

**Paper - XII (Section-A)**  
**Cost Accounting**

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## LESSON 1

### COST ACCOUNTING

#### Introduction

Cost accounting is a branch of accounting, it is younger than financial accounting and has developed because financial accounting alone could not serve all the purposes of modern business. Financial accounting plays a very useful role, specially in indicating the results of operations during a period and also portraying the financial position of a concern. But for carrying on day-to-day work, the management of any undertaking will need much more information than financial accounting can as such give. Questions mentioned below will always be occurring to the management of a industrial concern :

1. Is there any wastage of material or time?
2. Is the level of efficiency what it should be?
3. What should be the selling price of an article or what should be the price to be quoted to a customer for whom a job is to be done?
4. Additional sales can be made at concessional price. How much concession in price should be offered?
5. When times are difficult and sales are not easy, prices have to be reduced. Should goods be sold at even below cost?

These are only some of the questions which management will have to answer. For the purpose of solving the problems indicated above, the ordinary Profit and Loss Account and the Balance Sheet will not serve any useful purpose. What is required is that all the accounting information should be analysed according to each type of activity. If such an analysis is made say for each article produced or for each job done, the management would have good deal of information on the basis of which some good decisions can be made. It is because of need to handle the sort of problems indicated by the questions put above that the need of cost accounting was felt and this branch of accounting emerged.

Cost accounting is concerned with analysis of all the expenses and costs incurred so that the cost of completing each job or producing each product, or for that matter completing any identifiable activity, is known. Not only the total cost has to be ascertained; the figure has also to be fully analysed into all its components. Take the example of this lesson which is in your hand. It would be desirable to know the cost of paper and the cost of printing it as well as the cost of getting it prepared before it is sent to the press. It is with the help of such an analysis only that useful information would be available to the management for its purposes.

#### Definition

The Institute of Cost and Management Accountants, London has defined Cost Accountancy as :



"The application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and the ascertainment of profitability. It includes the presentation of information derived therefrom for the purpose of managerial decisions making."

Costing has been defined by the Institute as :

"The technique and process of ascertaining costs."

And Cost Accounting as :

"The process of the accounting for cost from the point at which expenditure is incurred or committed to the establishment of its ultimate relationship with cost centres and cost units. In its wide usage it embraces the preparation of statistical data, the application of cost control methods and the ascertainment of the profitability of activities carried out or planned."

The definitions given by the Institute bring out the point that the processes and techniques of ascertaining costs have the following aims :

- (i) Cost control, i.e., keeping cost under check ;
- (ii) ascertaining profitability and profits earned, including ascertaining causes that lead to a particular figure ; and
- (iii) collection and presentation of such information as is required by the management in making decisions. The decisions to be made may be of various types some examples of which have been mentioned on the previous page.

#### Advantages of Cost Accounting

If a good system of cost accounting is installed, the undermentioned advantages should be available.

- (i) With the help of cost accounting, it would become possible to measure and then improve efficiency. This is done by comparing costs in one period with those in another period or cost of one firm with that of another etc. Suppose, in the month of July 1993 the labour cost per unit comes to Rs. 6 whereas in the month of June 1993, the figure was Rs. 5.70 ; it would indicate that to some extent there is inefficiency in the use of labour. One should note that really speaking, cost accounting is the only way of an objective measurement of efficiency. This is specially so when actual costs are compared against what are known as standard costs which may be thought of as target costs.
- (ii) When prices are within the control of the firm, it would be possible to fix proper prices only if costs are known. For example, when a contractor sends tender to the prospective contractee, he can do so only on the basis of costing information in his possession.
- (iii) Even when it is not possible for the firm to control prices, it has still to decide whether certain products should be produced or not, having regard to the price which is available. Suppose, the price in the market is only Rs. 7 whereas the cost of producing the article comes to Rs. 7.50 ; the firm will have to decide whether this product should be sold or whether its production should be stopped.



- (iv) In special times and for special customers, special concessions have to be given. This also can be decided only by reference to the figures of costs.
- (v) Cost accounting necessitates a number of records to be maintained ; good deal of information is then automatically available. For example, availability stocks of raw materials would be known. This will help the management in two ways. Any theft or pilferage will be immediately apparent. Also, and more important, it would be possible for the firm to plan its work.
- (vi) Some of the very important questions like replacement of men by machines cannot be decided without there being full costing information available.
- (vii) Cost accounting enables a firm to ascertain the exact causes of losses or wastages and thus enables it to put a stop to that.
- (viii) Cost accounting encourages the habit of making decisions on the basis of calculations and therefore management will be discouraged from being reckless.

### **Installation of a Costing System**

Even though there are a number of advantages which are available to management, it should be remembered that by and large it is still not compulsory to install a cost accounting system. Concerns instal such a system chiefly because of the advantages. However, the advantages would be available only if the management is capable of studying and willing to study all the costing information which is available.

Also, it should be remembered that every firm has its own peculiar problems and, therefore, each firm must specially design its own cost accounting system. Sometimes, chiefly in case of contractors or firms which produce only one main product, separate cost accounting is not necessary and financial records can be made to serve the purposes of cost accounting. But in case of Jobbing factories, i.e., those firms which produce a large number of products, separate cost accounting records are generally necessary.

Another point to remember about cost accounting is that in this case reasonable accuracy is sufficient. In other words, it is not desirable or necessary to try to arrive at the cost of a product which is absolutely correct. For one thing, it may not be possible to do so; for another, the cost of having this accurate information may be too high considering the benefit which may be derived. For example, one can say that the cost of building one flat comes to Rs. 45,358. 13 P. This accuracy may not help much in cutting down wastage whereas the clerical cost may be too large. However, in case of cloth or sugar or cement, it would be desirable to know the cost of each unit to 2 or 3 decimal places since even a small saving per unit will mean a very large total saving in rupees. A sugar mill produces 2,00,000 quintals of sugar ; a saving of even one paise per quintal will mean a total saving of Rs. 2,000. The meaning of reasonable accuracy, therefore differs from industry to industry.

Another important point is that the costing information is usually required for enabling management to make decisions. Therefore, this information should be supplied promptly. Delay in sending this information may mean that the time for taking action has already been over. It is for this reason also that only reasonable accuracy is considered enough in case of costing information because prompt supply of information is more important than accuracy.



### SELF CHECK TEST

State which of the following statements are true :

- (i) Joint stock companies must instal a system of cost accounting just as they must have a good financial accounting system.
- (ii) The chief aim of cost accounting is to help in fixing price; hence if prices are beyond the control of a firm, it will be useless for it to have cost accounting.
- (iii) Cost accounting should enable one to know not only the total cost of a product or job but also an analysis of it.
- (iv) One can easily measure one's efficiency and check wastages and losses on the basis of the Profit and Loss Account.
- (v) Cost accounting help in determining prices under special circumstances.
- (vi) Measurement of efficiency is possible through comparision of costs in one period with those in another.
- (vii) Cost Accounting requires records in quantitative and monetary terms regarding materials and stores.
- (viii) Costing information will be useless unless it is fully correct.
- (ix) Each firm must fashion its own cost accounting system, no ready made system is available.
- (x) Cost Accounting should be installed by all firms since it is fashionable to do so.

( True : (iii), (v) to (vii) & (ix) )

#### Elements of Cost

Take this lesson again and let us try to list the costs which will be incurred to make it ready for you to read it. The cost would comprise the following :

- (i) the paper on which it is printed;
- (ii) the amount paid to the press for printing the lesson and also for folding and binding it;
- (iii) the proportionate amount of the expenses of the salaries paid to the members of staff of the Commerce Department of the School to write and read through the lesson and edit it;
- (iv) the proper proportion of the salary paid to the proof reader employed by the School;
- (v) the proportionate amount of the general expenses incurred in the office to pay attention to the preparation, printing and despatch of this lesson.

It can easily be noticed that the first two items have been incurred only for this lesson and the amounts will be different from lesson to lesson—if one lesson is bigger than another, the cost of the paper consumed and the cost of printing it would naturally be higher. In some lesson, there may even be graphs for which blocks have to be prepared; these blocks would not be useful for any other lesson. Such costs or expenses which are peculiar to a particular lesson, are known as direct costs. One can define direct costs as those expenses which can be conveni-



ently associated with a particular job or product or unit of cost. Note the word 'conveniently'. This is because we must not spend on cost accounts more than the benefits which we expect to get from it. Hence, we should not devote too much time and effort to the definite allocation of expenses to different units of costs. Ordinarily, for any product, materials used and the wages paid and in some cases, some expenses will be direct expenses.

The other type of expenses listed above are common to the various lessons which are being prepared. The staff of the Commerce Department of the School has prepared not only this lesson but others also; besides, it does other work also like attending to students and to their Response Sheets. The proof readers also have to make corrections not only in lessons written in the Commerce Department but also in other departments. Further, the office is paying attention to a most of problems of which preparation of lessons is only one. Such expenses are known as indirect expenses because they are incurred not for a particular product or job or unit of cost but for work in general. It is rather inconvenient to allocate exactly these expenses to individual units of cost; it is more convenient to treat them in lump sum and have a sort of rough and ready method of apportioning them over various units of cost.

For industrial concerns, in direct expenses usually can be divided into the undermentioned categories:—

- (i) factory expenses ;
- (ii) office and administrative expenses ; and
- (iii) selling and distribution expenses.

Expenses incurred for purposes of production are factory expenses ; expenses incurred for obtaining orders from customers and despatching the goods to them are known as selling and distribution expenses ; expenses incurred for the general office are known as office and administrative expenses.

