progress can not bear the cost of completed units, work-in-progress is required to be converted into their 'Equitable production'. The procedure is followed helps to prepare three statement – the statement of evaluation. For calculating 'Equivalent production' of the opening work-in-progress, there may be difference in costs from period to period or batch to batch, The difference in costs also depend upon the method of costing. Two methods of costing are usually used (a) average cost method (b) first in first out method (FIFO), under FIFO method of costing, Costing is based on presumption that since unit in progress at the beginning are to be completed first.

The procedure for evaluation of equivalent production involves the problems about opening and/or closing work-in progress with or without processes losses, when thee are process loss the procedures of computation of equivalent production is more complex.

17.7 KEY WORDS

Equivalent Production : It is the production of a process in terms of completed units. It represents the output of a process expressed in terms of completed units

FIRST in FIRST OUT (FIFO) : This method of costing is based on the presumption that units in progress at the beginning are to be completed first. IN LIFO method, materials received last are issued first.

Conversion Cost : The cost of labour plus overheads

17.8 ANSWERS TO CHECK YOUR PROGRESS

A) 4. (a) True (b) False (c) True (d) True (e) False

17.9 TERMINAL QUESTIONS / EXERCISES

1) What do you mean by 'Equivalent Production' ?

2) Explain the methods of calculating equivalent units.

3) Describe the cost accounting treatment when there is opening and closing stock of work-in progress with process losses and abnormal gains.

4) From the following details, prepare statement of "Equivalent Production", statement of cost and find the value of (a) output transferred (b) closing work-in progress by using average cost method

Opening Work-in-progress	2000 units
	Rs.
Materials (100% complete)	7,500
Labour (60% complete)	3,000
Overheads (60% complete)	1,500
Units introduced into the process	8,000

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

Materials 100%, Labour 50%, Overheads 50%

8,000 units are transferred to the next process.

The process costs for the period are:-

Materials Rs. 1,00,000, Labour Rs. 78,000, Overheads Rs. 12,39,000

5) From the following data of Appollo Industry Ltd.

Calculate

(a) Equivalent production

(b) Cost per unit "Equivalent Production"

(c) Cost of units completed and awaiting completion

No. of units introduced in the process	4000
No. of units completed and transferred to next process	3,000
No. of units in process at the end of the period	800

Stage of Completion :-

Materials 80%, Labour 70%, Overheads 70%

Normal process loss at the end of 200 units

Value of Scrap Re. 1 per unit

Value of Raw Materials	Rs. 7,480
Wages	Rs. 10,680
Overheads	Rs. 7,120

6) The Cost recorded for Department B of a plan during April were as follows:-

	Rs.
Cost from Department A	25,000
New Material added	4,500
Conversion	8,800
	38,300

New material is added when work-in-progress is 50%

Complete for conversion

The production record showed the following:-

Units received from Department A	5,000
Units Completed	4,000
Units in process April 30	
60% complete for conversion 500	
20% complete for conversion 500	1,000

Required for Department B

(a) Production converted to 'Equivalent Production",

(b) Unit cost by elements

(c) Cost of completed production

(d) Cost of work-in-progress on April 30

7) Processing in Department 3 calls for the addition of water at the beginning of processing, which doubles the weight of mixture received from Department 2. The mixture is then cooked. Cooking results in a 10% loss of weight. During May, Department 3 received 1,00,000 kilos of partially. Completed product form Department 2 at a preceding department cost of Rs. 2,70,000. Conversion costs in department 3 were Rs. 90,000. Determine the cost per kilo at the end of processing in Department 3.

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

SOME USEFUL BOOKS

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. 2018. *Cost Accounting: Methods and Problems,* Academic Publishers : Calcutta.

Maheshwari, S.N. and S.N. Mittal, 2018. *Cost Accounting: Theory and Problems,* Shree Mahavir Book Depot: Delhi. (Chapters 6, 7, 8, 11) Nigam B.M.L. and G.L. Sharma, 2018.

Theory and Techniques of *Cost Accounting,*

Himalaya Publishing House: Bombay. (Chapters 11, 12, 14, 17)

Owner, L.W.J. and J.L. Brown, 1984. Wheldon's *Cost Accounting*, ELBS : London. (Chapters 17, 18)

UNIT 18 SERVICE COSTING

Structure

18.0 Objectives
18.1 Introduction
18.2 Meaning and Cost Classification of Service Costing
18.3 Characteristics of Service Costing
18.4 Scope of Service Costing
18.5 Computation of Transport Service Costing
18.6 Comprehensive Illustrations
18.7 Let Us Sum Up
18.8 Key Words
18.9 Answers to Check Your Progress
18.10 Terminal Questions / Exercises

18.0 OBJECTIVES

After studying this unit you should be able to :

- discuss the importance of service costing;
- explain the meaning, characteristics and scope of service costing;
- describe the type of costs and their accumulation in respect of transport service; and
- preparing operating cost statement.

18.1 INTRODUCTION

In the previous units under the head "Methods of Costing", you have studied and learnt about the procedure of maintaining the cost accounts for manufacturing goods. In this unit we are going to discuss about the costing system for services. This method of costing explains how to ascertain cost in those concerns which provide services. Such concerns may be hospitals, educational institutions, transport organisations, electricity companies, etc. However, in this unit we study to ascertain the costs of transport organisations only.

Service Costing is also known as "operating Costing'. "It is that form of costing which applies where standardised services are provided either by an undertaking or by a service cost centre within an undertaking". Section 2(O) of Consumer Protection Act 1986 defines service "means service of any description which is made available to potential users and includes which is made available to potential uses and includes but not limited to, provision of facilities in connection with banking, financing, insurance, transport, processing, supply of electrical or other energy, board and lodging or both, housing construction, entertainment, amusement or purveying of news or other information but does not include the rendering of any service free of charge or under a contract of personal service". Service costing

is thus an operating costing and not about manufacturing of a product. The services provided may be for sale to general public. Sometimes, they may be provided within the organisation e.g. services rendered by service department to production department or canteen in a factory, as you have studied in Unit 8 of this course 'Distribution of Overheads'. Thus, there is external as well as internal service.

18.2 MEANING AND COST CLASSIFICATION OF SERVICE COSTING

Meaning

Service costing is a method of costing whereby the cost of providing service per unit is calculated. Here it may be remembered that cost unit is different from service to service e.g. a ton per kilometre or a passenger per km in case of transport undertakings, a bed per patient per day in hospitals, kw hours or h.p. hours in case of electricity or number of meals in a hotel. Each undertaking is free to determine the cost unit most appropriate for its own purpose. However, a common cost unit by similar undertakings facilitates valuable cost comparison. There are simple cost units and composite cost units. In simple cost unit, unit is obvious e.g. per student, per kilometre, per bed etc. In composite unit more than are unit is combined e.g. per passenger – kilometre, per tonne – kilo metre. It may be noted that "operating" costing is different from "operation" costing. It is explained about the operating costing whereas operating costing deals with further detailed application of process costing.

Cost Classification

In Unit 2 of this course, we discussed various bases according to which costs have been classified. Among them, the most appropriate classification for service costing is that the classification on the basis of variability. Accordingly, brief description of the cost classification will be discussed here.

Costs in service department are classified into : -

1) **Fixed Costs:** This type of cost do not change either increase or decrease of production or services rendered only upto certain level in respect of volume of time. For example, in case of transport service: salaries of drivers, conductors, office staff etc., buildings/garage rent, insurance, transport licence, taxes, etc., these costs are termed as **Standing Charges.**

2) **Semi-Variable Costs and Variable Costs:** If the costs are increased or decreased with a change in the volume of services rendered but not in the same proportion as the change in the volume of services are termed as **Semi Variable Costs.** If the costs are increased or decreased in direct proportion to change in the volume of services rendered are termed as **Variable Costs.** These costs are termed as running costs or Operating Costs or Maintenance costs. For example, tyres, petrol/diesel/CNG, repairs lubricating oil, painting, servicing, depreciation etc. It may be noted that depreciation is a semi variable cost and usually treated either fixed or operating cost depending on

method of change depreciation. Hence, the above classification is not a matter of rule. It will be guided by the nature of expenditure.

18.3 CHARACTERISTICS OF SERVICE COSTING

Service or operating costing has special application to undertakings, which provide services to the public as a whole, rather than manufacture of products. Generally, following are the characteristics of undertakings whose service is rendered.

1) **Unique Services :** the undertaking offer unique services to their customers In case of internal service, the undertaking does not depend on outsiders

2) **Investment :** In undertakings offering services have to invest large proportion of their capital in fixed assets. In case of railways, for example, the investment is made in laying down the track, build stations and in engines, bogies etc.

