

METHODS OF COSTING

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13.0 OBJECTIVES

The objectives of this study are :-

- (a) Define unit or batch costing and determine the cost of production of each batch or unit.
- (b) Define job costing and prepare a job cost sheet.
- (c) Define process costing and prepare process cost accounts.
- (d) Define operating costing and determine a statement of operating cost of services

31.1 INTRODUCTION

There are various products manufactured in business organizations. They use different costing systems to meet their needs. Basically, there are two methods or systems of assigning costs of manufacture to individual products :- (a) Job order costing and (b) Process costing. These are the important methods of Product costing. These methods are used for determining the unit cost of production and keeping detailed records supporting the work in Process inventory. There are variety of methods of costing which are merely variations or adaptations of the two basic methods of costing Important methods can be enumerated as follows :-

- (i) Unit or Batch costing
- (ii) Job costing
- (iii) Contract costing
- (iv) Process costing
- (v) Operating costing

13.2 UNIT OR BATCH COSTING

Unit costing is a method of costing under which the cost of a unit is ascertained by dividing the total cost by the number of units produced. It is used in the industries which are engaged in manufacturing exclusively one homogeneous product or a few grades of the same product. It is also called as single or output costing. Unit is also called as single or output costing. Unit cost is the average cost of production. The examples of industries are Cement, Paper, Sugar, Steel etc. The computation of cost is done in the form of cost sheet.

Batch costing is concerned with producing a large quantity of products which could be stocked and sold later on. A batch is a cost unit consisting of a group of identical items which maintain their identity through one or more stages of production. A lot is the quantity of product which can be conveniently and economically produced and costed. The companies which produce shoes, medicines, drugs and nuts & bolts use

this method of costing. In batch costing the cost unit is a batch of specific quantity of identical products.

In batch costing each batch is given a definite order number. All the costs relating to the batch are accumulated. After completion of batch or order the cost sheet is totaled and the total cost is divided by the total quantity produced in order to determine the cost per article.

Illustration – 1 :

SMP Ltd. manufactures papers. The following details are given for the current year

Direct materials - Paper Pulp – 500 tonnes @ Rs. 500 each

Other materials – 100 tonnes @ Rs. 300 each

Direct labour - 80 Skilled men @ Rs. 30 per day for 25 days

- 40 unskilled men @ Rs. 20 per day for 25 days

Direct expenses – Special equipment & Dyes Rs. 40,000 Factory overheads are variable @ 100 % of direct wages and Fixed @ 60% of direct wages. Administrative overheads are @ 10 Percent of Factory cost and Selling & Distribution overheads are @ 15 % on Work cost. 400 Tonnes of Paper was manufactured during the year and Rs. 8000 realized by selling waste materials. Calculate unit cost of production per tone of paper manufactured.

Solution :

Cost sheet for the year ended

Production 400 Tonnes	Total cost (Rs.)	Cost Per Tonne (Rs.)
Direct materials –		
Paper Pulp	250000	625
Other materials	30,000	75
Direct Labour		
Skilled	60,000	150
Unskilled	20,000	50
Direct Expenses	40,000	100
PRIME COST	4,00,000	1000
Factory overheads :		
Variable	80,000	200
Fixed	48,000	120
Sale of waste	-8000	-20
WORKS COST	520,000	1300
Administrative overheads	52,000	130
COST OF PRODUCTION	572,000	1430
Selling & Distn Expenses	78,000	195
COST OF SALES	650,000	1625

Illustration – 2 :

PGG Ltd. undertakes to supply 1000 units of a component per month for Jan. Feb. & March. Every month a batch order is opened

against which materials and labour cost are booked at actuals. Overheads are levied at a rate per labour hour. The selling price is fixed at Rs. 15 per unit. From the following data, determine the cost and profit per unit of each batch order and overall position of the order for 3000 units.

Month	Batch output (Numbers)	Materials cost Rs.	Labour cost Rs.
January	1250	6250	2500
February	1500	9000	3000
March	1000	5000	2000
Labour is paid at the rate of Rs.2 per hour. The other details are :-			
Month			
January	Overhead		Total labour hour
February	Rs.12000		4000
March	Rs.9000		4500
	Rs,15000		5000

PGG Ltd.**Statement of cost & Profit per unit of each Batch**

	January	February	March	Total
Batch output (Nos)	1250	1500	1000	3750
Sale value (Rs.)	18750	22500	15000	56,250
Cost	-	-	-	-
Materials	6250	9000	5000	20,250
Wages	2500	3000	2000	7500
Overheads	3750	3000	3000	97500
Total	12500	15000	10000	37500
Profit per batch	6250	7500	5000	18750
Cost per unit	10	10	10	
Profit per unit	5	5	5	

Overall position of order for 3000 units –

Sales value – 3000 x 15 Rs.45,000

Total cost - 3000 x 10 Rs.30,000

Profit Rs.15,000

Workding :-

	Jan.	Feb.	March
Cost	2500	3000	2000

(a) Labour Hours = ----- = ----- ----- -----

	Rate	2	2	2
	=	1250	1500	100
	Overheads =	12000	9000	15000
(b) Overhead per hour	=-----	-----	-----	-----
	Hours	4000	4500	5000
	Rs. =	3	2	3
(c) Overheads for batch	=	1250 x 3	1500 x 2	1000 x 3
		3750	3000	3000

13.3 JOB COSTING

Job costing is a method of costing which is applied to determine the cost of specific job of production generally manufactured according to customers specification. All the jobs are not similar. They do not pass through the same manufacturing process. Each job requires different amount of materials and labour and different levels of skills. Therefore, the cost of each job differs from other. The cost is recorded separately for each job. Each job or batch is regarded as a cost unit from the view point of accumulation. For example, Printing jobs, Automobile repairs, Hospitals, Ship-univers have to follow job costing.