From the above, one can say that the total cost can be analysed under the six undermentioned elements :

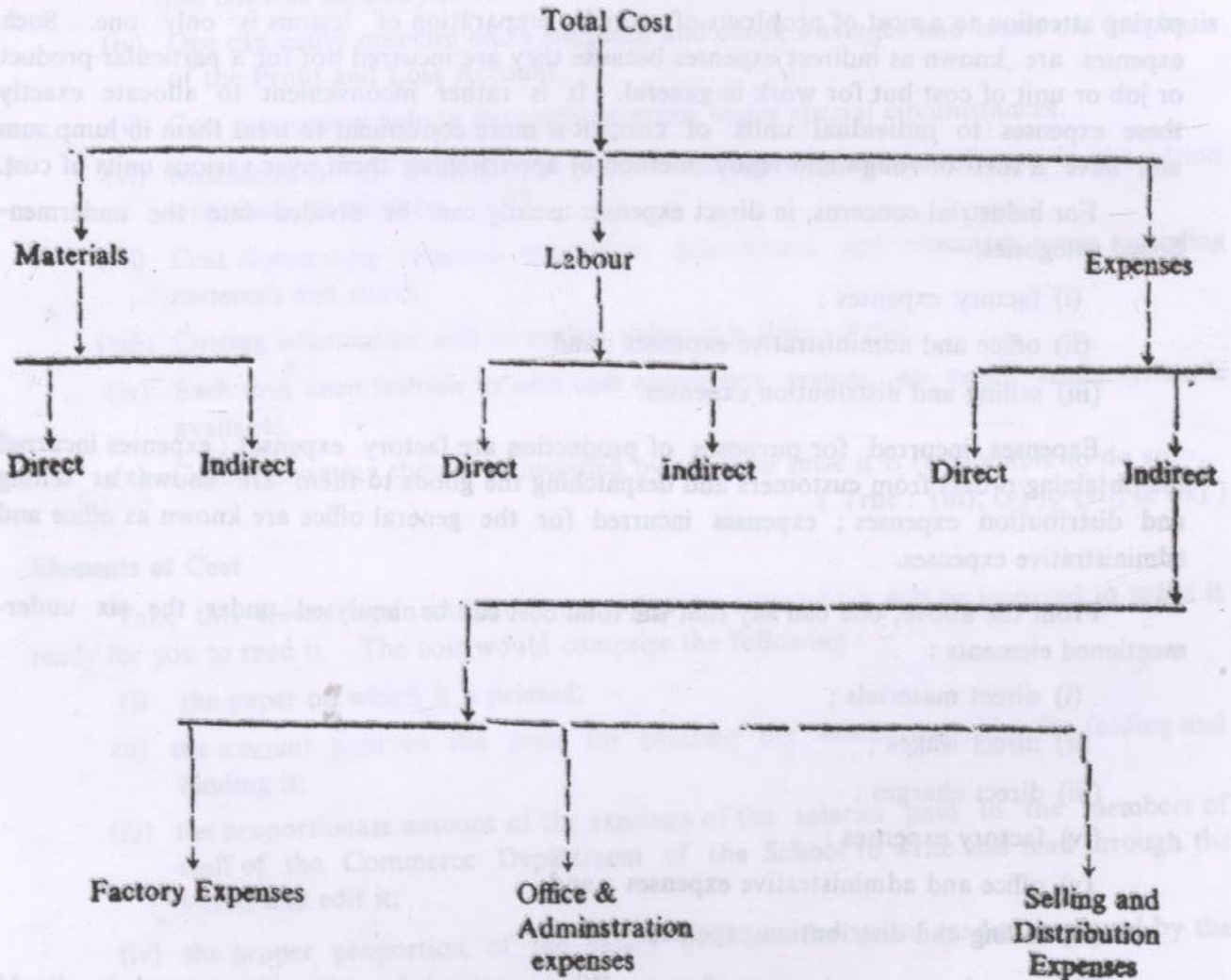
- (i) direct materials ;
- (ii) direct wages ;
- (iii) direct charges ;
- (iv) factory expenses ;
- (v) office and administrative expenses ; and
- (vi) selling and distribution expenses.

These are known as elements of cost. When costing information is presented, it should be analysed under the six heads mentioned above so that one can know the relative importance of each element. One should note, however, that if a concern is very small, it may have only one category of expense instead of three or, if it is bigger but not very big, it may have one category for factory expenses and only one for both office and selling expenses. If a concern is very big, each of the three types of indirect expenses can be further sub-divided. For example many concerns make a distinction between selling expenses, i.e., expenses incurred to obtain orders, and distribution expenses, i.e., expenses incurred to comply with the orders.



One should also note, some of the important terms which are often use in costing terminology. The total of the first three elements namely, direct material, direct wages and direct charges is known as prime cost. When factory expenses are added to the prime cost, it become factory cost, or works cost. When office and administrative expenses are added to the works cost, we call it as office cost or cost of production. Selling cost or cost of sales arrived at by adding to Office Cost, the selling and distribution expenses. Of course, when cost of sales is compared with sales, the profit or loss will be ascertained. Costing information is usually set out in the form of a statement called cost sheet.

A chart showing Total Cost divided into Elements of cost is given below :—



**Example I.** In a factory 30,000 units were manufactured in the month of June, 1994. Prepare Cost Sheet from the following :

	Rs.
Opening Stock of Raw Materials	7,500
Purchases of Raw Materials	82,500
Closing stock of Raw Materials	15,000
Direct Wages	37,500
Factory Overheads	60,000
Office and Administrative overheads	30,000

**Solution :**

Cost Sheet for the month of June, 1994

	Total Cost (30,000) units Rs.	Cost per unit Rs. P.
Raw Materials		
Opening	7,500	
+ Purchases	82,500	
	<u>90,000</u>	
— Closing	15,000	
	<u>75,000</u>	2.50
Material Consumed	75,000	
Direct Wages	37,500	1.25
	<u>1,12,500</u>	3.75
Prime Cost	1,12,500	
+ Factory Overheads	60,000	2.00
	<u>1,72,500</u>	5.75
Works on Factory Cost	1,72,500	
+ Office & Admn. Overheads	30,000	1.00
	<u>2,02,500</u>	6.75
Cost of Production	2,02,500	

**Example II.** From the following information, prepare Cost Sheet for 1993

	Rs.
Raw Materials	
Opening	25,000
Purchases	85,000
Closing	40,000
Carriage inwards	5,000
Wage—Direct	75,000
—Indirect	10,000
Direct expenses	15,000
Rent and Rates—Factory	5,000
—Office	500



Indirect consumption of materials	500
Depreciation—Plant	1,500
Office furniture	100
Salary—Office	2,500
—Salesmen	2,000
Foreman's Salary	5,700
Other office expenses	900
Managing Director's remuneration	12,000
Other selling expenses	1,000
Travelling expenses of Salesmen	1,100
Carriage and freight outwards	1,000
Dividends	30,000
Sales	2,50,000
Advance income-tax paid	15,000
Advertisement	2,000
Interest	1,000

Managing Director's remuneration is to be allocated Rs. 4,000 to factory, Rs. 2,000 to the office and Rs. 6,000 to selling department.

#### Cost Sheet for the year 1993

Raw Materials	Rs.	Total Rs.
Opening	25,000	
+ Purchases	85,000	
	<u>1,10,000</u>	
—Closing Stock	40,000	
Material Consumed		70,000
Direct Wages		75,000
Carriage inwards		5,000
Direct expenses		15,000
		<u>1,65,000</u>
	<b>Prime Cost</b>	
Factory Expenses—		
Indirect Wages	10,000	
Rents and Rates	5,000	
Indirect Materials	500	
Depreciation of Plants	1,500	
Foreman's Salary	5,700	
Mg. Director's remuneration	4,000	
		<u>26,700</u>
	<b>Works Cost or Factory Cost</b>	<u>1,91,700</u>
Office and Administrative Expenses :—		
Rent and Rates	500	
Depreciation on office furniture	100	
Salary	2,500	
Other office expenses	900	
Mg. Director's remuneration	2,000	
		<u>6,000</u>

<b>Cost of Production or Office Cost</b>		1,97,700
<b>Selling and Distributive Expenses—</b>		
Salary—Salesmen	2,000	
Mg. Director's remuneration	6,000	
Other selling expenses	1,000	
Advertisement	2,000	
Travelling expenses	1,100	
Carriage & freight outwards	1,000	13,100
		<hr/>
<b>Cost of Sales</b>		2,10,800
<b>Profit</b>		39,200
		<hr/>
<b>Sales</b>		2,50,000
		<hr/> <hr/>

**Note :** Dividends, Advance Income-tax and interest are excluded from Cost-Sheet.

### Illustration 3

The Metal Products Company Ltd. manufactured and sold 1,000 Ceiling Fans during year ended 31st December, 1992. The summarised accounts of the Company are given below :—

#### Manufacturing Trading and Profit and Loss Account for the year ended 31st December, 1992

	Rs.			Rs.
To Material used	80,000	By Sales		4,00,000
„ Direct Wages	1,20,000			
„ Manufacturing Cost	50,000			
„ Gross Profits	1,50,000			
	<hr/>			
	4,00,000			4,00,000
	<hr/> <hr/>			<hr/> <hr/>
To Salaries	60,000	By Gross Profit		1,50,000
„ Rent Rates and Insurance	10,000			
„ General Expenses	20,000			
„ Selling Expenses	30,000			
„ Net Profit	30,000			
	<hr/>			
	1,50,000			1,50,000
	<hr/> <hr/>			<hr/> <hr/>

For the year ending 31st December, 1993 it is proposed that :—

(i) Output and Sales will be 1,200 Fans ; (ii) Price of materials will rise by 20% on the previous year level ; (iii) Wages per unit will rise by 5% ; (iv) Manufacturing cost will rise in



proportion to the combined cost of materials and wages ; (v) Selling expenses per unit will remain unchanged ; and (vi) Other expenses will remain unaffected by the rise in output.

Prepare a statement of Cost, showing the price at which the fans should be marketed so as to earn a profit of 10% on the selling price.