3) **Less Working Capital :** As compared to other undertakings, those offering services require less working capital.

4) **Operating Costs :** The operating cost is divided into fixed, semi variable and variable costs. It is very important to fix the unit cost.

18.4 SCOPE OF SERVICE COSTING

The service costing or operating costing has a special application to undertakings which provide service to public as a whole. For example, transport companies, gas and water works, electricity supply companies, hospitals, cinemas, schools etc. provide public service of a special type to the public. They are called as public utilities. Similarly, within an organisation ancillary services like repairs and maintenance, canteens, internal transport purchasing and stores. Thus operating or services costing is necessary for both internal and external services. The cost of providing services internally can be compared by such costing with services bought from outside source. Thus scope of service costing is very wide due to nature of service provided. However, in this unit we discuss only transport service costing.

18.5 COMPUTATION OF TRANSPORT SERVICE COSTING

From theory point of view there are three theories for fixing rate per unit for transport. They are :-

1) cost of service (2) value of service (3) what the traffic will bear. It is not so easy to fix rate per unit in transport sector. Since the mode of transport are (a) Land – by road transport and Railways (b) sea – by ships (c) Air – by Aeroplanes. For fixing rate per unit for service rendered depends upon the mode of transport. It is complex costing in railways or ships or aeroplanes. To make the topic more easy, the discussion is confined to road transport only.

Collection of Costs

It is essential to differentiate the different expense heads. There are three type of costs (a) Fixed (standing Costs) (b) Maintenance Charges (c) Operating and running charges. The fixed costs are incurred irrespective of mileage run e.g. salary of manager. Maintenance charges are directly related to mileage run e.g. repairs. It may be noted that costs are classified and accumulated under two heads also. They are a) Standing or Fixed Charges b) Running or Variable Charges. Operating and running charges vary in direct proportion to distance e.g. petrol expenses and depreciation.

For accumulation of costs each vehicle given a distinct number like in a job or contract costing. All the basic documents of that vehicles will contain that number. The driver has a separate daily report or log book for each vehicle. It will be helpful for cost control. All the details of the cost incurred in the course of day can be known from the log book.

Selection of Units: - In transport costing, the cost unit is either passenger - kilometre or tonne - kilometre or composite of both. This will help to ascertain the cost of carrying a passenger for a kilometre and cost of carrying goods of one tonne.

Objectives of Transport Costing

1) It helps in operating, maintenance and controlling costs
2) A comparison can be made of cost between hiring a vehicle and using own vehicle.
3) If a company, firm or a person is engaged in business of transport and owns many vehicles, a comparison can be made of operating costs of those vehicles.
4) Comparison of oil or petrol or gas as consumption and time taken can be made for each trip or destination.
5) Information is available for giving quotation and fixing rates.

LOG BOOK

A Log Book is a book that is meant for entering details of every trip. It is kept by the office. It has three parts. In Part A, particulars like the make of the vehicle, its registration number, date of purchase, price, capacity, insurance policy number, road taxes paid, permit to go to states or whole of India. The Part B gives details and addresses of driver, conductor, cleaner, mechanic with their license issued by road transport authority. The Part C contains particulars of operating expenses e.g. number of trips made, number of kilometres run, petrol, oil or gas consumption, hours lost with reason for delay. A daily log sheet is given to driver. It contains same particulars as log book.

Cost Sheet: In transport undertakings a cost sheet is prepared. It is main document in transport costing. The cost sheet shows cost per unit. It is also used to measure efficiency of the vehicle, and helps to control costs. It also helps to compare the periodic costs and budgeted costs. It is a decision making tool. A specimen is given below : -

COST SHEET

Vehicle No

Carrying Capacity Period ---------

Particulars	Rs.
(a) **Fixed costs**	
Garage rent	
Insurance charges	
Motor Vehicle Tax	
Interest on Capital	
Depreciation	
Road Tax	
Administration	
Total (A)	
(b) **Maintenance Charges**	
Repairs	
Overhauling	
Painting	
Tyres, Tubes and Spares	
Servicing and Cleaning	
Garage Staff	
Total (B)	
(c) **Operating Costs**	
Petrol/Diesel /Gas	
Grease and Lubricating Oil	
Wages of Operators	
Mechanics	
Cleaner	
Total (C)	
Total ABC Operating Cost	

Other Details

1) Days maintained
2) Days operated
3) Days idle (1-2)
4) Total hours operated
5) Total distance covered
6) Total trips made
7) Total Kilometres run

Total monthly charges

Cost per day operated

Cost per day maintained

Cost per kilometre

Cost per hour

Cost per trip

Cost per passenger kilometre

Now, we will take up some illustrations for transport services costing.

Illustration 1

A Transport company runs buses at two places –A and B from following particulars calculate (a) total kilometres (b) Total passenger kilometres for both places

	A	B
Number of Buses	4	5
Days operated in a month	30	25
Trip made by each bus	4	4
Distance of route (one way)	30 kilometres	25 kilometres
Capacity of Bus	60 passengers	50 passengers
Normal passengers travelling	80% of capacity	90% of capacity

Solution : - For A Total Kilometres Covered

No. of buses × No. of days × No. × of trips × distance of trip

4×30×4×(30×2) two ways 60 = 28,800

Total Passenger Kilometre Covered

$$28{,}800 \times 60 \times \frac{80}{100} = 13{,}82{,}400 \text{ passengers kilometres}$$

For B Total Kilometres Covered

No. of buses × No. of days × No. of trips × distance of trip

5×25×4×(25×2) 50 two ways = 25,000 kms

Total passenger kilometres

$$25{,}000 \times (50 \times \frac{90}{100}) = 11{,}25000 \text{ passenger kilometres}$$

You may be noted that as per the above calculation, first calculate total distance covered, then calculate passenger kilometre covered. In case of a truck, instead of passengers total capacity in terms of tons/gallons/litres are to be taken into account.

Illustration 2

SIDHU TRANSPORT Company supplies following details of a truck of 5 tons capacity:-

Cost of Truck	Rs.9,00,000
Estimated life	10 years
Oil, grease, etc	Rs. 150 per trip each way
Repairs and maintenance	Rs. 5,000 per month
Drivers wages	Rs. 10,000 per month
Insurance	Rs. 48,000 per year
Taxes	Rs. 24,000 per year
General Supervision charges	Rs. 48,000 per year

The truck carriers to and fro city covering a distance of 50 km each way. Required to workout operating cost per ton –km. operating days of the truck are 25 days in a month.

Solution :

Operating Cost Sheet

Particulars	Per month Rs.	Per tonne kilometre Rs.
Fixed Costs :	Rs.	
Driver's wages	10,000	
Insurance	4,000	
Taxes	2,000	
General supervision charges PA	4,000	
Total	20,000	
Fixed Cost per tonne – kilometre (Rs. 20,000		2.666
Running Costs :		
Oil, grease etc. Rs. (150 × 25 × 2)	7,500	
Repairs and maintenance p.m.	5,000	
Depreciation $\left(\frac{Rs.9,00,000}{10\times12}\right)$	7,500	
Total	20,000	
Running cost per tonne –kilometre (Rs 20,000 ÷ 7500)		2.666
Total cost per tonne kilometre		5.332

Working Note:

- Calculation of tonne – kilometre per month: [(Kilometres for going capacity in tonnes) + (Kilometres for coming in tonnes)] No. of days [(50×5) + (50×1)] 25 = 7500 tonne kilo metres.

Illustration 3

SINGH Tours and Travels, a transport service company, is running 4 buses between two cities, 50 kilometres apart. Seating capacity of each bus is 40 passengers The particulars are as follows :

	Rs.
Wages of drivers, conducts and cleaners	24,00,000
Salaries of office and supervisory staff	10,00,000
Diesel oil and other oils	4,00,000
Repairs and maintenance	80,000
Taxes, insurance et	1,60,000
Depreciation	2,60,000
Interest and other charges	2,00,000
	14,40,000

Actual passengers carried 75% of seating capacity all the four buses ran all the days of the November month. Calculate the cost per passenger per kilometere.