A job cost sheet is prepared on receipt of an order. A specific number is allotted to each job put into production. General information in respect of the job is recorded at the top of the job-sheet. Appropriate inputs are recorded in the job cost sheet regarding direct materials, labour and overheads. Additional information such as labour-hours, machine hours, quantity and quality of materials used are also recorded for the purpose of planning controlling cost and evaluating performance. Finally the profit or loss on the job can be easily determined. The job cost sheet also provides for the comparison of the actual cost with the estimated costs.

Illustration – 3 :

The following information is taken from the records of Automotive Engineering Works in respect of Job. No. 101.

Materials	Rs. 4020
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Wages :-

Dept. A – 60 Hours @ Rs. 3 per hour

Dept. B – 40 Hours @ Rs. 2 per hour

Dept. C – 20 Hours @ Rs. 5 per hour

The overhead expenses are as follows :

Variable :-

Dept. A – Rs. 5000 for 5000 Labour Hours

Dept. B – Rs. 3000 for 1500 Labour Hours

Dept. C – Rs. 2000 for 1000 Labour Hours

Fixed :- Rs. 20,000 for 10,000 working Hours. Determine the cost of Job No. 101 and price for the job to give a profit of 25 per cent on the Selling Price.

Solution :

Job Cost Sheet – Job No. 101

	Amount Rs.

Materials	4020
Wages Dept. A – 60 x 3	= 180
Dept. B – 40 x 2	= 80
Dept. C – 20 x 5	= <u>100</u> 360

Overhead expenses :- Variable

Dept A – 60 x 1	Rs. 60	
Dept B – 40 x 2	Rs. 80	
Dept C – 20 x 2	Rs. <u>40</u>	180

Overhead expenses – Fixed

120 hours @ Rs. 2 each	240
Total cost	4800
Profit (33 1/3% on cost)	1600

Selling Price	6400

Workding :-

1) Variable overhead Rate =

Dept. A – Rs. 5000 for 5000 Hours = Rs. 1 per hour

Dept. B – Rs. 3000 for 1500 Hours = Rs. 2 per hour

Dept. C – Rs. 2000 for 1000 Hours = Rs. 2 per hour

2) Fixed overhead Rate = Rs. 20000 for 10000 hours = Rs. 2 per hour

Illustration – 4 :

The normal expenses attributable to Machine No. 303 and the normal hours for which the machine is expected to be utilized in the current year are given below :-

Fixed		Rs. 2000
Variable – Power	Rs. 15000	
– Repairs	Rs. 900	
– Lubricants	Rs. 600	3000

	Total	5000

Predetermined normal hours of working :-

To make ready	-	200
To run the jobs	-	800

Total		1000 Hours

From the following information, compute the cost of Job No. 123

Materials consumed – 10 units @ Rs. 5 each

Direct labour cost :-

To make ready – 2 machine Hours @ Rs. 1 each

To run the job – 8 machine Hours @ Rs. 1 each

Solution :

Job cost sheet (Job No. 123)

	Amount Rs.
	50
Materials (10 units @ Rs. 5 each)	
Direct Labour :-	
To make ready – 2 Hours @ Re. 1 each	02
To run the job – 8 Hours @ Re. 1 each	08
	<hr/>
Prime cost	60
	<hr/>
Factory overheads :-	
To make ready :- 2 hours @ Rs. 2 each	04
To run the job – 8 Hours @ Rs. 5.75 each	46
	<hr/>
Cost of Production	110

Working :

Determination of Factory overheads :

$$\text{Fixed overhead rate to make ready} = \frac{2000}{1000} = \text{Rs.2}$$

13.4 CONTRACT COSTING :

Introduction : Contract Costing is the form of specific order costing which applies where work is undertaken to customer's special requirements and each order is of long duration. It is a special type of job costing where the unit of cost is a single contract. Contract itself is the cost centre and it is executed under the specifications of a customer. Contract Costing is mainly used by Civil Engineers who undertake long term projects such as construction of road, bridge, building etc. it is similar to job costing. It has following features.

- (i) The work is done at a site which is generally away from the contractor's premises.
- (ii) The contract takes more than a single accounting period.
- (iii) Most of the expenses are chargeable directly to the contracts.
- (iv) Each contract is distinct and dissimilar from other contracts.

13.4.1 Important Terms used in Contract Costing :

The following terms are generally used in Contract Costing.

- (a) **Contract** : A contract is a legally enforceable agreement. It is an agreement between contractor and contractee which contains the terms and conditions in relation to a job.
- (b) **Contractor** : The person who undertakes to do the job is a contractor.

- (c) **Contractee** : The person for whom the job is being done is the contractee.
- (d) **Contract Price** : It is the amount agreed to be paid by the contractor as consideration for the job to be done.
- (e) **Work certified** : It is the quantum of work done by the contractor and certified by the technical assessor (surveyor or architect) appointed by the Contractee in terms of the contract.
- (f) **Work uncertified** : It is the value of work completed by the contractor but not certified by the Architect or Surveyor at the end of the accounting period.
- (g) **Reteintion Money** : It is the amount in respect of the portion of work certified and retained by the contract with firm as security deposit on account of any loss that may arise due to defects in the work noticed in future.

13.4.2 Recording costs on contract :

Under Contract Costing, a contract is basically the cost unit and it is regarded as a cost centre for the purpose of control. A separate contract account is opened for individual contract for the purpose of determination of profit or loss on each contract. The following costs are recorded in the contract account.

(1) **Materials :-**

Materials are normally purchased and delivery obtained at the site. Excess materials, if any, may either be sold at site or returned to the store. Sometimes, materials are sent from one site to another. All the materials purchased or sent from the stores or another site are debited to contract account and materials sold or returned to stores are credited to the contract. Materials on hand at the end of the accounting period are credited to contract account.