**Solution :**

**Statement of Cost and Profit for the Manufacture of 1,000 Fans for the  
ended 31st December 1992**

	Total Cost (1,000 units)	Cost per unit
	Rs.	Rs.
Materials used	80,000	80.00
Direct Labour	1,20,000	120.00
<b>PRIME COST</b>	<b>2,00,000</b>	<b>200.00</b>
<i>Add</i> Factory Overheads	50,000	50.00
<b>FATORY COST</b>	<b>2,50,000</b>	<b>250.00</b>
<i>Add</i> Office Overheads		
Salaries	60,000	
Rent, Insurance	10,000	
General Expenses	20,000	
	90,000	90.00
<b>COST OF PRODUCTION</b>	<b>3,40,000</b>	<b>340.00</b>
<i>Add</i> Selling Overheads	30,000	30.00
<b>SELLING COST</b>	<b>3,70,000</b>	<b>370.00</b>
Profit	30,000	30.00
	<b>4,00,000</b>	<b>400.00</b>



Estimate for the Manufacture of 1,200 Fans during 1993

	Rs.	Cost per Fan	Total Cost
		Rs.	Rs.
Materials	80	96	1,15,200
Add 20% increase $\left(\frac{20 \times 80}{100}\right)$	16		
Direct Labour	120		
Add 5% increase $\left(\frac{5}{100} \times 120\right)$	6	126	1,51,200
<b>PRIME COST</b>		222	2,66,400
Add Factory Overheads 25% on Prime Cost		55.50	66,600
<b>FACTORY COST</b>		277.50	3,33,000
Add Office Overheads			
Salaries			
Rent			
General expenses		75.00	90,000
<b>COST OF PRODUCTION</b>		352.50	4,23,000
Add Selling Overheads (remains unchanged)		30.00	36,000
<b>COST OF SALES</b>		382.50	4,59,000
Add Profit (10% on sales or 1/9th cost)		42.50	51,000
<b>SELLING PRICE</b>		425.00	5,10,000

**Working Notes :**

Profit is 10 on Selling Price i.e.  $= \frac{100 \times 10}{90} \times \% \text{ on cost}$

$= \frac{100}{9} \% \text{ on cost}$

$\therefore \text{Profit} = \frac{100}{9} \times \frac{4,59,000}{100} = \text{Rs. } 51,000.$

## Classification of Cost

The cost can be classified into the following :

1. According to Elements,
2. According to Functions,
3. According to Nature or Behaviour,
4. According to Controllability,
5. According to Normality,
6. According to Relevance to decision-making and control.

1. *According to Elements* : The cost is classified into (i) Direct Cost and (ii) Indirect Cost according to elements viz., Material, Labour and Expenses which we have studied earlier in this Chapter.

2. *According to Function* : The cost is classified into the following :

- (i) Production Cost or Manufacturing Cost
- (ii) Administration Cost
- (iii) Selling Cost, and
- (iv) Distribution Cost.

(i) *Production Cost* : The cost of sequence of operation which begins with supplying materials, labour and services and ends with primary packing of the product—I. C.M.A.

(ii) *Administration Cost* : "The cost of formulating the policy, directing the Organisation and controlling the operations of an undertaking. Which is not related directly to a production, selling, distribution, research or development activity of function." I. C.M.A.

(iii) *Selling Cost* : "The cost of selling to create and stimulate demand sometimes termed marketing and of securing of order." I.C.M.A.

(iv) *Distribution Cost* : "The cost of sequence of operations, which begins with making the packed product available for despatch and end with making the re-conditioned returned empty package, if any, available for re-use." I.C.M.A.

The following terms of cost are also included in the 'classification of cost' as per I.C.M.A.

1. *Research Cost* : The cost of searching for new or improved products, new application of materials or improved methods.
2. *Development Cost* : The cost of the process which begins with the implementation of the decision to produce a new or improved product or to employ a new or improved method and ends with the commencement of formal production of that product or by that method.
3. *Pre-production Cost* : That part of development cost which is incurred in making a trial production preliminary to formal production.



4. *Conversion Cost* : It is the sum of direct wages, direct expenses and overhead cost of converting raw materials to the formed state or converting a material from one stage of production to the next.
5. *Policy Cost* : A cost incurred, in addition to the normal requirements, as a matter of policy of the undertaking is the policy cost.
6. *Idle facilities cost* : The cost of abnormal idleness of fixed assets or available services is the Idle Facilities Cost.

3. *According to Nature* : According to nature or behaviour cost, cost is classified into :

(i) Fixed cost, (ii) Variable cost, and (iii) Semi fixed or Semi-variable cost.

(i) *Fixed cost* : "A cost which tends to be unaffected by variation in volume of output. Fixed cost depend mainly on the effluxion of time and do not vary directly with volume or rate of output. Fixed costs are sometimes referred to as period costs in systems of Direct Costing." I.C.M.A.

Fixed costs or Fixed expenses are those which do not change with the increase or decrease in production.

(ii) *Variable Cost* : "A cost which tends to vary directly with volume of output. Variable costs are sometimes referred to as direct costs in systems of direct costing." I.C.M.A.

Variable costs or expenses are those which increase in direct proportion with the increase in production.

(iii) *Semi-fixed or Semi-Variable Cost* : "A cost which is partly fixed and partly variable." I.C.M.A.

This is the cost which change but not in direct proportion to the increase or decrease in the production output, e.g. Repairs and Maintenance, Depreciation etc.

4. *According to Controllability* : The costs can be divided into :

(i) Controllable cost, and (ii) Uncontrollable cost.

(i) *Controllable Costs* : The costs which can be controlled by a 'specified member' who is an important link in the management are controllable cost. All variable costs are controllable.

(ii) *Uncontrollable Costs* : Uncontrollable Costs are those costs which can not be minimised by a 'specified member' who is an important link in the management are uncontrollable costs. All uncontrollable costs are fixed costs.

*According to Normality* : Normal costs are those which are incurred at a given level of output under normal conditions.

*Abnormal Cost* : are those which are incurred at a given level of output under abnormal conditions. They are incurred in exceptional circumstances and as such they are not charged to the cost of production but to Costing Profit & Loss Account.



*According to relevance to decision making and control* : The costs classified on this basis are the following :

*Shut-down Cost* : A cost which will be required to be incurred even through a plant is closed or shut-down for a temporary period e.g., Depreciation, Repairs and Maintenance expenses, the cost of rent and rates etc.

*Sink Costs* : These costs are incurred in the past and have no effect on future decision making e.g. when replacement of an asset is under consideration the undepreciated value of existing asset it is sink cost and so irrelevant for decision making.

*Opportunity Cost* : Costs which are related to benefits, sacrificed or forgone are human opportunity costs. When the management adopts one course of action, it may have to give up an alternative course. The benefits which might accrue from the alternative would be regarded as the opportunity cost of choosing the particular course.

*Imputed Cost* : It is hypothetical cost required to be considered to make costs comparable. For instance interest on capital is after required to be included in the cost of projects even though it is not actually payable.

*Out-of-Pocket Cost* : A cost which will have to be paid to outsiders as against costs such as depreciation, which do not require any cash payment. This cost is relevant in fixation of prices during trade recession or in make or buy decisions.

### Methods of Costing

Since the nature of work done by various firms is different, it naturally follows that the exact method employed to ascertain costs per unit would depend on the nature of the business. The following are the principal methods :—

(1) *Job Costing*. Work may be performed against individual orders from the customer, as in the case of motor workshop undertaking repairs of cars or in the case of a printing press undertaking printing jobs of different types. A factory may also produce different types of goods against orders. The production may also be undertaken against 'stock' order, i.e. for keeping the goods in the stock for ready supply of customers' requirements. In all these cases the best costing results can be obtained by giving a distinct job number to each order in the factory or workshop and by opening an account to which all expenditure on the job is debited. This will enable us to know the cost of undertaking a particular job. Separate Cost Accounting books are necessary.

(2) *Batch Costing*. Factories which have to produce a large number of parts in order to make a product undertake the production of each part in batches. For example, a bicycle factory may produce 10,000 handles at one time and then take up the manufacture of other parts. When this supply of handles is exhausted another lot of handles will be made. Thus production is made in batches. The cost of each batch is ascertained separately and the method is known as batch costing. It is similar to job costs.

(3) *Contract or Terminal Costing*. This term applies to the system of costing which relates to business concentrating on the completion of big contracts only. Since all the energies of the business are devoted to one or two contracts, the compilation of costs incurred is



comparatively simple although the nature of contract costs is not different from job costs. A 'job' is a small contract ; a 'contract' is a big job. Costing information can be obtained from financial books themselves, if suitably modelled.

(4) *Single or Output Costing.* This method is applied where there is only one product as in the case of a brewery or a colliery. As in case of contract costs, the financial books themselves can be made to yield details to make up the cost sheets. No separate set of book is generally required and costing information is presented in the form of a statement known as Cost Sheet.

(5) *Process Costing.* When a product passes through distinct stages or processes, each having a bearing on the total cost of production or each yielding valuable by-products or each causing considerable wastage of materials, finding out the cost of each process will yield good results. For example, in case of oil, there are three distinct processes—crushing, refining and finishing. Allocating expenditure to each process will give valuable information. This method is known as process costing.

(6) *Operation Costing.* This is used in case of mechanical products. Generally, many operations are necessary to make an article. For example, if cycle mud-guards are to be made the steel sheets will first be cut into proper strips and then shaped according to the designs and then machined and then polished. Each one of these is an operation and it is possible to find out the cost of each operation separately. The cost of the mud-guard can be found out by adding the cost of these operations. If this is done it is known as operation costs. There is really not much difference between process costing and operation costing.

(7) *Operating Costing.* Where business does not produce tangible goods but renders some service, the system of costing would be known as operating cost. A transport company does not produce any article but it carries goods or passengers. It should know the cost per tonne-kilometre i.e. cost of carrying one tonne of goods one kilometre; or the cost per passenger-km—the cost of carrying one passenger one km. In an electricity concern cost would be ascertained per kilowatt hour. The system of finding the cost would be similar to that of single or output costing

(8) *Departemental Costing.* A factory may be divided into a number of departments and sometimes good results are obtained by allocating expenditure first to different departments and then to the different products manufactured in that department. It will be seen later that departmental costing, as this is known, is generally advantageous for the purpose of estimating and allocating expenses correctly.

(9) *Multiple Costing.* The method (a combination of two or more methods) is followed where the final product consists of a number of separate parts, e.g., bicycle, radio set, motor car, etc. The cost of each part has to be ascertained (through batch or job costing) and then the cost of assembling the part will be tabulated. The cost of the assembly department will be more or less on the lines of single or output costing. The total cost of the final product will consist of the cost of all the parts plus the cost of assembling them.

### SELF CHECK TEST

A company manufactures steel chairs on a large scale. Below is given a list of items of various expenses, though it is not exhaustive :—

- (i) steel tubing
- (ii) wages paid to moulders
- (iii) cane used for seats
- (iv) polish
- (v) salary paid to accountant
- (vi) salary of salesmen
- (vii) rent of godown where ready chairs are stocked
- (viii) wages paid to fitters
- (ix) power to drive machines
- (x) depreciation on machines
- (xi) rent of office
- (xii) lighting in the workshop
- (xiii) lighting for the neonsing.

(a) Which of the above listed expenses are direct?

(b) List the selling and distribution expenses?