Solution :

Particulars	Amount Rs.
Fixed or standing charges : -	
Wages of drivers, conductors and cleaners	2,40,000
Salaries of office and supervisory staff	1,00,000
Taxes, in service etc.	1,60,000
Interest and other charges	2,00,000
	7,00,000
Variable or running charges:	
Diesel and other oils	4,00,000
Repairs and maintenance	80,000
Depreciation	2,60,000
	14,40,000

Calculation of passenger Kilometres:

No. of buses × No of actual passengers × distance of trip × days

4 × 30(75% of 40) × 100 × 30 = 3,60,000

Cost per passenger kilometre working = $\frac{14,40,000}{3,60,000}$ = Rs. 4

Illustration 4

From the following data ascertain the cost of carrying one tonne of goods for a distance of one Km :

	Rs.
Cost of truck	8,00,000
Estimated scrap value	25,000
Life estimated	5 years
Capacity	4 tonnes
Average daily distance covered	200 km
(100 km going 100 km coming)	
Working days in a month	25 days
Freight : Full capacity going	
50% on coming	
Annual Charges:	
Insurance @	2%
Repairs and maintenance	14,500
Garage rent	3,600
Taxes	6,000
Interest @ 18% on Rs. 8,00,000	

Tyre, battery etc.		65,000
Monthly charges : -		
Driver's salary		1,20,000

Petrol etc. Rs. 100 for every 1 km.

Solution :

Operating Cost Sheet

Going Journey : 4 tonnes 100 km, 400 tonnes – Km

Coming Journey : - 50% i.e., 2 tons 100 km = 200 tones km

Total 600 tons – kms daily for 25 days 15000 tons kms

Fixed Costs	Rs.
Insurance @ 2% p.a. on Rs. 8,00,000	16,000
Garage rent P.A.	3,600
Taxes P.A.	6,000
Interest @ 18% p.a. on Rs. 8,00,000	1,44,000
Driver's salary P.A.	1,20,000
Total Fixed Cost P.A.	2,89,600

Total Fixed Cost per month

$2,89,600 \div 12 =$ = 24,134

Total ton-kms per month Cost per ton – km $24,134 \div 15,000 =$ 1.608

Running Costs:-

Petrol Rs. 100 for 1 km, per km 100

Depreciation = $\frac{8,00,000 - 25,000}{5}$ = 1,55,000

Per year = $\frac{1,55,000}{12}$ per month = 6,667

Repairs and Maintenance $\frac{4500}{12}$ = 1208

Tyres, Battery etc = $\frac{65000}{12}$ = 667

Total Running Cost P.M.	85.42	
Total ton – km per month	15,000	0.569
Operating Cost per ton-km		102.177

Check Your Progress A

1) Define Service Costing.
2) Name the three service where Service Costing method is used.
3) What are the characteristics of service costing?
4) State whether the following statements are **True** or **False** and justify your answer.

a) Educational Institutions do not come under services definition.

b) Service Costing and Operating Costing are same.

c) A log book is a book in which enters all details of a trip by a vehicle.

d) In a Cost sheet costs are classified as direct or indirect costs.

e) Services undertakings require much investment in fixed assets.

18.6 COMPREHENSIVE ILLUSTRATION

Illustration 5

ARUN KUMAR owns a bus which runs between Delhi and Chandigarh and back for 10 days in a month. This distance between Delhi and Chandigarh is 150 Km. The bus completes the trip from Delhi and Chandigarh and will be back on the same day. The bus goes to Agra for another 10 days. The distance between Delhi and Agra is 120 kilmetres. This trip is completed on the same day. For the rest of 4 days of its operation it runs in the local city. Daily distance covered is 40 km. Calculate the charge to be made by the owner who wants to earn profit 33/13% on the earnings. The other information is as under:- cost of the bus Rs. 2,40,000, Salary of driver Rs. 10,000 p.m. Insurance Rs. 1680 p.a. Depreciation 20% p.a. Diesel Consumption of 4 km per litre costing Rs. 100 (one hundred) per litre, toll tax Rs. 600 p.a. Lubricant Rs. 10 per 100 km. Repairs and maintenance Rs. 500 p.m., permit fee Rs. 284 p.m. Normal capacity 50 persons. The bus is generally occupied 90% of the capacity when it goes to Chandigarh 80% when it goes to Agra. It is always full when it runs within the city. Passenger tax is 20% of net earnings.

Solution

Statement of Operating Cost for one month

Fixed Charges	Rs.	Rs.
Salary of Driver	10,000	
Depreciation	4,000	
Insurance	140	
Toll tax	50	
Repairs and Maintenance	500	
Permit Fee	284	14,974
Variable Expenses	1,39,000	
Diesel	556	1,39,556
Lubricant		
Total Cost for one month		1,54,530
Profit on takings 33i.e., 50% on cost		77,265
Total Net takings		2,31,795
Add 2% passenger tax		46,359
Total revenue from passengers		2,78,154

Rate per passenger km = 2,79,154 ÷ 2,39,000 = 1.168 passenger km paise.

Calculation of Passenger km

1) Chandigarh Trip = $10 \times 300 \times 50 \times \frac{90}{100}$ = 1,35,000 passenger km

2) Agra Trip = $10 \times 240 \times 50 \times \frac{80}{100}$ = 96,000 passenger km

Formula =km covered in a day × passenger capacity × average capacity

Total km in a month km

a) Chandigarh = 10 × 150 = 3,000

b) Agra = 10 × 120 × 2 × 2,400

c) Local = 4 × 40 = 160

Total 5,560

Illustration 6

New Delhi transport company is operating a bus on a route of 20 kms. The cost of the bus is Rs. 4,50,000. It is insured @ 3% p.a. and annual tax is Rs. 5,000. Garage rent is Rs. 500 p.m. Repairs are Rs. 2,500p.a. and the life of buss estimated 5 years other particulars are : -

Driver's Salary Rs. 1,500 p.m.

Conductors salary Rs. 1,200 p.m.

10% common in takings (to be shared by driver and conductor equally

Stationery Rs. 150 p.m.

Manger salary Rs. 1,350 p.m.

Diesel and oil Rs. 50 per 100 kms.

The bus will make 3 round trips carrying on an average 40 passengers on each trip. Assuming 15% profit on earnings, calculate the bus fare to be charged from each passenger. The bus will run on an average 45 days in a month.

Solution :

Statement of Operating Cost

Fixed Charges	**Per annum**	**Per Month**
		Rs.
Insurance	13,500	
Road Tax	5,000	
Garage rent	6,000	
Driver's Salary	18,000	
Conductor's Salary	14,400	
Stationery	1,800	
Manager salary	16,200	
Total Fixed Charges	74,900	6,241.66
Operating Charges		

Diesel and oil : 50 × 3000/100 kms	1500.00
Depreciation $\frac{4,50,000}{5} = \frac{\text{Rs. } 90,000}{12} =$	7500.00
Repairs	208.34
Commission	2060.00
Total Cost Per Month	17,510.00
Add profit 15% on earnings	3,090.00
Total earnings	20,600

Workings

Effective passenger km per month

Distance × trips (3 round trips) Days passengers

20 kms × 6 (one way) × 25 × 40 = 1,20,000 passenger-kms

Bus fare to be charged = 20,600 ÷ 1,20,000 = Rs. 0.17

Commission

Total earnings : - If x to be total takings, commission is 10% of × that is $\frac{x \times 10}{100} = \frac{x}{10}$

Total earnings = Total cost + Commission + Profit

Accordingly Profit = 15% on taking i.e., $\frac{x \times 15}{100} = \frac{15x}{100}$ *or* $\frac{3x}{20}$

Total earnings = 15,540 (total above excluding commission) + $\frac{x}{10} + \frac{3x}{20}$

$$x = \frac{3,09,000 + 2x + 3x}{20}$$

$20x = 3,09,000 + 2x + 3x$

$2x - 5x = 3,09,000$

x = Rs. 20,600

Commission is 10% of Rs. 20,600 = Rs. 2,060

Profit if 15% of Rs. 20,600 = Rs. 3,090

Illustration 7

Mr Hazara Singh owns a fleet of taxies and following information is available from records kept by him.

Number of taxes	10
Cost of each taxi	Rs.5,00,000
Manager's salary	Rs. 11,000 p.m.
Garage rent	Rs. 4,600 p.m.
Insurance	5% p.a.
Annual tax	Rs. 2,400 per taxi
Driver's salary	Rs. 12,000 p.m. per taxi
Annual repair	Rs. 1000 per taxi

Total life of a taxi is about 2,00,000 km. A taxi runs in all 3,000 km in a

month of which 30% it runs empty. Petrol consumption one litre for 10 km @ Rs.100 per litre. Oil and other sundries Rs. 5 per 100 km. Calculate the cost of running a tax per km.