(2) Labour :

It is easy to allocate major part of the labour to contract account. A muster is maintained at the site for the contract. Labour cost is accumulated and debited to each contract. Some workers are deputed from one site to another for some time which is debited to the respective contract on the basis of the time spent on each contract. At the end of the accounting period, the amount of outstanding labour charges is determined and also debited to the contract account.

(3) Plant & Tools :

The contract account is debited to the extent of the depreciation of the plant or tools used for the period on each contract.

(4) Sub-Contracting :

A part of the work may be given to another contract or which is called sub-contracting. The entire amount paid to the sub-contractor is debited to the particular contract account.

(5) Work in Progress :

At the end of the accounting period an incomplete contract will appear as an asset in the balance sheet. The work in progress includes the following :

Cost of work Certified	xxx
Cost of work uncertified	xxx
Profit taken credit for	<u>xxx</u>

Total

Less : Account received from the Contractee xxx

Work in Progress xxx

The value of work in progress is the balance on the contract account which is carried down to the following accounting period.

13.4.3 Profit on Incomplete Contracts :

The difference on the two sides of contract account naturally indicates the profit or loss on the contract and is transferred to costing profit and loss account. When the contract is incomplete at the end of the costing period, several adjustments are usually necessary to close the books.

It is the general rule that profit cannot be anticipated and taken credit for. Therefore, profit earned on a contract must be recognized only on the completion of the contract. However, large contracts are hardly completed in the year of commencement. They extend over a number of accounting periods. Therefore, it is advisable to take credit for profit where it is anticipated. In such a case it is always good that profit is conservatively calculated and only a percentage of total estimated profit on the complete contract equivalent is transferred to the general profit and loss account.

The following principles must be borne in mind in determining the amount of profit to be taken credit for :

- (i) The stage of completion of the contract is determining as follows :

$$\text{Work Certified} = \text{Contract Price} \times 100$$

- (ii) It is conventional to classify incomplete contracts on the basis of the stage of completion as under :

- (a) If the work completed is less than 25%, then no profit is

- taken credit for during that accounting period.
- (b) If the work completed is 25% to 50%, one third of profit is taken credit for during that period.
 - (c) If the work completed is more than 50% but less than 75%, half of the profit is taken credit for during that period.
 - (d) If the work completed is more than 75 % but less than 90 % two third of the profit is taken credit for during that period and
 - (e) If the work is almost completed and very insignificant portion is remained, estimated cost of expanses for the outstanding work is charged, to the cost and the entire profit is taken credit for during the period.

Even here, it is considered improper to take the entire estimated profit to the profit and loss account when cash for the work done is not received. The portion of profit for which credit can be taken is determined by using the following formula :

$$\text{Profit} = \text{Estimated Profit} \times \frac{\text{Cash received}}{\text{Work Certified}}$$

Since the cash received from the contractee is normally less than work certified, this method is suitable for conservatism principles.

Illustration – 5 :

National Co. Ltd. undertook a contract at a price of Rs. 10,00,000. The work started 1st on April 2008. Prepare a Contract Account for the year ended 31st March 2009, from the following particulars.

	Rs.
Materials issued to site	85,000

Labour on site	75,000
Plant installed at site	15,000
Sundry Direct Expenses	3,000
Establishment charges allotted to contract	4,000
Materials returned to stores	500
Work certified by architect	2,00,000
Cost of work not certified	5,000
Materials on hand on 31-3-2009	2,000
Wages due on 31-3-2009	10,000
Value of plant on 31-3-2009	12,000
Cash received	1,80,000

Solution :**Contract Account**

		Rs.		Rs.
To Materials		85,000	By Contractee A/c	2,00,000
To wages	75,000		(Work Certified)	
+ Outstanding	10,000		By Materials returned to	
		85,000	Stores	500
To Depreciation on Plant		3,000		
To Sundry Expenses		3,000	By Work in Progress	

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To Establishment charges	4,000	Work uncertified	5,000
To Balance c/d	32,000	Materials on hand	<u>2,000</u>
(work in Progress)			7,000
	2,12,000		2,12,000

Note :- Since the contract has been completed less than 25% no profit will be taken to Profit & Loss Account. Hence, the balance of contract account will be taken as work in progress.

Illustration – 6 :

SM Construction Ltd. have obtained a contract for construction of a bridge. The contract price is Rs. 12,00,000 and the work commenced on 1st November 2008. The following details are shown in their books for the year ended 30th September 2009.

	Rs.
Materials issued to site	3,25,000
Wages paid	3,00,000
Plant purchased	50,000
General overheads apportioned	30,000
Direct Expenses	10,000
Wages accrued on 30-9-2009	3,000
Materials at site on 30-9-2009	4,000
Direct expenses accrued as on 30-9-2009	1,000
Work not yet certified	14,000

Cash received being 80% of work certified 6,00,000

Life of the plant purchased is 5 years and the scrap value is nil.
Prepare Contract account, and show the amount of profit which would be taken on contract on a conservative basis.

Solution :

Contract Account

		Rs.		Rs.
To Materials		3,25,000	By Work in progress	
To Wages	3,00,000		cost of work	
+ Accured	3,000	3,03,000	Uncertified	14,000
			Materials at site	4,000
To Direct Exp.	10,000		By Contractee A/c	7,50,000
+ Accured	1,000	11,000		
To Depreciation on Plant		10,000		
To General Overheads		30,000		
To P & L A/c	35,600			
To Balance C/d	53,400			
		89,000		
		7,68,000		7,68,000

Note : Profit to be taken to P & L Account is as follows :

$$(i) \quad \text{Contract completed} = \frac{7,50,000}{12,00,000} \times 100 = 62.5\%$$

- (ii) Since contract is complete more than 50% but less than 75% half of the estimated profit should be taken to Profit and Loss Account which will further be reduced to the proportion of cash received to work certified.