(c) Which of the expenses are controllable?

a. (i) to (iii), (viii)

b. (vi), (vii), (xiii)

c. (i) to (iii), (viii), (ix)



## LESSON 2

### MATERIALS PROCEDURES

In almost all industries, materials are of great importance ; the proportion of material to the total cost unit may be substantial, in some cases it is even as high as 50% to 60%. Even if the proportion is not as high as that, it is necessary to exercise full control over the use of this element of cost.

This has the following implications :—

- (i) While purchasing the material, care should be taken to see that quality purchased is the one which is required for the product. The quality should neither be too inferior nor too superior; in the first case the quality of the main product will be low and in the second case the price paid for the materials will be unnecessarily high.
- (ii) The price paid for the materials purchased should be as low as possible.
- (iii) There should be no loss while materials are being kept in the godown or in the store.
- (iv) The loss during the process of manufacture should be kept as low as possible.
- (v) Information about the availability of stores should always be available in order to help planning of production.
- (vi) All the materials and stores of various types should be available all the time so that there is no interruption in the production process.

Usually in every industrial concern, there is a Purchase Department whose job is to purchase the materials of right quality in right quantity and at the right time, paying only that price which is prevailing in the market. There is also usually a store-keeper whose job is to receive the materials, keep them in good condition and safe custody and issue them when they are required. He is also accountable for balance of the material in hand.

*Purchase Department.* This department maintains a list of all materials and stores, small or big, required in the factory. It is the duty of this department to see fresh stock are obtained before the old ones are exhausted. It is also the duty of this department to see that there is no overstocking.

When such a system is in operation, the people working in the store or those who come into the store will be under a moral pressure not to resort to pilferage or any other mischievous practice.

*Minimum and Maximum quantities.* The store-keeper also plays an important role in this respect. The work involves the fixing of minimum and maximum limits for each item in the store. *Minimum Stock* is that quantity on the reaching of which a fresh order for replenishment should be placed. For example, if it is considered proper that for welding rods the



minimum oil stock is 100 kg., then as soon as the actual stock approaches this figure a new order must be sent out so that new supplies are received before the oil stock is exhausted. Minimum stock usually is fixed on the following basis .

- (i) *Determining the lead time*, i.e., the time which will elapse between the placing of the order and the actual receipt of materials.
- (ii) *Determining the average consumption during that period*. Suppose average weekly consumption of an item is 20 kg. and the lead time is six weeks, then the total consumption required during the lead time will be 120 kg.
- (iii) Adding to the figure arrived at (ii) a *margin of safety*. Suppose it is considered that 40 kg. would be safe in this respect as margin, the minimum quantity will be 160 kg. Now orders will be placed as soon as the actual stock come near this figure of 160 kg.

In this respect, quite a few terms are used, but meaning of those terms are not much different. One of the terms is *re-order level*. Really speaking, it means the same minimum stock as described above. If a firm is using both the terms, *re-order level* and *minimum stock*, then by *minimum stock* it will be meant a figure without the safety margin, when issues will be restricted to only important jobs. Some firms use the term *danger level* also : in that case, the firm will name a figure of stock ; if the actual reaches that level, the firm will take emergency action to replenish the stock.

As against *minimum stock*, whose purpose is to see that the production process go on without interruption, firms also determine what is known as *maximum stock*. The purpose determining this figure is to see that there is no overstocking.

- (i) It obviously means locking up of a large amount of capital which could either be used otherwise for some profitable purpose or it would mean loss of interest.
- (ii) There may be deterioration in quality when materials are kept in store for a long time.
- (iii) When large quantities are in stock, people are encouraged to steal since they will feel that small thefts will not be detected easily.
- (iv) There is the danger of obsolescence, i.e., it is possible that after some time the firm may not need the material and therefore the material will have to be disposed off at a high loss.

Overstocking is thus very costly and firms generally try to avoid it through fixing maximum limits over which actual stock will not be allowed to rise. While fixing the limit, the facts that are to be taken into account are the following :—

- (i) The funds that are available.
- (ii) Future production plans. Plans should be firm and not mere vague ideas the firm would like to do in the future.
- (iii) The storage space that is available.
- (iv) When the prices are expected to rise, then larger quantities will be kept in stock.



(v) Conditions of supply : If it is thought that getting supplies in future will become more difficult, then larger quantities may be kept.

It may be noted that what is said above about maximum stock should apply only to ordinary materials and stores but it would not apply to spares of machines which are in use. As long as a machine is in use, the spares of that should be kept in stock since often later on it becomes difficult to get the spares.

In case, it is found that a material has not been used for a long time, and that large stocks are being kept unnecessarily, action should be taken to immediately dispose off the excess quantity.

### Basis of Stores Controls

The importance of stores control in modern industry has led to the use of various techniques and devices to make it efficient. We will discuss some of these devices which are generally adopted by large concerns.

#### 1. Selling Inventory Level

Store keeping essentially means keeping adequate store at minimum cost. For this purpose it is necessary to decide when to requisition the purchase of various items of materials, and what quality to requisition. If the average rate of daily consumption and the normal delivery (lead time) are known, adequate supply of materials can be ensured and cost of storage minimised by fixing in advance (i) a *minimum level* of inventory below which the quantity of materials in store will not fall, (ii) a *re-order level* which will indicate when requisition for purchase should be issued, (iii) a *maximum level* beyond which the stock will not rise, and (iv) the *re-order quantity* which will prevent under-stocking and over-stocking of any item and minimise the cost of storage.

#### Minimum Level

The minimum level of a particular items that should be in stock to meet unforeseen contingencies is generally fixed on the basis of (a) the maximum rate of consumption ; and (b) the minimum time which would be required to arrange delivery under top priority conditions. Thus, for example, if the maximum usage is 200 units per week and emergency delivery can be obtained in 3 weeks, the minimum level of inventory will be fixed at  $(200 \times 3)$  or 600 units. The minimum level of stock falls below the minimum, the management must arrange fresh supplies at once on top priority.

#### Re-order Level

The Re-order level is the level of inventory at which purchase requisition should be issued. This is determined by reference to (a) the average rate of consumption, (b) the normal delivery time, (c) the minimum level decided to be maintained, and (d) an allowance or safety margin to insure against contingencies like delay in normal delivery, excessive spoilage use, etc. If the normal usage is (say) 150 units per week, average delivery time is 4 weeks the minimum level is fixed at 600 units and a safety margin of 150 units is decided upon, the re-order level should be fixed at  $600 + (150 \times 4) + 150$  i.e. 1350 units.

#### Maximum Level

The maximum level of stock is the upper limit beyond which the quantity of any item



held in stock should not rise. This level is fixed in advance to prevent over-stocking of any material. However, the chief executive may authorise stocks to be held above the maximum limit under special circumstances e.g., to take advantage of favourable purchasing condition, or in the face anticipated rise of prices. The maximum level of stock is fixed after due consideration of the storage costs of holding excessive stock, storage space available, risks of obsolescence, risks of deterioration and average rate of consumption. In ordinary practice, it is determined as follows :

Maximum level : Re-order Level—Minimum usage during quickest delivery period + Re-order quantity (given by the number of weeks requirement to be ordered at a time).

Supposing, 8 weeks normal consumption is ordered at a time, the normal usage is 150 units per week; minimum usage is 100 units per week, quickest delivery period is 4 weeks, and the re-order level is fixed at 1350 units, the *maximum level* of inventory will be ; 1350 units—(100 × 4) + (150 × 8) or 2,150 units.

#### Average inventory in hand

The average inventory in hand may be computed as follows :

Average Inventory : Re-order level—Normal usage during average delivery time + half the re-order quantity.

Given the above data the average inventory in hand will be equal (1,350—150 × 8) + 1,200/2 i.e. 750 units.

#### Re-order Quantity

The re-order quantity (also known as Economic Order-Quantity) is obtained by *balancing the saving in costs from large orders* (e.g. special discounts, economy of bulk transport, save in cost of placing orders) and the increased carrying cost of larger inventory holding (rent of storage space, cost of insurance, opportunity cost of tying up large working capital etc.) The Re-order quantity can be computed from : the formula given below :

$$R.O.Q = \sqrt{\frac{2AS}{IC}}$$

Where A is the normal consumption for a given period (in physical units) :

S is the order cost per lot;

C is the invoice of materials per unit;

I is the invoice cost of inventory expressed as ratio of the invoice cost of materials.

**Initiation of purchase process :** When the actual stock reaches the minimum level or the records level, the form given below is filled up and sent to the Purchase Manager.



Form No. 2

No.....

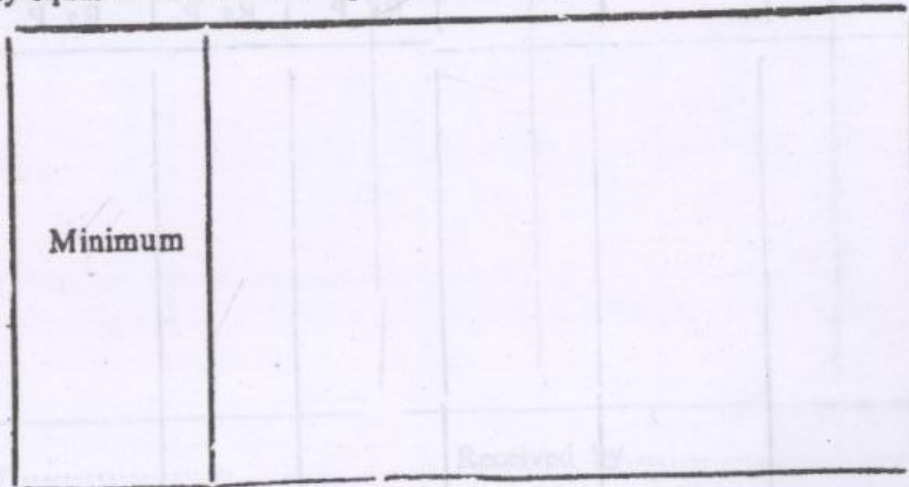
Date.....

Purchase Requisition (OR INDENT)

Serial No.	Name of the Article required	Symbol or Code	Present Stock	Minimum Quantity	Maximum Quantity	Remarks

.....  
Storekeeper

*Double Bin System.* Some firms divide the bin (the placement for storing the article) physically in two portions—one, the smaller one, to store the quantity equal to the minimum quantity (or ordering level) and the other to store the remaining quantity. The staff has instructions not to use the quantity in the smaller portion as long as there is stock in the other portion. As soon as it becomes necessary to use the quantity marked as minimum, it is a signal to place a fresh order. When the fresh stock is received, care will be exercised to see that quantity equal to the minimum quantity is segregated.