Solution

Operating Cost Sheet

Fixed Cost per month (for 10 taxis)	Rs.	Rs. Per km
Manager's salary	11,000	
Garage rent	4,000	
Total Fixed Cost	15,000	
Fixed Cost per month per taxi (15,000	1500	
Insurance Premium ($5,00,000 \times \frac{5}{100} \times \frac{1}{12}$)	2083	
Taxes	200	
Driver's Salary	12,000	
	15,783	7.51
Fixed cost per taxi (15783 ÷ 2100) *		
Variable Cost per km		
(a) Deprecations (per effective Km)		
[Rs.5,00,000 for 70% of 2,00,000 km		3.57
$\frac{5,00,000}{1,40,000}$		
(b) Petrol [monthly $\frac{100}{10} \times 3000$ = Rs. 30,000]		
Per effective km = $\frac{30,000}{21,000}$		1.42
(c) Repairs $\left[\frac{1000}{21000} \times \frac{1}{12}\right]$		0.04
(d) Oil and other sundries [$\frac{5}{100} \times 3,000$] ÷ 150		0.07
Cost per Km per taxi		12.61

* A taxi runs 30% empty and thru effective run is 7% all costs have been calculated taking into consideration its effective km.

Illustration 8

A practicing lawyer spends Rs. 8 per kilo metre on taxi fare for work in court . He considers two other alternatives, the purchase of a new small car or an old bigger car. The estimated cost figures are :

Items	New Small Car	Old Bigger Car
Purchase Price	Rs.3,50,000	Rs. 2,00,000
Sale price after 5 years	Rs. 1,90,000	Rs. 1,20,000
Repairs and servicing p.a.	Rs. 10,000	Rs. 12,000
Taxes and Insurance p.a.	Rs.17,000	Rs. 7,000
Petrol Consumption per litre	10 km	7 km
Petrol price per litre	Rs. 100	Rs.100

He estimates he does 10,000 km annually, Which of the three alternatives will be cheaper. If his practice expands and he has to do 19,000 km, what should be his decision. He will be driving the car himself. The tyres of old car are in good condition.

Solution :

	New Small Car Rs.	Old Bigger Car Rs.	Taxi Rs.
Fixed Expenses			
Depreciation : $\frac{3,50,000-1,90,000}{5}$	32,000		—
$\frac{2,00,000-120,000}{5}$		16,000	
Repairs and Servicing	10,000	12,000	—
Taxes and Insurance	17,000	7,000	—
(A)	**59,000**	**35,000**	
Variable Expenses			
Petrol : $\frac{100}{10}\times 10,000\text{kms}$	1,00,000	1,42,857	
$\frac{100}{7}\times 10,000\text{kms}$			
Hire Charges in case of Taxi (8 × 10,000)			80,000
(B)	**1,59,000**	**1,77,857**	**80,000**
For 19,000 km $\frac{100}{10}\times 19000\text{km}$ $\frac{100}{7}\times 19000\text{km}$	1,90,000	2,71,428	1,52,000
Total Cost (a) For 10,000 km B (b) For 10,000 km (A + B) 306428	1,59,000	1,77,857	
For 10,000 km (A + B)	2,49,000	3,06,428	80,000

Note (1) (59,000 + 1,90,000) = 2,49,000 (2) (35,000 + 2,71,728) = 3,06428			

18.7 LET US SUM UP

Service costing, also known as operating costing is that form of costing is that from of costing which applies where standardised services are provided either by an understanding or by a service cost centre. Within an undertaking, examples are transport, electricity, hotels, schools, insurance, and banking. The cost of providing a unit is calculated. A unit may be a tonne of passenger in transport service, a bed/patient in a hospital or room/ meals in a hotel etc. The operating costs are dividend in three categories namely. Fixed, semi variable or variable costs or running costs. A cost sheet is prepared to show these costs.

In transport costing costs are accumulated on the basis of a log book. A log book contains all details.

To calculate total kilo meters the formula is as under: - No of vehicles × no of days × no of trips × distance of the trip . To calculate total passenger kilometres covered the are multiplied by number of passengers and the figure so arrived is multiplied by capacity of the vehicles. In case of a truck instead of passengers number the total capacity is taken. In cost sheet fixed charges, or standing charges are first shown, followed by running or maintenance cost i.e. operating charges. Fixed costs examples are insurance, tax driver's or cleaner or supervisory staff salary. Operating charges are like depreciation, repairs, petrol, commission, battery etc.

18.8 KEY WORDS

Public Utilities : It means undertakings providing services, .e.g. water, gas, electricity. etc.

Log Book : A log book is meant for entering details of every trip.

Operating Cost Sheet : It shows total fixed charges and running charges and cost per passenger or per ton.

18.9 ANSWERS TO CHECK YOUR PROGRESS

A) 4. (a) False (b) True (c) True (d) False (e) True

18.10 TERMINAL QUESTIONS AND EXERCISES

1) a) Define "Operating Costing". In what type of industries it is applied?

   b) What is the meaning of composite units in Operating Costing?

2) Draw a proforma cost sheet for a transport company showing different types of costs.

3) A truck starts with a load of 10 tonnes of goods from Porbunder. It unloads 4 tonnes at station Ahmedabad and rest goods at station Baroda. It reaches back directly to Porbunder after getting reloaded with 8 tonnes of goods at Baroda. It reaches back directly to Porbunder after getting reloaded with 8 tonnes of goods at Baroda. The distance between Porbunder to Ahmedabad. Ahmedabad to Baroda and then from Baroda to Porbunder are 40 kms, 60 kms and 80 kms respectively. Compute "absolute tonne – Km" and Commercial respectively.

4) Madhya Privahan company gives following details about a tuck of 5 tonne capacity.

Cost of Truck	Rs. 8,00,000
Estimated Life	20 years
Diesel, Oil Grease	Rs. 2,150 per trip each way
Repairs and maintenance	Rs. 5,000 per month
Cleaners wages	Rs. 12,500 per month
Drivers wages	Rs. 25,000 per month
Insurance	Rs. 48,000 per year
Road Tax	Rs. 24,000 per year
General Charges	Rs. 96,000 per year

Truck carries goods to and from Indore covering a distance of 5000 kilometres each way while going to Indore, freight is available to the extent of full capacity and on return 40% of capacity, Assume that the truck runs on an average 25 days a month, Work out

i) Operating cost per tonne – kilo meter and

ii) Rates per tonne per trip that the company should charge if profit of 50% on freightage is to be earned

5) Laxmi transport company is running 4 buses between Delhi and Panipat, which are 100 km apart, seating capacity of each has is 40 passengers The following details are available from log book for one month.

	Rs.
Wages of drivers, conductors and Cleaners	1,48,000
Salaries of supervisor	1,20,000
Diesel Oil and Petrol	48,000
Repairs and Maintenance	16,000
Road tax and insurance	32,000
Depreciation	52,000
Interest and other charges	40,000
	4,56,000

Actual passenger carried were 75% of seating capacity. All four buses run on all days of the month. Each has made one round tripper day. Find out cost per passenger km.

6) From the following data calculate the cost per kilo metre of a Bus :-

Value of a Bus	Rs. 1,00,000
Garage Rent p.a.	5,000
Insurance p.a.	4,800
Toll tax per year	1,400
Driver's wages per month	15,000
Cost of petrol per litre	100
Maintenance per kilo metre	50
Estimated Life	10 years
Kilometres per litre of petrol-	10
Estimates annual distance-	600 km

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

SOME USEFUL BOOKS

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. 2018. *Cost Accounting: Methods and Problems*, Academic Publishers : Calcutta.

Maheshwari, S.N. and S.N. Mittal, 2018. *Cost Accounting: Theory and Problems*, Shree Mahavir Book Depot: Delhi. (Chapters 6, 7, 8, 11) Nigam B.M.L. and G.L. Sharma, 2018.

Theory and Techniques of *Cost Accounting*,

Himalaya Publishing House: Bombay. (Chapters 11, 12, 14, 17)

Owner, L.W.J. and J.L. Brown, 1984. Wheldon's *Cost Accounting*, ELBS : London. (Chapters 17, 18)

UNIT 19 RECONCILIATION OF COST AND FINANCIAL ACCOUNTS

Structure

19.0 Objectives
19.1 Introduction
19.2 Methods of Cost Accounting
19.2.1 Integral Accounting
19.2.2 Non-Integral Accounting
19.3 Need for Reconciliation of Cost and Financial Accounts
19.4 Causes of Difference
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19.6 Memorandum Reconciliation Account
19.7 Comprehensive Illustrations
19.8 Let Us Sum Up
19.9 Key Words
19.10 Answers to Check Your Progress
19.11 Terminal Questions/Exercises

19.0 OBJECTIVES

After studying this unit, you should be able to:

- explain briefly the two methods of cost accounting;
- explain the need for reconciliation of cost and financial accounts;
- list the factors responsible for causing difference in profit or loss shown by cost and financial accounts;
- prepare reconciliation statement; and
- prepare memorandum reconciliation account.