Cash received

$$\begin{aligned} \text{Profit} &= \text{Estimated Profit} \times \frac{1}{2} \times \frac{\text{Cash received}}{\text{Work certified}} \\ &= 89,000 \times \frac{1 \times 6,00,000}{2 \times 7,50,000} = 35,600 \end{aligned}$$

$$\begin{aligned} \text{(iii) Work certified} &= \frac{100}{80} \times 6,00,000 = 7,50,000 \end{aligned}$$

13.5 PROCESS COSTING :

Introduction : Process costing is a method of costing in which the cost of each process is ascertained and the same is absorbed by the output of that process. It is a product costing system which is applied to manufacturing concerns in producing large volume of similar products with continuous flow or process. In a process costing system the type of production is such that a continuous flow of output of identical products is produced.

There is no unit with an individual identity because each unit is part of a process. This method is used in industries like chemicals, textiles, rubber, cement, sugar, coal etc. It can also be used in the assembly type industries which manufacture items like typewriters, automobiles, radios and TV's etc. Therefore, process costing is usefully applied when products are manufactured under conditions of continuous processing or under mass production method.

13.5.1 Features of Process Costing :

A Process cost system has the following features :

- (i) The factory is divided into departments or process which are limited to a certain operation.
- (ii) Manufacturing costs are accumulated for each production department or process.
- (iii) The manufacturing cost are accumulated by department or process for specific period.
- (iv) Process costing is an averaging process.
- (v) Each process or department has its own account for recording the processing costs.
- (vi) The production is continuous and emphasis is uniform or standardized product.
- (vii) The unit completed in one process are transferred to the next process together with costs associated with them. Completed unit are transferred to finished goods.
- (viii) Wastages or cost of spoiled units is added to the cost of good units produced which increases the average cost per unit.

13.5.2 Costing Procedure :

Specific accounting procedure is followed in order to accumulate production costs by process and to compute unit costs. A separate account is maintained for each process to which all costs of material, labour, direct expenses and overheads are debited.

Materials :

Normally, all materials required for production are issued to the first process. However, extra or new materials may be added to the next process. The cost of materials consumed is debited to the respective process account.

Labour :

Wages and salaries paid to workmen and supervisory staff

engaged in a particular process are debited to the concerned process account. When workers are engaged in more than one process, the gross wages are distributed to each process on the basis of time spent on each process.

Direct Expenses :

Direct expenses, which can be attributed directly to a process, are debited to the respective process account. For example, electricity, depreciation, hire charges of equipments etc.

Manufacturing Overheads :

Overheads are generally high in the process costing. The overheads have to be analysed and apportioned on some equitable basis over the different processes involved. Overheads may be apportioned on a predetermined rate based on direct wages or prime cost.

13.5.3 Treatment of Process Loss :

In many processes, a loss of weight may arise in the course of manufacture. In process industries, production losses are inevitable and output is always less than the input. Thus, when the output is less than the input the difference is known as process loss. Even though the loss is inevitable, it is still essential that accurate records are maintained and suitable steps are taken to minimize the process loss. Since it affects the production costs, it should be pointed out to the foremen and supervisors for ensuring efficiency in the use of material in future. They may have keen inspection at each stage of production and losses can be reduced in future. Process loss can be divided into two categories (i) Normal loss and (ii) Abnormal loss.

- (i) **Normal loss :-** Certain losses can be anticipated and an estimate of such loss can be made depending upon the material used, production operation involved, equipment used, technology employed and other factors. These losses are inherent in the production operation and are known as normal losses. For example, in the Sugar or Oil Industry the output cannot be equal to

the input of sugarcane or oil seed. Normal loss is unavoidable, uncontrollable and expected in normal conditions. It may be inherent in the manufacturing process. When normal loss occurs, the cost of such loss is absorbed in the cost of production of good products i.e. output. Thus, normal losses are absorbed by good production and its cost shown as nil in the process cost account. However, if the normal loss is in the form of scrap and has some realizable value, the process cost account is credited with the value of scrap.

- (ii) **Abnormal Loss** : Losses which are in excess of normal losses are called Abnormal Losses. These losses are incurred due to abnormal or unexpected conditions like accidents, inferior quality of materials, carelessness of workers and defective plant maintenance. Abnormal process loss is controllable and avoidable. All losses of this type must be recorded and thoroughly investigated and possible steps should be taken to prevent such losses in future.

Abnormal losses are not included in the cost of normal output. The average cost of the lost units is charged to an abnormal loss account which is credited with the scrap and transferred to profit and loss account. The value of abnormal loss is determined as under :

$$\text{Abnormal loss per unit} = \frac{\text{Cost of Production} - \text{Scrap Value}}{\text{Output (no of units)}}$$

The value of abnormal loss is debited to Abnormal Loss Account and credited the process Account. The scrap value of abnormal loss is credited to Abnormal Loss Account. The balance so Abnormal loss account is transferred to the Profit and Loss Account

Abnormal Gain :

Abnormal gain arises when the actual loss is less than the normal loss expected. When the loss is less than expected, the result is abnormal gain. The value of abnormal gain is calculated in a similar manner to an abnormal loss and such value is debited to the concerned Process Account and Credited to a separate account called Abnormal Gain Account. The amount of scrap which would otherwise have been realized had there been normal loss and no abnormal gain is debited to the abnormal gain account. The balance of abnormal gain account is finally transferred to the Profit and Loss Account.