.....  
Bin

**Duty of purchase Department :** On receipt of the form (Purchase Requisitions or Indent), it becomes the duty of the purchase manager to take steps to procure the goods. The normal procedure is as follows :

- (i) *Inviting quotations* from various prospective suppliers.
- (ii) *Comparing the quotations.* The comparison must take into account (i) the quality of the goods offered ; (ii) the quantity ; (iii) the promised date of delivery ; and (iv) the price quoted including expenses like freight, etc., that the purchaser will have to pay.
- (iii) *Selecting the firm* with whom the order will be placed and making out the order ; sending one copy to the Storekeeper, as intimation that the goods may be expected.
- (iv) *Pursuing the order* to see that the material is received on time.

**Receipts :** On receipt of materials, the store-keeper should examine the quantity and the quality. These should be the same as have been mentioned in the order. If the quality is not upto the mark, the material should not be accepted and the supplier should be informed accordingly so that he can take it back or the purchase manager should be informed about the situation ; it is possible that material may be accepted and a price concession obtained from the supplier. If there is a discrepancy between the actual quantity received and the quantity order, the Purchase Manager should again be informed. If both the quantity and quality are found suitable the store-keeper should make out Goods Receipt Note whose form is given below :

**Form No. 3**  
**STORES (OR GOODS) RECEIPTS NOTE**

No.....

Supplier.....

Order No. and Date.....

Date.....

Serial	Description	Symbol	Quantity	Amount			Remarks
				Due to Supplier	Charge	Total	
				Rs. P.	Rs. P.	Rs. P.	

Received by..... Inspected by..... Bin Cards posted by.....  
Store-keeper..... Costed by..... Stores Ledger posted by.....



He should fill the columns only regarding the quantities leaving the amount columns blank. On his signing the note, he affirms that he has received the materials mentioned in it and he becomes responsible for them.

In the store, a particular place called bin should be allotted to a particular material and all supplies of that material should be kept only in that place. A bin may be a corner in the godown or a rack or a drawer or any other suitable place for the material concerned. In very big godowns, bins are allotted code number so that by looking at the number, one can see where exactly the bin would be and proceed to the place and find the material concerned.

**Issues :** The store-keeper would not issue materials unless there is a proper authorisation for it. Usually, the foreman or a department is authorised to ask the store-keeper to issue the materials. For this purpose, he fills the form which is given below :

**Form No. 4**

**MATERIALS (OR STORES) REQUISITION**

No.....

Department.....

Date.....

Job No.....

Quantity	Description	Symbol	Bin Card No.	Store Ledger Folio	Rate	Amount Rs. P.

Authorised by.....

Received by.....

Storekeeper's Signature.....

Calculations checked by.....

Materials Abstract by.....

The foreman will enter the particulars of the material and also the quantity required. He must also mention the purpose for which it is required that is to say the job number or the work order number concerned. When the requisition slip is sent to the store-keeper, he will issue the material on taking the signatures or thumb impression of the workman who has come to take the materials. The store-keeper will collect all the requisition slips for the day.

**Record :** The store-keeper is responsible for the balance of the materials and stores which has been entrusted to his care. For this purpose, he maintains a record on what is called the bin card whose ruling is given below :

**Form No. 5  
BIN CARD**

No.....  
Name of the article.....  
Symbol.....unit.....  
Bin No.....  
Stores Ledger Folio.....

Maximum Quantity.....  
Minimum Quantity.....  
Previous Year's.....  
Consumption.....

ORDERED			Date	Refer- ence	Recei- ved	Issued	Bala- nce	Date che- cked	Remarks
No. & Date	Qty.	Date Received							
RESERVED									
Job No.	Qty.	Issued Date							

Received by ..... Bin Card posted by .....  
Store-keeper ..... Stores Ledger posted by .....



There are various columns in this but basically there are three columns—one to record the receipt of materials, the second to record the issues and the third to record the balance. After every receipt as indicated by the goods receipt note and every issue as indicated by the requisition slip, the store-keeper should make an entry and arrive at the balance. After doing this, he has to forward both the goods receipt notes and the requisition slips to the store ledger section which will arrive at the accounts involved and fill the amount columns in these two types of vouchers.

It may be noted that if the cards whose form is given above are kept along with the materials in the bin itself, it would be known as a bin card. But often all these cards are kept together in the office of the store-keeper in a drawer it is then usual to call them as stock control cards. But the rulings of the two cards is absolutely the same and the purpose of both is to enable the store-keeper to have a record of receipts, issues and balance of every item which has been entrusted to his care.

*Note* : A stores ledger will also be maintained ; it is a record in terms of both quantities and amounts. It will be discussed along with issues of materials.

**Continuous Stock Taking** : Though theoretically there is no reason why the actual stock should be different from the figures shown on the bin card, in actual practice it often happens that there is a difference. This is because of errors on entries or errors in issues or loss or wastages which may have occurred. A moment's thought will show that if the actual stock is much different from the stock shown by the bin card then the information on the bin card becomes rather unreliable. It is necessary, therefore, to see that the discrepancy between the actual stock and a stock as per the bin card should be nil. For this purpose, it is recommended that the store-keeper or some other officer in the company should check 20 to 25 items every day by rotation and compare their actual stocks with the figures shown on the bin card. If this is done, then all items in the store will be checked about 4 or 5 times in a year. If a discrepancy is found, the store-keeper can still remember what happened and in that case the errors can be located and rectified early.

This system can be said to have the following advantages :

- (i) The actual stock and the figure on the bin card be relied upon for purpose of planning the production or other purposes.
- (ii) It is not necessary then to close the factory for purposes of the annual stock taking, which is usual, since the bin card figures will always be represented by actual stock, the stock sheet can be prepared from the bin card.
- (iii) Store-keeper is forced to go round every bin regularly and he will then be able to see whether any damage has set in. The damage can be then immediately stopped.
- (iv) With such a system in operation, the people working in the store or those who come there will be under a moral check not to resort to pilferage or any other mischievous practice.

**N B.** The continuous stock taking system is an essential part of what is known as 'Perpetual Inventory' which means a system of keeping such records as will continuously make available information about materials and stores on hand. Chiefly, it is the bin card and the stores ledger that constitute perpetual inventory.



**Method of Pricing the issues :** There are various methods in use for pricing issues of materials or stores. But it should be noted that whatever the method for pricing the issue, *the actual issues should always be on the basis of first in first out, i.e.,* the earliest consignment on hand should be exhausted first before the next lot is touched.

The different methods used for pricing out stores are the following :—

(i) *FIFO—first in first out—Method :* In this case the assumption is that while issuing the materials the earliest consignment is used up first. On the same basis the cost of the issue of stores is arrived at. Suppose the first consignment received is of 200 units at Rs. 6 each and the second consignment is 300 units at Rs. 8 each. If 250 units are issued, the cost will be :

$$200 \text{ units at Rs. 6} = \text{Rs. } 1,200$$

$$50 \text{ units at Rs. 8} = \text{Rs. } 400$$

---


$$\text{Total} = \text{Rs. } 1,600$$


---

Under the system the prices of material issued is exactly the same as paid and, hence, the cost of jobs or products will be accurately, known, at least as regards materials. But against this there is the disadvantage that clerical labour may be excessive since every time an issue is made, the clerk will have to go through his record to find out what price is to be charged. Also it is possible that if similar jobs are undertaken on the same day or in the same week, the costs may differ simply because the materials have been taken from different lots even though the materials are of the same nature.

(ii) *LIFO—last in first out—Method :* Though in actual practice issues are made on first in first out basis, it is assumed for costing purpose some time that it was the latest consignment which was used up first and cost is arrived at accordingly. In the example given above, the cost will be 250 units at Rs. 8 or Rs. 2,000.

**Advantages :**

- (a) The issue will be priced at the market rate prevailing more or less near the date of issue. This has the advantage of ascertaining the cost at about the prevailing market price and the cost thus ascertained will enable the prices to be fixed on competitive basis.
- (b) The principle of issuing the goods at cost has not been given up.
- (c) In case of rising prices the method has the advantage of showing a lower profit which may help in saving tax to some extent. It is without reason that this method has come into use only when prices have been steadily rising.

The disadvantages of this method are the same as those of FIFO methods, namely, excessive clerical labour and different costs of similar jobs using similar materials.

(ii) *Average Cost :* There are two possibilities—simple average and weighted average. In case of simple average, the mean of the various prices is arrived at and issues are accordingly priced. In the above illustration, the mean will be Rs. 7 and the cost of 250 units issued will be Rs. 1,750.



In case of weighted average, the quantities are also taken into consideration. In the above example the weighted average will be Rs. 7.20 as shown below :—

200 units at Rs. 6	=	Rs. 1,200
300 units at Rs. 8	=	Rs. 2,400
		Rs. 3,600
		3,600
Average cost per unit	=	———— or 7.20 500

The issue will be costed at this price.

It is better to follow the weighted average. Whatever the average used the issues will be costed at the average price irrespective of the lot from which the issue is made. The average does not change with issues but it will change with a fresh supply when a new average will be calculated. This method saves clerical labour and adheres to the costing principle. In periods of fluctuating price the weighted average method will even out the fluctuations.

(iv) *Market Price* : In this method as the name implies, the cost is ignored and issues are priced at the prevailing market price.

It is claimed that where quotations have to be made, this is the best method since it would reflect the latest competitive condition. But this confuses estimating with costing. We should certainly take into account the ruling prices of materials if we are preparing to make a tender but to find out the cost of doing a job is quite different. For this purpose, the cost of materials and not their prevailing price should be used.

The method is also called Replacement Cost Method since the market price on the date of issue means the price at which present stock could be replaced by new stock.

It is also claimed for this method that it would automatically disclose efficiency or inefficiency in buying. The Stores Ledger will use cost for receipts and the market price for issues. Higher rate for issues than for receipts will disclose, efficiency in buying (and *vice versa*). This will leave a proportionately small amount for the quantity in hand. There may even be a negative amount for a positive quantity balance.

It is, however, submitted that this would unnecessarily complicate costing books, and, in any case, costing has nothing to do with profits or losses as such. This method introduces an element of profit or loss in the cost itself because of the use of market price rather than the cost for issue of materials. It is better to avoid the use of the method, even though the market price would naturally be taken into consideration at the time of sending tenders or fixing prices.