19.1 INTRODUCTION

You have learnt that cost accounts act as a check on financial accounts. It is achieved by comparing the profit/loss ascertained under cost accounts with profit/loss ascertained under financial accounts. Their amounts usually differ. But, these can be reconciled by preparing reconciliation statement which explains the causes of difference. In this unit you learn about the various causes of difference between the profit/loss shown by cost accounts and the profit/loss shown by financial accounts, and the preparation of Reconciliation Statement.

19.2 METHODS OF COST ACCOUNTING

Large manufacturing firms often maintain their cost accounts on double entry system. For this purpose, they adopt one of the following two methods:

1) Integral or Integrated Accounting
2) Non-integral or Independent Accounting

It is important to decide whether cost and financial transactions are to be unified or kept separate, for an appropriate method of cost accounting. Where cost and financial transactions are to be unified, the method to be adopted is called 'Integral/Integrated Accounting'. On the other hand, if cost and financial transactions are to be kept separate, the method followed is called 'Non-integral' or 'Independent Accounting.' The problem of reconciliation of cost and financial accounts arises only when non-integral accounting method is followed. Let us, therefore. discuss these two methods briefly before we take up the problem of reconciliation.

19.2.1 Integral Accounting

The term 'Integral/Integrated Accounting' means the merger of financial and cost accounts and maintenance of a single set of books to record both financial and cost transactions. In other words, **it refers to the unified method which serves the purpose of both financial and cost accounts.** Under this method, book-keeping procedure followed Wry much similar to the procedure involved in financial accounting. In addition to the General Ledger, Sales Ledger and Bought Ledger in financial accounting, a Cost Ledger and three subsidiary ledgers viz., Stores Ledger, Work-in-progress Ledger and Finished Stock Ledger are also maintained. **Cost Ledger:** It refers to the principal ledger in cost accounting which contains all the nominal accounts. It also contains a control account for each subsidiary ledger i.e., Stores Ledger Control Account, Work-in-progress Ledger Control Account and Finished Stock Ledger Control Account if non-integral accounting is followed. In case of integral accounting, however, these control accounts appear in the General ledger.

Stores ledger: It refers to a subsidiary ledger which contains an account for each item of stores and its movement. This account is debited with purchases of materials and credited with issues of materials to jobs.

Work-in-progress ledger: It refers to a subsidiary ledger which contains an account for each job, process or operation which is pending on the shop floor. This account is debited with the cost of materials, labour and overheads, and is credited with the cost of goods transferred to Finished Stock Ledger as and when they are completed.

Finished Stock Ledger: It refers to a subsidiary ledger which contains an account for each item of finished product manufactured or job completed. Each such completed product or job account is debited with the cost of production and credited with the cost of goods transferred to Cost of Sales Account.

Since only one set of accounts is maintained **under this method, no Costing Profit and Loss Account is prepared. Thus there is only one figure of profit or loss and, as such, there is no need for reconciliation of costing and financial profit or loss.**

19.2.2 Non-integral Accounting

When independent cost accounts are maintained, the subsidiary ledgers and the cost ledger are inter-locked through control accounts maintained

in each ledger. These control accounts cross-check the accuracy of ledgers and also make each ledger self-balanced so that a separate trial balance may be prepared for each ledger without reference to the other ledgers. Besides these control accounts, a General Ledger Adjustment Account is opened in the cost ledger for all items of income and expenditure. The account is also known as 'Cost Ledger Control Account'. The cost ledger also contains control accounts such as Wages Control Account. Production Overheads Control Account. Administrative Overheads Control Account, Selling and Distribution Overheads Control Account, etc. Thus, under non-integral accounting, the double entry is completed through control accounts.

Hence, this system has also been termed as 'Control Accounts System'.

Costing Profit and Loss Account: When cost accounts are maintained independent of financial accounts, a separate Costing Profit and Loss Account is prepared for determining the profit or loss of a particular period. This account is debited with the cost of sales and credited with the sales value. It is also debited with items like abnormal losses, under absorption of overheads, loss or sale of special jobs etc., and credited with items like abnormal gains, over absorption of overheads, profit on sale of special jobs, etc. The balance of this account will indicate the profit or loss as per cost records which should be reconciled with the profit or loss as per financial records

19.3 NEED FOR RECONCILIATION OF COST AND FINANCIAL ACCOUNTS

When cost accounts and financial accounts are maintained independent of each other, the profit or loss as disclosed by the two sets of books is bound to differ from each other. This non-agreement of profit or loss shown by the two sets of books necessitates the preparation of a reconciliation statement which shows the causes leading to the difference between two figures. The preparation of this statement is a must in order to establish the accuracy of cost accounts. Not only that, it also helps in cross-checking the arithmetical accuracy of operating results shown by the financial accounts.

19.4 CAUSES OF DIFFERENCE

The factors responsible for the difference between the profit or loss shown by the two sets books can be broadly summarised as follows:

Items shown only in the financial accounts and not in the cost accounts: There are quite a few items which appear in the financial accounts and not in the cost accounts. A such items of expenses and losses reduce the financial profit while all such items of incomes and gains increase the financial profit.

This items can be classified as under:

a) **Financial Charges**

- i) Cash discount allowed
- ii) Interest paid on debentures, bank loans, mortgages, etc.
- iii) Penalties and fines paid
- iv) Income-tax paid
- v) Loss on sale of fixed assets

vi) Loss on sale of investments
vii) Obsolescence loss
viii) Expenses on issue of shares/debentures
ix) Discount on issue of shares/debentures
x) Goodwill, Preliminary Expenses, etc. written off.

b) **Financial Incomes**
i) Interest received on investments, bank deposits, etc.
ii) Dividend received on investments
iii) Share transfer fees received
iv) Rent received
v) Profit on sale of fixed assets
vi) Profit on sale of investments
vii) Cash discount received

c) **Items of Appropriation of Profits**
i) Transfer of profits to reserves
ii) Dividend paid
iii) Proposed dividend

Items shown only in the cost accounts and not in the financial accounts: There Are very a few items which appear in the cost accounts and not in the financial accounts. Such items are as follows:

a) **Interest on capital employed :** Sometimes, it is the policy of the management to charge interest on capital employed for costing purposes. But, in reality, no such interest is paid As such, it is excluded from the financial accounts.

b) **Charges in lieu of rent:** It is also the policy of the management to charge notional rent for the premises owned so as to enable comparison between the cost of production in a factory owned by a company and the cost of production in a leasehold or rented factory However, in reality, no such rent is actually paid and, as such, it is excluded from financial accounts.

Under/Over absorption of overheads : The recovery of overheads in cost accounts is always based on estimates while the financial accounts are based on actuals. Hence, the amount of overheads recovered in cost account and the amount of expenditure actually incurred and recorded in financial accounts will invariably disagree.

The overheads charged in cost accounts may either fall short of or exceed the actual amok of expenses incurred and recorded in the financial accounts. If overheads are not fully recovered in cost accounts the shortfall is known as underabsorbed overheads. On the other hand, if overheads recovered in cost accounts are in excess of the actual expenditure, the excess amount is known as ‘over absorbed overheads’.

Different basis of stock valuation : Quite often, the stock figures shown in cost accounts differ from the figures shown in financial accounts. This may be due to the different bases followed for stock valuation in the two sets of

books. The conventional method of stock valuation in financial accounts is based on the principle of 'cost price or market price whichever is lower'. However, in cost accounts, the basis of stock valuation is invariably the actual cost of production and this may even include the administration overheads.

19.5 PREPARATION OF RECONCILIATION STATEMENT

The preparation of a statement to reconcile the profits shown by the cost accounts with the profits shown by the financial accounts is similar to the preparation of bank reconciliation statement. It may provide for two amount columns, the first (plus column) for showing the amounts of items to be added and the second (minus column) for showing the amounts of items to be subtracted. You can take profits as per cost accounts as the starting point and arrive at profits as per financial accounts by making the necessary adjustments, or vice versa. In case you start with profits as per cost accounts as the base, take the following steps to arrive at the profit as per financial accounts.