12.5.4 Joint Product and By Products :

Most of the industries carry out multiple production in their factories. Two or more

products can be produced simultaneously from the use of a single raw material. There are many industries which produce Joint Product and By Products. Some examples of industries where Joint Products and By Product are produced are as under :

Industry	Joint Products and By products
Oil	Oil Oil Cakes
Dairy	Butter, Cream, Ice-cream
Steel	Iron, Steel
Sugar	Sugar, Paper, Country Liquor.

Joint Products :

When two or more products are separated in the course of processing, each having a sufficiently high saleable Value, these are called joint products. Thus a joint product is any output of a manufacturing process producing multiple products that add significantly to the total market value of all output. Joint products require simultaneous common processing. They have a physical relationship and processing of one of

the joint products simultaneously results in the processing of the other joint products. Joint products are the primary objectives of manufacturing process.

By Products :

By products is a product which is recovered incidentally from the material used in the manufacture of main product. The value of By product is generally less than the values of main products. Thus a product which is secondary to the main product and obtained during the course of manufacture of main product is a By product. By-product is generally subject to further processing after separation from the main product.

When income from By product is negligible, it is treated as miscellaneous income. However, when the income from By product is considerable, the market value of the By product after deducting costs and expenses incurred from the point of separation to the actual sales should be credited to the main product process account. If the By product is sold after further processing the main product process cost account must be credited with the market value of the By product after deducting the further processing charges from the point of separation.

Illustration – 7 :

The manufacture of Product X requires three distinct process. On completion, the product is passed from PROCESS III to finished stock. During June 2009 the following information was obtained in respect of the product.

Element of cost	Total			
	Process			
	I	II	III	
	Rs.	Rs.	Rs.	Rs.
Direct Material	7,600	5,600	1,250	750
Direct Labour	3,360	620	860	1,880
Direct Expenses	1,000	800	200	-

Production Overhead 5,040 - - -

There was no stock of raw material or work in progress either at the beginning or at the end of the period. Production overhead is absorbed by processes on the basis of 150% of direct wages. Production during the month of June 2009 was 100 units.

Prepare Process Account and Finished Stock Account.

Solution :

Process I Account

	Rs.	Per Unit Rs.		Rs.	Per Unit Rs.
To Direct Material	5,600	56.00	By Output transferred to Process II	7,950	79.50
To Direct Labour	620	6.20			
To Direct Expenses	800	8.00			
To Production Overhead	930	9.30			
Total	7,950	79.50	Total	7,950	79.50
Process II Account					
	Rs.	Per Unit Rs.		Rs.	Per Unit Rs.

To Output transferred from Process I	7,950	79.50	By Output transferred to Process III		
To Direct Materials	1,250	12.50		11,550	115.50
To Direct Labour	860	8.60			
To Direct Expenses	200	2.00			
To Production Over head	1,290	12.90			
Total	11,550	115.50	Total	11,550	115.50

Process III Account

Output	Rs.	Per Unit Rs.		Rs.	Per Unit Rs.
To Transferred From Process II	11,550	115.50	By Output transferred to Finished stock Account		
To Direct Materials	750	7.50		17,000	170.00
To Direct Labour	1,880	18.80			
To Direct Expenses					
To Production Overhead Head	2,820	28.20			
Total	17,000	170.00	Total	17,000	170.00

Finished Stock A/c

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	Rs.	Rs.
To Output transferred from		
Process III	17,000	-
	-----	-----
	-	-
	-----	-----

Illustration – 8 :

Product Z is obtained after it is processed through three distinct processes. The following cost information is available for the operation.

Element of Cost	Total	Process		
		I	II	III
	Rs.	Rs.	Rs.	Rs.
Direct Materials	56,250	26,000	20,000	10,250
Direct Wages	73,300	22,500	36,800	14,000
Production Overhead	Rs. 73,300			

5000 Units @ Rs. 4 Per Unit were introduced in Process I.
Production overheads be distributed as 100% on direct wages.

The actual output and normal loss of the respective process were.

	Output	Normal	Value of
	Units	Loss	scrap per
		On input	Unit Rs.
Process I	4,500	10%	2
Process II	3,400	20%	3
Process III	2,70	25%	4

There was no stock in progress in any processes. You are required to prepare -

- (a) Process Accounts.
- (b) Normal Loss Account.
- (c) Abnormal Loss and Abnormal Gain Account.

Solution :

Process I Account

	Units	Cost Rs.		Units	Cost Rs.
To Materials Introduced	5,000	20,000	By Normal Loss	500	1,000
To Materials		26,000	By Transfer to Process II	4,500	90,000
To Direct Wages		22,500			
To Production Overhead		22,500			
	5,000	91,000		5,000	91,000
Process II Accounts					
	Units	Cost Rs.		Units	Cost Rs.
To Transfer from Process I	4,500	90,000	By Normal Loss	900	2,700
To Materials		20,000	By Abnormal Loss	200	10,050
To Direct Wages		36,800	By Transfer to Process III	3,400	1,70,850
To Production Overhead		36,800			
	4,500	1,83,600		4,500	1,83,600

Working :**(1) Calculation of Abnormal Loss**

$$\text{Input} - \text{Normal Loss} = \text{Normal Output}$$

$$\text{Abnormal Loss} = \text{Normal Output} - \text{Actual Output.}$$

$$\begin{aligned} \text{Normal output} &= 4,500 \text{ Units} - 900 \text{ Units} \\ &= 3,600 \text{ Units} \end{aligned}$$

However Actual Output is 3,400 units.