(v) *Standard Price* : In the case receipts and issued both are recorded at a predetermined price. Suppose in the above example, the standard price is Rs. 5 then even though actual prices have been Rs. 6 and Rs. 8 both receipts and issues will be recorded at Rs. 5 per unit. The extra amount paid is debited to Price Variance Account ; if later the actual price paid is less than Rs. 5, the difference will also be credited to Price Variance Account.



(vi) *Inflated Price* : When the materials are subject to inherent wastage, in other words when the actual quantity to be available for use is likely to be less than the quantity purchased, the cost may be inflated suitably by dividing the actual amount paid by the number of units likely to be available. In this manner, the expected wastage will be automatically charged to units of cost.

*Materials Abstract*. Since it is desirable to know the cost of materials used on various jobs, the requisition slips (on which Stores Ledger clerk has entered the amount) have to be analysed. The analysis is called Materials Abstract. A specimen of this is given below with assumed figures.

From No. 7.  
MATERIALS ISSUE ANALYSIS SHEET  
(Materials Abstract)

Week ending.....

Requisition slip No.	A Rs. P.	Job Nos.					Total for jobs Rs. P.	(Overheads Indirect) R. P.
		105 Rs. P.	106 Rs. P.	107 Rs. P.	108 Rs. P.	109 Rs. P.		
1	10.94		10.94				10.94	
2	11.50	11.50					11.50	
3	12.81				12.81		12.81	
4	9.00			9.00			9.00	
5	21.62		21.62				21.62	
6	16.50				16.50		16.50	
7	8.25			8.25			8.25	
8	13.50					13.50	13.50	
9	15.37	15.37					15.37	
10	6.19							6.19
11	11.94					11.94	11.94	
12	13.43							13.43
13	12.19			12.19			12.19	
Etc.	Etc.							
<b>Total</b>	<b>163.24</b>	<b>26.87</b>	<b>32.56</b>	<b>29.44</b>	<b>29.31</b>	<b>25.44</b>	<b>143.62</b>	<b>19.62</b>

**The Stores Ledger.** Firms usually maintain a stores ledger also ; its ruling is given below.



Form No. 6  
STORES LEDGER

Name of the Article.....  
Symbol.....Unit.....  
Bin No.....  
Bin Card No.....

Minimum Qty.....  
Maximum Qty.....  
Previous Year's Consumption.....  
Period of Delivery.....

ORDERED			QUANTITY				AMOUNT				
Quantity	Order	Date	Refer-ence	Rece-ipt	Issue	Bala- nce	Rece- ipt Rs. P.	Issued Rs. P.	Bala- nce Rs. P.	Rate	Remar- ks
RESERVED											
Quantity	Job No.	Issued									

The following is the record of receipt of certain materials, during the month of January;

1994

- Jan. 4 Received 200 Units @ Rs. 20 per unit
- Jan. 8 Received 150 Units @ Rs. 22 per unit
- Jan. 19 Received 100 Units @ Rs. 24 per unit
- Jan. 25 Received 200 Units @ Rs. 26 per unit

During January, 1994 the following materials were issued :—

Jan. 13.....	100
Jan. 18.....	50
Jan. 20.....	100
Jan. 23.....	100
Jan. 29.....	50
Jan. 31.....	100

Record these transactions in the Stores Ledger under FIFO method.

### STORES LEDGER

Name of the article.....	Minimum Qty.....
Symbol.....	Maximum Qty.....
Bill No.....	Ordering Level.....
Bill Card No.....	Previous year's Consumption.....
	Period of Delivery.....

RECEIPTS				ISSUE				BALANCE	
Date	Qty.	Rate Rs.	Amount Rs.	Date	Qty.	Rate Rs.	Amount	Quantity	Amount Rs.
1994				1994				200	4,000
Jan. 4	200	20	4,000	Jan. 13	100	20	2,000	350	7,300
Jan. 8	150	22	3,300	Jan. 18	50	20	1,000	250	5,300
Jan. 19	100	24	2,400	Jan. 20	100	50 × 20	2,100	200	4,300
Jan. 28	200	26	5,200			50 × 22		300	6,700
				Jan. 23	100	100 × 22	2,200	200	4,600
				Jan. 29	50	50 × 24	1,200	100	2,400
<b>TOTAL</b>	<b>650</b>		<b>14,900</b>	Jan. 31	100	50 × 24		300	7,600
						50 × 24	2,500	250	6,400
								150	3,900

This Consist of 150 Units @ 26.

The student may have noted the following :—

- The Goods Received Note is prepared and signed by the Storekeeper and sent to the Store ledger clerk. This clerk fills up the amounts columns on the Note on the basis of the invoice received from the supplier and expenses incurred. After that he makes an entry into the relevant account in the stores ledger—the quantity is entered in the quantity receipt column and the amount receipt column.



- (ii) After making the issues, the requisition slips are sent by the store-keeper to the stores ledger clerk. This clerk will open the ledger at the relevant page, ascertain the rate per unit, calculate the amount for the quantity issued and enter the figure on the requisition slip. Then he enters the quantity in the quantity issue column and the amount in the amount issue column.

After every entry he ascertains the balance both in respect of quantity and of amount.

**Illustration :**

Usnig the average cost, LIFO and FIFO record on the stores ledger account from the transactions below :

Dec. 1 Balance on hand 1,200 units @ Rs. 4.00

(Copper wire.....)

- 5 Issued 60 units on Req. No. 108  
 11 Issued 200 units on Req. No. 210  
 14 Received 800 units Receiving Report 634 Price Rs. 4.75  
 15 Issued 400 units on Req. No. 274  
 20 Return for credit 60 units found defective, received on Dec. 14  
 25 Received 1,000 units Receiving Report 712 price Rs. 5.00  
 30 Issued 640 units on Req. No. 318.

**Solution**

**Stores Ledger Account (Weighted Average Method)**

Name : Copper wire  
 Code No.  
 Bill No.

Max. Level  
 Mini. Level  
 Re-order Level

Date	Req. No.	Receipts			Issues			Balance		
		Qty.	Rate	Value	Qty.	Rate Rs.	Value Rs.	Qty.	Rate Rs.	Value Rs.
1								1,200	4.00	4,800
5	108				60	4.00	240	1,140	4.00	4,560
11	210				200	4.00	800	940	4.00	3,760
14	634	800	4.75	3,800				1,740	4.345	7,560
15	274				400	4.345	1,738	1,340	4.345	5,822
20	Return				60	4.345	260	1,280	4.345	5,562
25	712	1,000	5.00	5,000				2,280	4.632	10,562
30	318				640	4.632	2,964	1,640	4.632	7,598

## Stores Ledger Account

(The FIFO Method)

Date	Req. No.	Receipt			Issues			Balance		
		Qty.	Rate Rs.	Value Rs.	Qty.	Rate Rs.	Value Rs.	Qty.	Rate Rs.	Value Rs.
Dec. 1								1,200	4.00	4,800
5	108				60	4.00	240	1,140	4.00	4,560
11	210				200	4.00	800	940	4.00	3,760
14	634	800	4.75	3,800				940	4.00	3,760
								800	4.75	3,800
15	274				400	4.00	1,600	540	4.00	2,160
								800	4.75	3,800
20	Return				60	4.75	285	540	4.00	2,160
								740	4.75	3,515
25	712	1,000	5.00	5,000				540	4.00	2,160
								740	4.75	3,515
								1,000	5.00	5,000
30	318				540	4.00	2,160			
					100	4.75	2,475	640	4.75	3,040
								1,000	5.00	5,000
								1,640		8,040



## Stores Ledger Account

(The LIFO Method)

Date	Req. No.	Receipt			Issues			Balance		
		Qty.	Rate	Value	Qty.	Rate	Value	Qty.	Rate	Value
			Rs.	Rs.		Rs.	Rs.		Rs.	
Dec. 1							1,200	4.00	4,800	
5	108				60	4.00	240	1,140	4.00	4,560
11	210				200	4.00	800	940	4.00	3,760
14	634	800	4.75	3,800				940	4.00	3,760
								800	4.75	3,800
15	274				400	4.75	1,900	940	4.00	3,760
								400	4.75	1,900
20	Return				60	4.75	285	940	4.00	3,760
								340	4.75	1,615
25	712	1,000	5.00	5,000				940	4.00	3,760
								340	4.75	1,615
								1,000	5.00	5,000
30	318				640	5.00	3,200	940	4.00	3,760
								340	4.75	1,615
								360	5.00	1,800
								1,640		7,175

## SELF CHECK TEST

1. Fill in the blanks :

- (i) It is necessary that the quality of the materials purchase should be such as will maintain the.....of the finished product. If the quality of the materials is too,.....the firm will have to pay unnecessarily.....in the

other case there will be a ..... in ..... but the ..... of the ..... will be.....

(ii) For all items in the store two..... have to be fixed,..... and.....  
 ..... The object is to see that stocks of all items are available all the time to avoid.....  
 and to avoid.....

(iii) On receipt of materials the Store-keeper makes out the.....  
 ..... and enters the.....

(iv) Issues will be made only on the basis of the.....  
 ..... and on issue the issue column of..... will be written up.

(v) Both the Goods Received Note and the Requisition Slips are sent to the ..... who writes up the.....  
 ..... on their basis.

2. Lead time is 6 weeks ; average weekly consumption is 20 units and safety margin is 3 weeks supply. What should be the minimum stock ?

3. The following purchases were made :

			Units	@	Rs.	2 per cent
Jan.	19	500		@	Rs.	2.20 ,,
Feb.	28	400		@	Rs.	2.50 ,,
March	20	600		@	Rs.	2.50 ,,

On 1st March 700 units were issued and on 25th March 400 units were issued. What is the value of closing stock in FIFO basis ?

**Answers :**

1. (i) Quality, high, high price, saving, price, quality, product, too low.  
 (ii) Limits, minimum, maximum, interruption, in production, overstocking.  
 (iii) Goods Received Note, Bin Card.  
 (iv) Requisition. Slips, Bin Card.  
 (v) Stores Ledger Clerk, Stores Ledger.
2. 180 units.
3. Rs. 1000; Rs. 800.