1) Show the profit as per cost accounts in the plus column. In case of loss, the amount may be shown in minus column.
2) Look at the debit side of the Profit and Loss Account and as certain the items such as interest, income tax, discount, etc. which are not shown in cost accounts. Had these items of expenses or appropriations been shown in cost accounts, the amount of profit would have been lower. Hence, these amounts should be deducted.
3) Look at the credit side of the Profit and Loss Account and ascertain the items such as income received on investments, rent received, etc. which are not shown in cost accounts. Had these items of income been shown in cost accounts, amount of profit would have been higher. Hence, these amounts should he added.
4) Look at the cost accounts and ascertain whether any amount of notional rent. proprietor's salary, interest on capital, etc. has been shown as expense. If so, add these amounts because they have resulted in lower profits in cost accounts.
5) Compare the amounts of all indirect costs (factory overheads, administration overheads, and selling and distribution overheads) charged in cost accounts with their actual amounts as recorded in the financial accounts. Add over absorption and deduct under absorption of various overheads.
6) Compare the values of stock shown in cost accounts with those shown in financial accounts. In all probability, the stock values shown, in cost accounts will be higher. Hence, the difference in closing stock shall be deducted and the difference in opening stock will he added.
7) Take the totals of both plus and minus columns and work out the difference between the two totals. If the total of plus column is higher than the total of the minus column, the excess represents the profit as

per the financial accounts. If, however, the total of the minus column is higher than the total of the plus column, the excess shall represent the loss as per the financial accounts.

Based on the above analysis, we can draw the lists of items to be added to the profits shown by cost accounts and the items to be deducted there from.

Items to be Added

1) Incomes not shown in cost accounts
2) Notional costs shown in cost accounts
3) Over absorption (overcharge) of any indirect cost iii cost accounts
4) Overvaluation of opening stock

Items to be Deducted

1) Charges not shown in cost accounts
2) Under absorption (undercharge) of any indirect cost in cost accounts
3) Overvaluation of closing stock

In case the figure of profit or loss as per cost accounts, is not given, you have to start with the profit or loss as per financial accounts. In that case, the items listed above for addition shall be deducted and shown in minus column, and the items listed above for deduction shall be added and shown in plus column. In other words, the whole treatment will be reversed.

Look at Illustration 1 and study how Reconciliation Statement is prepared a) when you take profits as per cost accounts as the base, and b) when you take profits as per financial accounts as the base.

Illustration 1 : The net profit of a manufacturing company appeared at Rs. 60,500 as per financial records for the year ended 31st March, 2018. The cost accounts, however, showed a net profit of Rs. 1,19,400 for the same period. A detailed comparison of the figures contained in both sets of books revealed the following factors responsible for their disagreement:

Directors Fees not charged in cost accounts	7,500
Works Overheads under-recovered in costs	1,500
Loss due to Obsolescence charged in financial accounts	3,500
Administrative overheads over-recovered in costs	1,800
Depreciation charged in financial accounts	10,000
Depreciation recovered in costs	12,000
Income Tax provided in financial accounts	54,500
Interest on Investments not included in costs	5,000
Transfer Fees credited in financial accounts	2,500
Fines paid not included in costs	1,200
Discount on issue of debentures written off in financial accounts	2,000

Prepare a Reconciliation Statement showing reconciliation of profit between the two sets of books.

Solution :

Reconciliation Statement

	Plus Column	Minus Column
	Rs.	Rs.
Net Profit as per Cost Accounts	1,19,400	
Directors' Fees not charged in costs		7,500
Works Overheads under-recovered in costs		1,500
Loss due to Obsolescence not charged in costs		3,500
Administrative Overheads over-recovered in costs	1,800	
Depreciation overcharged in costs (12,000 - 10,000)	2,000	
Income Tax provided in financial accounts		54,500
Interest on Investments not included in costs	5,000	
Transfer Fees credited in financial accounts	2,500	
Fines paid not included in costs		1,200
Discount on Issue of Debentures not shown in costs		2,000
	1,30,700	70,200
Net Profit as per Financial Accounts	60,500	

Reconciliation Statement

	Plus Column	Minus Column
	Rs.	Rs.
Net Profit as per Financial Accounts	60,500	
Director's Fees not charged in costs	7,500	
Works Overheads under-recovered in costs	1,500	
Loss due to Obsolescence not considered in costs	3,500	
Administrative Overheads over-recovered in costs		1,800
Excess depreciation charged in costs (12,000-10,000)		2,000
Income Tax provided in financial accounts	54,500	
Interest on Investments credited in financial accounts		5,000
Transfer Fees credited in financial accounts		2,500
Fines paid charged in financial accounts	1,200	
Discount on Issue of Debentures written off in financial accounts	2,000	
	1,30,700	11,300
Net Profit as per Cost Accounts	1,19,400	

Check Your Progress A

1) Fill in the blanks:

   a) If cost and financial transactions are maintained in a single set of books, the method is called……..

   b) If cost and financial records are kept separate, the method is called ……..

   c) Cost ledger is the ledger in cost accounting which contains all the nominal accounts.

   d) Stores ledger is a…….. ledger which records separate account for each item of stores.

   e) Object of preparing Costing Profit or Loss Account is to determine……..

   f) Preparation of reconciliation statement is necessitated because of ……..

2) Tick the correct answer:

   a) Under-recovery of works overheads should be added to the net profit as per financial records in order to arrive at the net profit as per costing records.

   b) Obsolescence loss should be deducted from the net profit as per financial records in order to arrive at the net profit as per costing records.

   c) Dividend on investments should be added to the net profit as per financial records in order to arrive the net profit as per costing records.

   d) Over absorption of selling and distribution overheads in costs should be deducted from the net profit as per costing records in order to arrive at the net profit as per financial records.

3) What is the purpose of preparing reconciliation statement?

19.6 MEMORANDUM RECONCILIATION ACCOUNT

The reconciliation of profits shown by the two sets of books can also be presented in the form of a ledger account called 'Memorandum Reconciliation Account'. This method is simple. The amounts which are to be added to profits shall be shown on its credit side while the amounts to be deducted from profits shall be shown on its debit side. In this case also, you can take either profit/loss as per cost accounts as the base or profit/loss as per financial accounts as the base. Based on data given in Illustration 1, the Memorandum Reconciliation or Account shall be prepared as follows:

Memorandum Reconciliation Account

Dr. Cr.

	Rs.		Rs.
To Directors Fees not charged in costs	7,500	By Net Profit as per Cost Accounts	1,19,400
To Works Overheads under-recovered in costs	1,500	By Administrative Overheads over-recovered in costs	1,800

To Lost due to Obsolescence not charged in costs	3,500	By Depreciation over-recovered in costs	2,000
To Income Tax charged in financial accounts	54,500	By Interest on Investments not included in costs	5,000
To Fines paid not included in costs	1,200	By transfer Fees credited in financial accounts	2,500
To Discount on Issue of Debentures not shown in costs	2,000		
To Net Profit as per Financial Accounts	60,500		
	1,30,700		1,30,700

Alternatively

Memorandum Reconciliation Account

Dr.	Rs.		Cr. Rs.
To Administration Overheads over-recovered in costs	1,800	By Net Profit as per Financial Accounts	60,500
To Excess Depreciation charged in costs	2,000	By Directors Fees not charged in cost accounts	7,500
To Interest on Investments credited in financial accounts	5,000	By Works Overheads under-recovered in costs	1,500
To Transfer Fees credited in financial accounts	2,500	By Loss due to Obsolescence charged in financial accounts	3,500
To Net Profit as per Cost Accounts	119,400	By Income Tax provided in financial accounts	54,500
		By Fines paid charged in financial accounts	1,200
		By Discount on Issue of Debentures written off in financial accounts	2,000
	1,30,700		1,30,700

19.7 COMPREHENSIVE ILLUSTRATIONS

Illustration 2 : From the following figures prepare a Reconciliation Statement.