$$\text{Abnormal Loss} = 3,600 - 3,400 = 200 \text{ units}$$

(2) Valuation of Abnormal Loss

$$\begin{aligned} \text{Abnormal Loss Per Unit} &= \frac{\text{Total Cost} - \text{Scrap Value}}{\text{Normal Out put}} \\ &= \frac{1,83,600 - 2700}{3,600} = \text{Rs. } \frac{1,80,900}{3,600} \\ &= \text{Rs. 50.25} \end{aligned}$$

$$\begin{aligned} \text{Total Abnormal Loss} &= 200 \text{ units @ Rs. 50.25} \\ &= \text{Rs. 10,050} \end{aligned}$$

Process III Account

Per	Rs.	Per Unit Cost	Rs.	Per Unit Cost	
To Trans from Process II	3,400	1,70,850	By Normal Loss	850	3,400
To Materials		10,250	By Transfer to Finished Stock A/c	2,700	2,17,801
To Direct Wages		14,000			
To Production Overhead					
To Abnormal Gain		14,000			
	450	12,101			
	3,550	2,21,201		3,550	2,21,201

Working :

(1) Calculation of Abnormal Gain.

$$\begin{aligned}
 \text{Normal Output} &= \text{Input} - \text{Normal Loss.} \\
 &= 3,400 - 25\% \text{ of } 3,400 \\
 &= 3,400 - 850 \\
 &= 2,550 \text{ Units}
 \end{aligned}$$

Actual Output was 2,700 units. Hence there is abnormal gain of 150 units as under : Actual Output – Normal Output =

$$2,700 - 2,550 = 150 \text{ Units.}$$

(2) Valuation of Abnormal Gain -

$$\begin{aligned}
 & \text{Abnormal Gain Per Unit} = \frac{\text{Total Cost} - \text{Scrap Value}}{\text{Normal Out put}} \\
 & = \frac{2,09,100 - 3,400}{2,05,700} \\
 & = \frac{2,550}{2,550} \text{ Rs.} \\
 & = \text{Rs. } 80.67
 \end{aligned}$$

Total Value of abnormal gain = 80.67 x 150 units = Rs. 12,101

Normal Loss Account

	Units	Rs.		Units	Rs.
To Process I	500	1,000	By Cash – Process I	500	1,000
To Process II	900	2,700			
To Process III	850	3,400	By Cash – Process II	900	2,700
			By Cash – Process III	700	2,800
			By Abnormal Gain	150	600
	2,250	7,100		2,250	7,100

Abnormal Loss Account

	Units	Rs.		Units	Rs.
To Process II A/c	200	10,050	By Cash	200	600
			By Profit & Loss A/c		9,450
	200	10,050		200	10,050

Abnormal Gain A/c

	Units	Rs.		Units	Rs.
To Normal Loss A/c	150	600	By Process III A/c	150	12,101
To Profit & Loss A/c		11,501			
	150	12,101		150	12,101

13.6 OPERATING COSTING :

Operating costing is that form of costing which applies where standardized services are provided either by an undertaking or by a service cost centre within an undertaking. It is also known as service costing. It is suitable for the business such as transport, electricity, hospital, canteens and hotels, banking etc. Operating costing is designed to determine the cost of services rendered by an organization. It is a form of unit costing which is applied to costing of services.

Operating costs are period costs. Expenses accumulated for a period are related to the quantum of services rendered during the period. The method of collection and analysis of cost is similar to single cost system. Direct materials and their costs are obtained from voucher or material requisitions. Information about direct labour is collected from wage records. Overhead costs are allocated on the basis of cost units. The following cost units are generally applied in different service organizations.

Nature of organization	Cost Unit
Transport	Per tonne or Per K.M
Electricity	Per Kilowatt hour
Hospitals	Per Patient, Per Bed
Hotels	Per Room
Canteen	Per Plate, Per Thali

Operating cost are generally collected under the following heads.

- (i) **Fixed or standing charges :-** These charges are incurred whether the organization is operating or not. For example, Depreciation. Interest on capital, Insurance Premium. License fees. Rent etc.
- (ii) **Semi fixed or Maintenance Charges :-** These expenses are incurred on repairs and maintenance of equipments, vehicles, and machines, in order to keep them in working condition. They are semi-fixed or semi-variable nature. For example, Repairs and maintenance, Garage Charges, Painting, Hire charges for vehicles etc.
- (iii) **Variable or Running charges :-** These expenses are incurred on the actual running of equipments, machines or vehicles. They vary from day to day. They are variable in nature. For example, Petrol, Oil, Electricity and Power, Driver's wages etc.

The computation of costs is recorded in a cost sheet or operating cost statement. The various elements of costs are arranged in such a way so as to calculate the operating cost per unit. The cost per unit is based on average cost.

Illustration – 9 :

ABC Transport Company is running four buses between two towns 50 kms apart. Seating capacity of each bus is 40 Passengers. The following particulars were obtained from the records of the company

	Rupes
Wages of Drivers, Conductors & Cleaners	24,000
Salaries of office staff	10,000
Diesel Oil etc.	40,000
Repair & maintenance	8,000
Taxes, Insurance etc.	16,000
Depreciation	26,000
Interest & other charges	20,000

Actual Passengers carried were 75 percent of the full capacity. All the four buses run on all days of the month. Find out operating cost per Passenger- KM.