## LESSON 3

### LABOUR

Labour also can be divided into two categories—direct and indirect. Direct labour is the wages payable to those workers whose time can be conveniently associated with particular jobs or products or other units of cost. For example, in a garment factory those who are actually stitching the various garments, say shirts and trousers, will be treated as direct workers. Indirect workers are those whose time cannot be conveniently associated as stated above these are workers whose services are meant for general purpose, like the workers engaged on repairs and maintenance, or in the power house or in the store, etc.

*Time-booking* : Whether the workers are direct or indirect, there is one common problem with them and that is regarding their attendance. Further, even though some of the workers will be paid on piece basis, i. e., according to the quantity of work done and not according to the time spent by them in the factory, it will still be necessary to record the time of arrival and departure of such worker. This is because of the following :

(1) It is necessary to have discipline among workers; all workers whether they are paid on time basis or piece basis, should come on time and should not be unduly absent.

(2) Sometimes enough work is not available for piece basis workers or they may have to sit idle due to some other reason, such as break-down in power. In such a case, these workers have to be paid usually on time basis, and therefore for ascertaining this time, their attendance etc., must be correctly recorded.

Thus, it will be seen that for all workers, it would be necessary to have a good system of regarding attendance.

*Methods of Recording Attendance* : Apart from the method of asking every worker to sign attendance register (or marking the arrival of a worker in the attendance register, which method can be useful only if the number of workers is very small), there are basically two methods—one by means of tokens and the other by means of time recording clocks.

*In the first method* each worker is allotted a number and a metal disc or token, bearing the worker's number, is put on a board. When the worker comes in the morning, he takes his token from the board and drops it into a box kept for the purpose. Obviously, all the tokens inside the box at a particular time will represent those who have arrived already. These workers can be marked present in the attendance register. Those who arrive after the appointed time, will have to give their tokens personally to the time-keeper and he will then record the exact time of arrival of each worker. This process may be repeated in the evening when workers are leaving. It may also be repeated if workers go out for lunch.

This method may be useful when the number of workers is not large, but it may give rise to disputes regarding the exact time of arrival. Also, there may be the evil of once worker dropping into the box not only his token but also the tokens of his friends, thus workers may be paid for time not actually spent in the factory.



*The second method* of time recording clocks is found to be useful when the number of workers is large. For each worker, a card is made out, say, for each week; the card bears the worker's number. All cards are neatly stocked in trays. When a worker arrived, he takes his cards, inserts in the time-recording clock and the clock will then print the exact time of arrival on the card. The clock similarly will record the exact time of departure. Obviously, it will be possible to record the time when the worker leaves for lunch and also when he comes back from it. This card, called Time Card, is therefore a fool-proof record of the exact time put in the workers, in the factory. This method, however, is also subject to the evil of the cards of other workers, who are not present, being inserted in the clock and thus absent workers may be marked present.

These days automatic machines are available which not only print the time of arrival and departure on the card but also can maintain a record inside themselves about the total time of the worker. Also if the rate of wages and particular of allowances and deductions are filled into the machine, it will be capable of preparing even the wages sheet.

*Duplicate Attendance* : The method described above show the method which has to be followed at the factory gate for recording attendance of workers. Usually, it is also desirable to mark the workers present once again in the particular department in which they are working. This will be very useful. Firstly, the worker, knowing that he has to get himself marked present once again, will proceed straight to his place of work and will not waste any time from the factory gate of his department; thus loitering will be checked to a large extent. Secondly, since the number of workers in a particular department will be small and the foreman of the department will be personally knowing each worker, it will be difficult for absent workers to get themselves marked present. If at the end of the month when Wages sheets are prepared, the attendance record kept by the time-keeper and that kept by the foreman of each department are compared, the accuracy of the wages sheet will be fully ensured. In such a case, it will be extremely difficult to put dummy workers on the pay roll and also to pay workers for the time for which they have not worked. It should be noted that frauds in connection with wages in the form of wages drawn for bogus workers are quite common. A firm should certainly take steps to see that this leakage is stopped. This method described above is a good method of checking frauds and errors in this respect. This method of internal control should be installed by all factories employing a large number of workers.

*Time Booking for Various Jobs* : The purpose of cost accounting is to see that the cost of individual jobs or production is correctly arrived at. This means that the time which is spent by workers on various jobs should be known. For this purpose, workers are issued with various type of time and job cards which the time taken by the workers for various job is noted. We give below the various types of cards which are in use for this purpose :—



(i) A card to record both attendance and analysis—useful when the number of workers is not large.

COMBINED TIME & JOB CARD

Worker's Name.....

Week Ending.....

Worker's No.....

Rate per hour.....

Day	Job No.	Time		Time		Amount	
		On	Off	Ordy.	Over	Rs.	P.
Monday							
Tuesday							
Wednesday							
Thursday							
Friday							
Saturday							

Foreman.....

Total

Gross Wages Rs.....

Time keeper.....

Hours.....

Entered in Wages Sheet

Deduction :

Wages Abstract written by.....

Fine.....

Insurance etc.....

Net Amount Payable Rs.....

\* These details are entered if payment is made weekly.

(ii) A card merely to analyse the time of workers :

**JOB CARD**

Worker's Name.....

Week Ending.....

Worker's No.....

Rate.....

Day	Job No.	Brief Description	Time		Time (Hours)	Amount	
			On	Off		Rs.	P.
Monday							
Tuesday							
Wednesday							
Thursday							
Friday							
Saturday							

Foreman.....

Cost Clerk.....

Wages Abstract written by.....



(ii) A card to collect at one place all the time spent on a job :

**JOB CARD**

(for one Job)

Job No.....

Week Ending.....

Description.....

Day	Worker's No.	Brief Description of work done	Time		Total Time	Rate	Amount	
			On	Off			Rs.	P.
Mon.								
Tues.								
Wed.								
Thurs.								
Fri.								
Sat.								

Total Time	Total Amount
------------	--------------

Foreman.....

Job Ledger postage by.....

(iv) A card meant for workers paid on piece basis :

PIECE WORK CARD

Worker's Name.....

Week Ending.....

Worker's No.....

Department.....

Category.....

Day	Work Performed	Job No.	No. of Units		Rate per unit	Amount		Initials	
			Tendered	Accepted		Rs.	P.	Worker	Inspector
Mon.									
Tues.									
Wed.									
Thurs.									
Fri.									
Sat.									

Foreman.....

Wages Abstract by.....

Entered on.....

Wages Sheet by.....

Wages Abstract :



## WAGES ANALYSIS SHEET (WAGES ABSTRACT)

Week Ending.....

Job Card No.	Amount		Job No.										Over-heads			
			205		206		207		208		209				Total Jobs	
	Rs.	P.	Rs.	P.	Rs.	P.	Rs.	P.	Rs.	P.	Rs.	P.	Rs.	P.		
481	45	40			45	40							Rs. 45	P. 40		
432	51	20	35	—									35	00	16	20
433	37	80	37	80									37	80		
434	44	30					44	30					44	30		
435	53	10							40	00			40	00	13	10
436	56	20					45	00	11	20			56	20		
437	48	10									48	10	48	10		
Total	336	10	72	80	45	40	89	30	51	20	48	10	306	80	29	30

*Over-time* : All workers, under the factories Act, are entitled to over-time .If on any working day they work for more than 9 hours or for more than 48 hours in any week, the rate of payment is double. Their ordinary hourly rate which should comprised not only basic but also dearness allowance and the value of any food concession which may be given to them. Thus, if a worker works for 54 hours in a week and his wage is Rs. 1.20 per hour, his over-time will be  $6 \times 2 \times 1.20$ , i. e Rs. 14.40.

It should be noted that if the worker has been working properly during the day, his efficiency or output in the extra time worked cannot be very high. Considering that payment is made at double the rate, over-time is therefore costly. Good concerns therefore try to avoid over-time as much as possible. However, even so usually there is some necessity for over-time.

The amount paid as over-time consist of elements, namely, the wages proper and the over-time allowance which is the extra payment made. The extra payment has to be treated as indirect expenses if there is a general rush of work. But if it is the customer who has responsible for the over-time, say because he insist on the work being completed very quickly then the extra payment should be treated as part of the job. If over-time is due to abnormal factors, such as prolonged break-down of machines, the over-time payment should be treated as abnormal expense and charged to Costing Profit & Loss Account.



## METHODS OF WAGE PAYMENT

There are numerous methods by which the wages of workers are calculated. But of these, the two most important methods are the time basis and the piece basis ; the time basis is older than the piece basis method.

*Time Basis Method* : In this method, it is only the time put in by the worker at his work which is considered and his wages are concerned with that. The wage rate may be so much per hour or so much per week or per month. Surely, no worker will be kept on a job if his output is extremely low but, otherwise, output is not considered. Suppose a worker is paid at the rate of Rs. 2/- per hour and in a week, he has put in 48 hours of work, he will be paid Rs. 96/- for that week.

*Advantages* : This method has the advantage of simplicity and also ensuring that the worker will receive a certain amount of money for attending the employer's work. There is another great advantage, that the worker, being in no hurry, to complete the work, will be careful about the quality of the work done and also about the use of materials and tools. In fact, wherever good workmanship is necessary and where costly tools and materials are used, it is usual to pay the workers on time basis.

*Disadvantages* : However, the workers have no incentive to increase their output, efficient workers and inefficient workers are treated alike because they are paid the same wage. The result is that the efficient workers also after some time, will lose any interest in the work and their output will also fall. When the output falls, the cost per unit will increase because the total wages paid and also the total fixed factory overheads have to be spread over the smaller quantity of output. This has the further implication that if the employer fixes his prices or submits quotations on the basis of a certain cost per unit in respect of labour and overheads, he may be disappointed later and may find that the actual costs per unit are higher. It is for this reason that the time basis method has been yielding place to the piece basis method.

*Piece Basis Method* : Under this method, the worker is paid on the basis of the quantity of output ; the actual time spent by him on doing the work is not considered. The rate of wages is also on the basis of per unit of output. Suppose, a worker is paid at the rate of 50 paise per unit. In one day he produces 20 units ; he will receive Rs. 10/- that day and if on another day, he produces only 16 units his wages will be Rs. 8/- for that particular day. This method may also be expressed on time basis but in that case the wages will be paid for the *Standard time* for the output. Suppose a worker is paid Rs. 2/- per hour and the standard time for each unit of output is  $1\frac{1}{2}$  hours. A worker produces 6 units in a day ; this means that he has done 9 hours of work, i.e.  $6 \times 1\frac{1}{2}$ , he will be paid Rs. 18/-, i.e.  $9 \times 2$ . On another day he produces only 5 units, this means that the standard time for his work is only  $7\frac{1}{2}$  hours and, therefore, this wages will only be Rs. 15/-.