	Rs.
Net Profit as per Financial Records	25,751
Net Profit as per Costing Records	34,480
Works Overheads under-recovered in costs	624
Administration Overheads recovered in excess in costs	340
Depreciation charged in financial records	2,240
Depreciation recovered in costing	2,500
Interest on Investments received but not included in costs	1,600
Obsolescence loss charged in financial records	1,140
Income Tax provided in financial accounts	8,060
Bank Interest credited in financial accounts	150
Store Adjustments credited in financial accounts	95
Loss of Stock due to Spoilage charged in financial accounts	1,350

Solution

Reconciliation Statement

	(+) Rs.	(-) Rs.
Net Profit as per Financial Accounts	25,751	
Works Overheads under-recovered in excess in costs	624	
Administration Overheads recovered in excess in costs		340
Excess Depreciation recovered in costs		260
Interest on investment not included in cost		1,600
Obsolescence loss charged in financial records but not in cost	1,140	
Income Tax provided in financial but not in cost	8,060	
Bank interest credited in financial books, but not in cost		150
Stores Adjustments credited in financial books, but not in cost		95
Loss of Stock due to Spoilage charged in financial books but not in cost	1,350	
	36,925	2,445
Net Profit as per Cost Accounts	34,480	

Illustration 3

The Net Loss shown by financial accounts of a company amounted to Rs. 57,320 while the Net Loss disclosed by company's cost accounts for that period amounted to Rs. 37,100. Scrutiny of figures from both the sets of books revealed the following facts:

i) Directors Fees not charged in cost Rs. 1,300

ii) A Provision for Bad and Doubtful Debts made in financial accounts Rs. 1,140

iii) Bank Interest credited in financial accounts Rs. 60

iv) Obsolescence Loss charged in financial accounts Rs. 16,600

v) Overheads in the Cost accounts were estimated at Rs. 17,000. The charge shown by the financial accounts was Rs. 16,640

vi) Depreciation charged in financial accounts was Rs. 9,600 while depreciation recovered in costs amounted to Rs. 8,000.

Prepare a statement reconciling the figures shown by the financial and cost account.

Solution

Reconciliation Statement

	(+) Rs.	(-) Rs.
Net Loss as per Financial Accounts		57,320
Directors Fees not charged in costs	1,300	
Provision for Bad and Doubtful Debts made in financial accounts but not in costs	1,140	
Bank Interest credited in financial accounts, but not credited in costs		60
Obsolescence loss charged in financial accounts, but not in costs	16,600	
Over absorption of overheads in costs (17,000-16,640)		360
Excess depreciation charged in financial accounts (9,600-8,000)	1,600	
	20,640	57,740
Net Loss as per Cost Accounts		37,100

Illustration 4

From the following Profit and Loss Account draw up a Memorandum Reconciliation Account showing the profit as per Cost accounts.

Profit & Loss Account for the Year ended 31st December, 2018

Dr. Cr.

	Rs.		Rs.
To Office Salaries	22,564	By Gross Profit b/d	1,09,236
To Office Expenses	16,540	By Dividend received on Investments	2,400
To Sales Expenses	28,452	By Interest on Bank Deposits	360
To Distribution Expenses	5,980		
To Loss of Sale of Machinery	3,900		
To Fines & Penalties	500		

To Discount on Debentures	1,000		
To Goodwill written off	10,000		
To Provision for Income Tax	10,000		
To Net Profit	13,060		
	1,11,996		1,11,996

Solution:

Memorandum Reconciliation Accounts

Dr. Cr.

	Rs.		Rs.
To Dividend received on Investments	2,400	By Net Profit as per Financial Accounts	13,600
To Interest on Bank Deposits	360	By Loss on sale of machinery	3,900
To Net Profit as per Cost Accounts	35,700	By Fines & Penalties	500
		By Discount on Debentures	1,000
		By Goodwill written off	10,000
		By Provision for Income Tax	10,000
	38,640		38,640

Illustration 5

The following figures are extracted from the financial accounts of Selwel Ltd. for the year ending 31-12-2018.

		Rs.
Sales (20,000 units)		50,00,000
Materials		20,00,000
Wages		10,00,000
Factory Overheads		9,00,000
Administration Overheads		5,20,000
Selling and Distribution Overheads		3,60,000
Finished Goods (1,230 units)		3,00,000
Work-in-process		
Materials	Rs. 60,000	
Labour	Rs. 40,000	
Factory Overheads	Rs.40,000	1,40,000
Interest paid on capital		40,000
Goodwill written off		4,00,000

In the costing records, factory overheads are charged at 100% of wages, administration overheads at 10% of factory cost, and Selling and Distribution overheads at the rate of Rs. 20 per unit sold.

Prepare a statement reconciling the profit as per financial records with the profit as per cost records.

Solution:

Trading and Profit & Loss Account of Selwel Ltd. for the year ending 31st December, 2018

Dr.				Cr.
	Rs.			Rs.
To Materials	20,00,000	By Sales		50,00,000
To Wages	10,00,000	By Closing Stock		3,00,000
To Factory Overheads	9,00,000	Finished Goods		
		Work-in-process	60,000	
		Materials	40,000	
		Labour	40,000	
		Factory Overhead		1,40,000
To Gross Profit c/d	15,40,000			
	54,40,000			54,40,000
To Administration Overheads	5,20,000	By Gross Profit b/d		15,40,000
To Selling and Distribution Overheads	3,60,000			
To Goodwill Written off	4,00,000			
To Interest pad on Capital	40,000			
To Net Profit	2,20,000			
	15,40,000			15,40,000

Cost Sheet of Selwel Ltd. for the Year ending 31st December, 2018

Output: 21,230 units

	Rs.	Rs.
Cost of Direct Materials used	20,00,000	
Less: Cost of Materials in Work-in-process	60,000	19,40,000
Cost of Direct Labour used	10,00,000	
Less: Cost of Direct Labour in Work-in-process	40,0000	9,60,000

PRIME COST		29,00,000
Factory Overheads @ 100% of wages		9,60,000
FACTORY COST		38,60,000
Administration Overheads @ 10% of Factory cost		3,86,000
COST OF PRODUCTION (21,230 units)		42,46,000
Less: Cost of closing stock of finished goods (1,230 units)		2,46,000
COST OF GOODS SOLD (20,000 units)		40,00,000
Selling and Distribution Overheads (20,000 Rs. 20)		4,00,000
COST OF SALES		44,00,000
Profit (Balancing Figure)		6,00,000
SALES		50,00,000

Reconciliation Statement

	(+) Rs.	(-) Rs.
Profit as per Cost Accounts	6,00,000	
Over absorption of Factory Overheads in costs (9,60,000-8,60,000)	1,00,000	
Overvaluation of closing stock of Finished Goods in financial accounts (3,00,000 -2,46,000)	54,000	
Under absorption of Administration Overheads in costs (5,20,000 - 3,86,000)		1,34,000
Over absorption of Selling and Distribution Overheads in costs (4,00,000- 3,60,000)	40,000	
Goodwill written off in financial accounts, but not considered in cost accounts		4,00,000
Interest paid on Capital charged in financial accounts, but not considered in cost accounts		40,000
	7,94,000	5,74,000
Net Profit as per Financial Accounts	2,20,000	

Working Notes

i) Total no. of units produced during the year

= No. of units sold + No. of units remaining unsold

= 20,000+1230 = 21,230 units

ii) Value of Closing of Finished Goods

$$= \frac{\text{Cost of Prodution}}{\text{Total No. of units produced}} \times \text{No of Units remaining un sold}$$

$$=\frac{42,46,000}{21,230}\times 1,230=\text{Rs.}2,46,000$$

iii) Actual expenditure incurred on factory overheads in financial accounts

Total amount - Amount spent on work-in-process

= Rs. (9,00,000 - 40,000) Rs. 8,60,000.

19.8 LET US SUM UP

Broadly speaking, there are two methods of maintaining cost accounts on double entry system: 1) Integral Accounting, and 2) Non-Integral Accounting. Under the second method of cost accounting (also known as control accounts system) cost records are maintained as an independent set of accounts. A separate Costing Profit and Loss Account is prepared to ascertain the profit or loss. The amount of profit or loss so ascertained is invariably different from the profit or loss as per financial accounts. This necessitates the preparation of a statement reconciling the amounts of profit or loss shown by the two sets of accounts.

The profit or loss shown by the two sets of books differs on account of four major factors. They are:

i) Items shown only in the financial accounts and not in the cost accounts

ii) Items shown only in the cost accounts and not in the financial accounts

iii) Under/Over absorption of Overheads

iv) Different basis of Stock valuation

The reconciliation statement can be prepared either with profit/loss as per cost accounts as the starting point or with profit/loss as per financial accounts as the starting point. In both cases, the amount of profit/loss as per the other set of books is arrived at by making adjustments in respect of all items responsible for the difference. The reconciliation of two figures of profit can also be done by preparing a Memorandum Reconciliation Account.

The preparation of Reconciliation Statement or Memorandum Reconciliation Account helps in cross-checking the arithmetical accuracy of both sets of accounting records and thus makes them more reliable.

19.9 KEY WORDS

Cost Control Accounts System : A method of maintaining accounts where the cost transactions are recorded in a completely separate set of books.

Cost Ledger : The principle ledger in Cost accounting which contains all nominal accounts and all control accounts for the subsidiary ledgers.

Costing Profit and Loss Account : An account prepared for determining the profit/loss as per costing books maintained under non-integral accounting.