Solution :**Operating cost Statement**

	Total Cost	Cost Per
		Passenger KM
	Rs.	Rs.
(a) Standing charges :-		
Wages of Drivers, Conductors		
& Cleaners	24,000	0.067
Salaries of Office Staff	10,000	0.027
Taxation & Insurance	16,000	0.045
Interest & other charges	20,000	0.055

	-----	-----
Total	70,000	0.194
(b) Running Charges :		
Diesel, Oil etc	40,000	0.111
Reparis & maintenance	8000	0.023
Depreciation	26,000	0.072
	-----	-----
Total	74,000	0.206
	-----	-----
Grand Total	1,44,000	0.400
	-----	-----

Operating cost per Passenger KM = Rs. 0.40 or 40 paise.

$$\begin{aligned}
 & \quad \quad \quad 75 \\
 \text{(c) Passenger KMs} &= \frac{\quad}{100} \text{ (Buses x capacity x Distance x day x 2)} \\
 & \quad \quad \quad 75 \\
 &= \frac{\quad}{100} (4 \times 40 \times 50 \times 2 \times 30) \\
 &= 100 \\
 &= 0.75 (480000) \\
 &= 3,60,000
 \end{aligned}$$

Illustraction – 10 :

From the following information relating to a hotel, calculate room rent to be charged to give a profit of 25% on cost excluding interest :-

- Salaries to staff Rs. 1,80,00 p.a.

- Wages of the room attendant Rs. 20 per day There is a room attendant for each room and wages are paid only when the room is occupied.
- Lighting, Heating & Power-Normal Lighting expenses for a room. For the whole month is Rs. 50/- when occupied.

Power is used only in winter and the charges are Rs. 20/- for a room, when occupied.
- Repair to Building Rs. 40,000 p.a.
- Linen Rs. 6000 p.a.
- Sundries Rs. 16000 p.a.
- Interior decoration & Furnishing Rs. 20,000 p.a.
- Depreciation @ 5% is to be Charged on buildings of Rs. 10,00,000
- Interest to be charged @ 15% on Investment of Rs. 15,00,000.
- There are 100 rooms in the hotel out of which 80% of the rooms are generally occupied in summer and 30% in winter. The period of summer and winter may be considered to be of 6 months in each case. A month may be assumed of 30 days.

Solution

Operating cost statement

	Rs.
	(Per Annum)
(a) Standing charges	
Staff Salaries	1,80,000
Repairs to Building	40,000
Linen	6,000
Sundries	16,000
Interior decoration etc.	20,000
Depreciation of Building	50,000
Interest on Investment	2,25,000

Total	5,37,000
(b) Running Charges	
Room attendant's wages :	288000
- summer (20 x 30 x 6 x 80)	108000
- winter (20 x 30 x 6 x 30)	36600

Lighting, Heating & Power	432600

Total Rent	969600
Profit @ 25% on cost excluding interest	186150

Total Rent	1155750

1155750

$$\text{Room Rent per day} = \frac{\text{-----}}{19800} = \text{Rs. 58.37}$$

Working :

(1) Calculation of room days =

- Summer 100 rooms x 6 months x 30 days x 80%	=	14400
- winter 100 rooms x 6 months x 30 days x 30%	=	5400
Total		19800

(2) Calculation of Lighting, Heating & Power =

Lighting

$$\text{Summer} = 50 \times 6 \times 100 \times 80\% = 24000$$

$$\text{Winter} = 50 \times 6 \times 100 \times 30\% = 9000$$

Power

$$\text{Winter} = \text{Rs. } 20 \times 6 \times 100 \times 30\% = 3600$$

$$\text{Total} = 36600$$

13.7 BOOKS RECOMMENDED

1. Cost Accounting & Costing Methods – H. J. Wheldon
 2. Cost Accounting – Jawaharlal.
-

13.8 EXERCISES

1. What is unit costing? What are its advantages?
2. What is job order costing? What is the nature of job costing?
3. What is contract costing? What are the principles to be followed in respect of computing and taking credit of profits on incomplete contracts?
4. What are the general features of process costing? What is the difference between normal and abnormal loss?
5. Why operating costing used.
6. Lion Industries Ltd. undertakes to supply 1000 units of a component pre month for January, February and March. Every month a batch order is opened against which materials and labour cost are booked at actual. Overheads are levied at a rate per labour hour. The selling price is contracted at Rs. 15 per unit. From the following data, present the profit per unit of each batch order and the overall position of the order for 6000 units :

Month	Batch output	Material cost	Labour cost
	(Nos.)	Rs.	Rs.

January	2500	12,500	5,000
February	3,000	18,000	6,000
March	2,000	10,000	4,000

Labour is paid at the rate of Rs. 20 per hour. The other details are :-

Month	Overheads Rs.	Total labour Hours
January	24000	8000
February	180000	9000
March	30000	10000

7. A work order for 5000 units of a commodity has to pass through four different machines of which the machine hour rates are :-

No. 1	Rs. 12.50
No.2	Rs. 30.00
No.3	Rs.40.00
No.4	Rs. 25.00

The following expenses have been incurred on the work order
Materials Rs. 40,000 and Wages Rs. 15000 :-

Machine No.	1. worked for 200 hours
	2. worked for 300 hours
	3. worked for 240 hours
	4. worked for 100 hours

After the work order had been executed, Materials worth Rs. 4,000 were returned to stores. Office overheads are to be estimated @ 60% of the

works cost. 10% of the production is going to be discarded, being unsatisfactory for which $\frac{1}{2}$ the amount can be realized from sale in the junk market. Find out the rate of Selling Price per unit if 20% Profit on Selling Price is desired.

8. Job No. X-10 has incurred the following costs by ABC Co. Ltd.

Materials – 15 kg @ 2.5 per kg.

Wages – Dept A-18 Hours @ Rs. 4 per hour

B-32 Hours @ Rs. 3 per hour.

Budgeted overhead for the year, based on normal capacity, is as follows :-

Variable overhead –

Dept A – Rs. 60000 for 9000 Direct labour hours

Dept B – Rs. 8000 for 10,000 Direct labour hours.

Fixed overheads –

Total budgeted direct labour hours – Rs. 22000

Total budgeted expenditure Rs. 16,500.

You are required to calculate the cost of job No. X-10 and estimate the percentage of profit obtained if the Price quoted to the customer was Rs. 372.