Finished Stock Ledger :A subsidiary ledger which contains accounts of all items of finished products manufactured or the jobs completed.

Integrated Accounting: A method of maintaining accounts where both the cost and financial transactions are recorded in a single set of books.

Memorandum Reconciliation Account : The formal way of reconciling the profit/loss shown by the two sets of books in the form of a ledger account.

Over absorption of Overheads: The recovery of overheads in excess of the actual expenditure.

Reconciliation Statement : The formal way of reconciling the profit/loss shown by the two sets of books in the form of a statement.

Stores Ledger : A subsidiary ledger which contains accounts for items of stores and shows the movement of stores.

Under absorption of Overheads : The short-fall in recovery of overheads.

Work-in-progress Ledger : A subsidiary ledger which contains accounts for all jobs, processes or operations pending on the shop floor.

19.10 ANSWERS TO CHECK YOUR PROGRESS

A) 1. a) Integral Accounting, b) Non-integral Accounting, c) principal, d) subsidiary e) Profit/loss as per costing records, f) Non-agreement of profit/loss as per two books

2. a) True, b) False, c) False, d) False

19.11 TERMINAL QUESTIONS/EXERCISES

Questions

1) What are control accounts? Describe their advantages.
2) What do you understand by 'Integrated Accounting'?
3) Explain the need for reconciliation of cost and financial accounts.
4) It has been stated that the results worked out from the costing records and those worked out from the financial accounts may not necessarily agree. Why?
5) Give reasons as to why it is necessary to reconcile cost accounts and financial account. What is the accounting procedure to be adopted for their reconciliation?
6) State briefly the causes of difference between profits shown by Financial Accounts and the profits shown by Cost Accounts.

Exercises

1) From the following figures prepare a Reconciliation Statement.

	Rs.
Net Profit as per financial records	1,28,755
Net profit as per costing records	1,72,400
Works Overheads under-recovered in costing	3,120
Administrative Overheads recovered in excess in costing	1,700
Depreciation charged in financial records	11,200
Depreciation recovered in costing	12,500
Interest received but not included in costing	8,000

Obsolescence Loss charged in financial records	5,700
Income Tax provided in financial records	40,300
Bank Interest credited in financial books	750
Stores Adjustments credited in financial books	6,750

2) From the following particulars prepare

   i) Statement of Cost of Manufacture for the year 1988.

   ii) Statement of Profit as per cost accounts, and

   iii) Profit & Loss account in the financial books and show how you would attribute the difference in the profit as shown by (ii) and (iii).

	Rs.
Opening stock of raw materials	30,000
Opening stock of finished goods	60,000
Purchase of raw materials	1,80,000
Stock of raw materials at the end	45,000
Stock of finished goods at the end	15,000
Wages	75,000

Calculate the factory overheads at 25% on prime cost and office overheads at 75% on factory overheads.

Actual works expenses amounted to Rs. 58,125 and actual office expenses amounted Rs. 45,750. The selling price was fixed at a profit of 25% on cost.

(**Answer:** Profit as per Statement of Cost Rs. 97,500; Profit as per Financial Amounts Rs. 98,625)

3) The following information has been obtained from the records of Freezer Ltd., a manufacturer of one tonne air-conditioners:

		Rs.
a)	Materials per machine	1,500
	Wages	900
	Number of machines manufactured and sold	80
	Selling price per machine	4,250

b) Works overheads to be charged @ 60% of the wages

c) Office overheads to be charged 20% of works cost

d) There were no stock of machines or work-in-progress at the beginning or at the end of the period.

Prepare a statement showing the profit per machine sold. Also prepare a statement showing the actual profit if work expenses were Rs. 43,000 and office expenses were Rs. 48,000 as per the financial records; and shown how you will reconcile the profits shown by two statements.

(**Answer:** Profit as per cost statement Rs. 57,760; Profit as per financial records Rs. 57,000)

4) The following is the summarised version of Trading and Profit & Loss Account of Continental Enterprises Limited for the year ended 31st March, 2018.

	Rs.			Rs.
To Materials	48,000	By Sales		96,000
To Wages	36,000	By Closing Stock Finished Goods		20,400
To Works Expenses	24,000	By Work-in-progress		
To Gross Profit c/d	14,400	Materials	3,000	
		Wages	1,800	
		Work Expenses	1,200	6,000
	1,22,400			1,22,400
To Administration Expenses	6,000	By Gross Profit b/d		14,400
To Net Profit	8,400			
	14,400			14,400

During the year 6,000 units were manufactured and 4,800 of them were sold.

The costing records show that works overheads have been estimated at Rs. 3 per unit produced and administration overheads at Rs. 1.50 per unit produced. The costing books show a profit of Rs. 11,040.

You are required to prepare a Reconciliation Statement.

(**Answer:** Valuation of Closing Stock of Finished Goods in Cost Rs. 21,240 (Overvaluation by Rs. 840). Under-recovery of Works Overheads Rs. 4,800 and Over-recovery of Administration Overheads Rs. 3,000)

5) Modern Company Limited furnishes the summary of Trading and Profit & Loss Account for the year ended 31st March, 2018.

	Rs.		Rs.
To Raw Materials	1,39,600	By Sales (1,200 units)	4,80,000
To Direct Wages	76,200	By Finished Stock (200 units)	8,000
To Production Overheads	42,600	By Work-in-progress	
To Administration Overheads	39,100	Materials 42,700	
To Selling & Distribution Overheads	2,200	28,200	
To Preliminary Expenses written off	2,501	Wages 11,976	47,995
To Goodwill written off	3,000	Production Overheads 7,999	6,000
To Dividends	4,100	By Interest on Securities	
To Income Tax	1,89,444		
To Net Profit			
	5,41,995		5,41,995

The Company manufactures a standard unit, scrutiny of cost records for the same period shows that

i) Factory overheads have been allotted to the production at 20% on prime cost.

ii) Administration overheads have been charged at Rs. 3 per unit on units produced.

iii) Selling and Distribution expenses have been charged at Rs. 4 per unit on units sold.

You are required to prepare a Statement of Cost to work out profit as per cost accounts and to reconcile the same with that shown in the financial accounts.

(**Answer:** Profit as per costing records : Rs. 1,88,493; Valuation of Closing Stock of Finished Goods in Cost Rs. 4,058 (under-valuation by Rs. 3,942); Over absorption of production overheads Rs. 560; Under absorption of administrative overheads Rs. 2,500 and over absorption of selling & distribution overheads Rs. 5,300)

6) The financial profit and loss account of a manufacturing company for the year ended 31st March, 2018.

	Rs.		Rs.
To Opening stock of Finished Goods	38,500	By Sales	2,50,000
To Purchase of Materials	60,000	By Closing Stock of Finished goods	35,000
To Wages	48,000		
To Works Overheads	38,000		
To Gross Profit c/d	1,00,500		
	2,85,000		2,85,000
To Administrative Expenses	20,000	By Sales	2,50,000
To Selling & Distribution Expenses	24,000	By Closing Stock of Finished Goods	35,000
To Bad Debts	7,200		
To Provision for Bad Debts	5,000		
To Net Profit	65,300		
	1,21,500		1,21,500

It is found that the Costing Profit and Loss Account has been prepared on the basis of figures furnished below:

Opening Stock of Finished Goods	Rs. 45,000
Closing Stock of Finished Goods	Rs. 31,500
Works Overheads recovered in costs	Rs. 36,000
Administrative Overheads recovered in Costs	Rs. 22,000
Selling & Distribution Overheads recovered in Costs	Rs. 20,000

You are required to prepare a Memorandum Reconciliation Account and determine the profit as per cost accounts.

(**Answer:** Profit as per cost accounts : Rs. 50,500;
Overvaluation of Opening Stock in cost Rs. 6,500;
Undervaluation of Closing Stock in cost Rs. 3,500;
Under-recovery of Works overheads in cost Rs. 2,000

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

SOME USEFUL BOOKS

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. 2018. *Cost Accounting: Methods and Problems*, Academic Publishers : Calcutta.

Maheshwari, S.N. and S.N. Mittal, 2018. *Cost Accounting: Theory and Problems,* Shree Mahavir Book Depot: Delhi. (Chapters 6, 7, 8, 11) Nigam B.M.L. and G.L. Sharma, 2018.

Theory and Techniques of *Cost Accounting*,

Himalaya Publishing House: Bombay. (Chapters 11, 12, 14, 17

Owner, L.W.J. and J.L. Brown, 1984. Wheldon's *Cost Accounting*, ELBS : London. (Chapters 17, 18)