9. The General Foundries undertakes to deliver 100 machines to be manufactured out of mild steel at Rs. 7.50 per casting. The expenses pertaining to the job are given below :-

Materials 150 kg mild steel @ Rs. 1.50 per kg.

- Mourning – 80 hours @ Rs. 1 per hour
- Coremaking – 40 hours @ Rs. 0.8 per hour
- Finishing – 50 hour @ Rs. 1.25 per hour

Overhead expenses –

- Moulding – 150 Percent of labour cost
- Core making – 200 per cent of labour cost
- Finishing – 100 percent at labour cost.

Casting cost come to Rs. 250 per operation and the input of mild steel in this case was 1000 kgs. 30 kg. of the metal is tested out and the value creditable is Rs.1 per kg. Also 2 kgs were lost in the process of melting and moulding. Actually 105 castings are made out of which 3 were defective and were rejected on inspection.

The excess casting in good condition were also delivered to the customer at a concessional rate of Rs. 6 per casting. Prepare the job – cost sheet suitably showing all the details.

10. ABC Contractor were engaged on one contract during the year 2009. The contract price was Rs. 2,00,000. The trial balance extracted from the books on 31st December 2009 stood as follows :

	Rs.	Rs.
Share Capital		50,000
Sundry Creditors		14,000
Buildings	27,000	
Cash at Bank	5,000	
Contract Account		

Materials	37,000	
Plant	20,000	
Wages	50,000	
Other Expenses	5,000	
Cash received (80% of work certified)		80,000
	-----	-----
	1,44,000	1,44,000
	-----	-----

Of the plant and materials charged to the contract, plant costing Rs.2,000 and materials costing Rs. 1,000 were destroyed by an accident. On 31st December 2009 plant costing Rs. 2,000 was returned to stores and materials at site was valued at Rs. 1,400, cost of uncertified work was Rs. 2,000.

Charge 10% depreciation on plant. Prepare Contract Account for the year, transferring two-third of profits on the basis of cash received to the profit and loss account and show the relevant items in the Balance Sheet as at 31st December 2009.

11. Farewell Limited commenced a contract on 1st January 2008. The total contract was for Rs. 20,00,000. It was decided to estimate the total profit and to take to the credit of profit

& loss account the estimated profit on the basis of cash received.

Actual expenditure for the year 2008 and 2009 was as follows :

	Rs.	Rs.
Materials	3,00,000	5,20,000
Labour paid	2,00,000	2,40,000
Labour accrued	20,000	-
Plant purchased	1,80,00	-
Expenses paid	80,000	1,42,000

Plant returned to store at the end of the year	20,000	50,000
Materials on site	20,000	-
Work certified	8,00,000	Full
Work uncertified	30,000	Nil
Cash received	6,00,000	Full

The Plant is subject to annual depreciation @ 20% on cost.

Prepare Contract account and Contractee account for both the years.

12. XYZ Ltd. manufactures three grades of products. The following details are available for a particular month .

Particulars	Process I	Process II	Process III
Materials used (tonnes)	20,000	15,000	10,000
Cost per tonne (Rs.)	20	10	5
Wages (Rs.)	80,00	40,000	30,000
Manufacturing expenses (Rs.)	40,000	30,000	10,000
Sent to warehouse	20%	40%	100%
Transferred to next process	80%	60%	-
Sale of scrap per tonne (Rs.)	10	12	15

In each process 5% of the total weight put in is lost and 4% is scrapped.

Prepare Process Cost accounts.

13. A Chemical product passes through Processes A and B before completion. In Process B, By – product is produced which after further processing in Process C is sold at a profit of 20% of cost.

You are required to prepare the following :

- (a) Process A, B and C Account
- (b) Abnormal Loss Account
- (c) Abnormal Gain Account

Particulars	Process		
	A	B	C
Output in units	4,200	3,800	100
Normal loss in process	20	5	-
(% of input)			
Scrap Value of any loss in			
Process per unit	Rs. 2	Rs. 5	-
Cost	Rs.	Rs.	Rs.
Direct Materials introduced	30,000	-	-
(5000 units)			
Direct Materials added	10,000	3,100	100
Direct Wages paid	12,000	14,700	300
Direct Expenses	6,000	1,200	-

Production overhead for the month were Rs. 12,000. These overheads are to be absorbed on the basis of Direct Labour.

14. A Transport company has been given a 40 k.m. long route to run a bus. The bus costs Rs. 500,000 and has been insured @ 4 per cent per annum. Annual taxes payable amount to Rs. 3000. Garage Rent is Rs. 200 p.m. Annual Repairs will be Rs. 4000 and the bus will be used for 5 years.

The drivers salary will be Rs. 300 p.m. and conductors salary will be Rs. 2400 p.m. Cost of Printing tickets will be Rs. 1000 p.m, Manager's salary will be Rs. 4000 per month.

Fuel cost will be Rs. 60 per 100 k.m. The bus will make 3 round trips carrying an average of 30 passengers on each trip. Assuming 25% profit on taking, calculate the bus fare to be charged from each passenger. The bus runs on an average 25 days in a month.

15. The following cost data pertaining to the year 2009 has been collected from the books of BEES Ltd. Prepare a cost sheet showing the cost of generation of Power per unit of KWTS.

Total units generated	15,00,000 kwts.
	Rs.
Operating labour	16,500
Plant supervision	5250
Lubricant & supplies	10,500
Repairs & Maintenance	21,000
Administration overheads	9000
Capital cost	1,50,000

Coal consumed per Kwts is 1.5 and cost of coal delivered to the power station is Rs. 33.06 per metric tonne. Depreciation rate chargeable is 4% p.a. and interest on capital is to be taken at 7%.