*Advantages* : This method is also quite simple. It has the further advantage of giving a very good incentive to workers to increase their output since, by increasing the output, they can increase their wages. The employer has the advantage in that the fixed overheads will be spread over a large output and therefore the amount of fixed overheads per unit will be lower. In any case the wages per units are fixed and thus the employer can fix his prices with confidence the knowledge that the wages and overheads per unit will not rise.



**Disadvantages :** The method is not free from defects :

- (i) Usually, the worker will be in a great hurry and, therefore, he may ignore the quality of the work, with the result that the firm may lose reputation as regards workmanship of the goods.
- (ii) The worker will not care about proper use of tools and materials so that there will be greater damage of tools and loss of materials.
- (iii) Some workers earn very good wages in a few days and then they absent themselves without leave but that upsets the work of other workers.
- (iv) Some other workers, in their anxiety to earn extremely high wages, will work even when they are ill so that they damage their own health.
- (v) Last, but very important a danger in the piece basis method is that often the wage rates are not fixed scientifically so that later the employer may try to cut the wage rates. This will be most damaging and the workers then will never try to maximise their output.

It is extremely necessary to fix the wage rates scientifically on the basis of the time and motion study.

**Choice :** The choice between the time and piece basis methods can be made on following basis :

1. If it is difficult to measure the output of workers, then naturally they must be paid on time basis.
2. If output can be measured but the quantity of output is beyond the control of the worker, then also he should be paid on time basis.
3. If the workmanship is of very great importance, then also the proper method will be time basis.
4. If reasonable workmanship can be ensured, through proper inspection etc., and the quantity of output can be properly measured, then it will be better to put the workers on piece basis.

It may be interesting to note that in the western countries for some time past, the tendency was to switch from the time basis to piece basis, now the tendency is again to pay the workers on time basis. This is because of automation where the worker has usually no control over the quantity of output.

**Incentive Plans :** There are numerous plans which are a compromise between two methods mentioned above—the essential features are that workers are given wages at least for the time worked by them, in other words, wages on time basis are guaranteed. If they show efficient performance through saving of time they are given a bonus which is dependent on the time saved. We give below the two most important methods :

**Halsey Premium Plan :** Under this method, standard time of doing a job is determined and workers are encouraged to do the job in less than the standard time. They are given wages for the actual time they take to do the job, but if they save time they are also paid a bonus



equal to one-half of the wages of time saved. Thus if S is the standard time, T the actual time taken and R the rate of wages per hour. total earnings will be.

$$T \times R + \frac{S-T}{2} \times R$$

*Example :*

Standard Time for a job	10 hours
Actual Time	6 hours
Rate per hour	90 P

The earnings of the worker will be  $6 \times .90 + 4/2 \times .90 = \text{Rs. } 7.20$ . The hourly wage comes

to Rs. 1.20, i.e.  $\frac{7.20}{6}$

Workers object to this method on the ground that they do not get the whole benefit of the time saved by them. But the objection is not valid if the saving in time is obtained with the co-operation of management or if the standard is inexact. The system is rather easy to enforce because hourly wages for the actual time spent by the workers are guaranteed.

*Rowan Plan :* In its essence, the plan is similar to the Halsey Plan. Wages at the ordinary rate for actual time put in by a worker are guaranteed and a bonus is given if the worker saves time out of the standard time set for him. The difference in the two plans lies only in the calculation of the bonus. Under this plan the bonus is that proportion of wages of actual time taken which time saved bears to the standard time, whereas in the Halsey Plan the bonus is merely one-half of the time saved. Thus in the Rowan Plan, if standard time is denoted by S, actual time by T and hourly rate by R, the *bonus* will be :

$$T \times R \times \frac{S-T}{S}$$

and the *earnings* will be  $T \times R + \frac{S-T}{S} \times T \times R$ .

In the example given above, the worker will earn

$$6 \times .90 + 4/10 \times 6 \times 9 = 5.40 + 2.16 = \text{Rs. } 7.56.$$

The hourly rate comes to Rs. 1.26, i.e.  $\text{Rs. } 7.56 \div 6$ .

The system is also subject to the same objection as the Halsey Plan with the added objection that two workers, one very efficient and the other not quite so efficient, may earn the same bonus under certain circumstances. In the above example, where a worker saves 4 hours, his bonus is Rs. 2.16. If a worker save 6 hours, spending only 4 hours to do the job his bonus,

will also be  $\frac{6}{10} \times 4 \times 0.90$  or Rs. 2.16.



**Example :**

Standard time allowed for a job is 50 hours. The hourly rate of wage is 40 paise per hour : a dearness allowance 25 paise per hour is paid only for the actual time worked.

The actual time taken by the worker was 40 hours. Calculated total wages on :

- (1) *Time Basis ;*
- (2) *Piece Basis ;*
- (3) *Halsey Plan ; and*
- (4) *Rowan's Plan ;*

**Solution :**

	Rs.
<b>(1) Time Basis :</b>	
Basic Wages for 40 hours @ 40 P.	16.00
Dearness Allowance for 40 hours @ 25 P.	10.00
	26.00
	====
<b>(2) Piece Basis :</b>	
Basic Wages for 50 hours @ 40 P.	20.00
Dearness Allowance for 40 hours @ 25 P.	10.00
	30.00
	====
<b>(3) Halsey Plan :</b>	
Basic wages for 40 hours @ 40 P.	16.00
Bonus @ 50% of basic wages for time saved (50—40) hours, viz. 10 hours @ 20 P.	2.00
Dearness Allowance for 40 hours @ 25 P. per hour for 40 hours.	10.00
	28.00
	====
<b>(4) Rowan's Plan :</b>	
Basic wages for 40 hours @ 40 P.	16.00
Bonus for $\frac{10}{50} \times 40$ hours, viz., 8 hours @ 40 P. per hour	3.20
Dearness Allowance for 40 hours @ 25 P. per hour for 40 hours,	10.00
	29.20
	====

		Rs.
<b>Earnings per hour worked :</b>		
<i>Time Basis</i>	26.00	
	40	=0.65
<i>Piece Basis</i>	30.00	
	40	=0.75
<i>Halsey Plan</i>	28.00	
	40	=0.70
<i>Rowan Plan</i>	29.20	
	40.00	=0.73

**Group Bonus :** It is a good rule that as far as possible tasks should be allocated to individual workers so that each worker can be remunerated according to his performance. This means that as far as possible work should not be entrusted to a group of workers ; there is the danger then that some of the workers will not contribute their proper share ; the performance of the group will be rather poor and the workers who have worked conscientiously will feel disappointed.

However, in many cases work cannot be done unless workers of different types and skills-co-operate and if any incentive is to be offered, must be offered to the group as a whole. Usually, a rate is set for the task as a whole and wages on time basis are guaranteed. If work is completed expeditiously, the workers share in the excess of the set rate over wages on time basis. While dividing the bonus amongst workers care must be taken to keep into view the different skills of the workers. The method to do so is to divide the bonus in the ratio of wages on time basis. Suppose a task is allotted to the following workers jointly for Rs. 150 and the workers completed as stated below :

Worker	Time Spent	Wage rate per hour Rs.	Total wages on time basis Rs.
A	30	1.00	50.00
B	50	0.60	30.00
C	80	0.50	40.00
			120.00

The bonus is Rs. 30, i.e., Rs. 150 less Rs. 120 ; it will be divided among the three workers in the ratio of a 5/12, B 3/12, and C 4/12.

**Payment of Wages and Preparation of Wages Sheet :** (The student should also read the lessons in Auditing as regards Internal Check on Wages).

Wages Sheets should be prepared on well designed form. One form is suggested below :



## WAGES SHEET

For the Month/Week.....

Serial No.	Worker's name and Classification	Worker's No.	No. of days Attended	Rate	WAGES			DEDUCTIONS				Net Amount Payable		
					Gross Wages Rs. P.	Allowances Rs, P.	Total Rs. P.	Provident Fund Rs. P.	Employees' State Insurance Rs. P.	Fines etc. Rs. P.	Total Rs. P.			

\*In case of piece workers, the column will show quantity of work done.



For preparing the wages sheet and payment of wages, the undermentioned steps are suggested :

- (i) The time-keeper should fill in the names and numbers of workers and also, the exact time the workers have put in the factory for which they are entitled to be paid.
- (ii) An independent person, say some one working in the Account Section, should compare the time filled in by the time-keeper and that shown by the foreman of each department.
- (iii) On the basis of the department record kept for each worker, his wages rate should be entered and other columns relating to allowances and deduction filled by one clerk.
- (iv) All amounts and calculations should be checked by another clerk.
- (v) The wages sheet should then be sent to the works manager for authorisation. Before signing, the works manager should obtain a reconciliation between the gross amount of wages paid last month and the amount payable this month to ascertain that any increase is properly authorised.
- (vi) The wages sheet should then be sent to the Accounts Section where a cheque for the exact amount should be drawn. Cash should be drawn in such a manner that each worker can be paid exactly.
- (vii) The wages of worker should be put in an envelope together with a slip showing the details of wages—the gross amount and the various deductions.
- (viii) The wages should be paid only by the cashier but in the presence of the departmental foreman who should sign the sheet as token of his affirmation that wages have been paid only to the right person.
- (ix) If a worker is absent on the pay-day, either wages may be paid to person duly authorised by him or the wages should be credit to Unpaid Wages Account to be paid when the worker himself claims the wages.

It should be noted that under the payment of Wages Act, wages may be paid before the seventh of the following month if the number of workers employed is less than 1,000 and before the tenth of the following in the other case. The deductions that are permissible are for : (i) fines, (ii) absence from duty, (iii) damage or loss caused by the worker, (iv) house accommodation, (v) amenities and services provided to the worker. (vi) advances, (vii) compulsory deductions under law and (viii) dues in respect of provident fund, co-operative societies and insurance.

#### Idle Time

Idle time may be defined as the difference between the time for which the workers are paid and the time actually spent by them on production. Idle time arises only when workers are paid on time basis, because the employer pays not only for the time which the worker has devoted in work but also for the time for which the employer gets no benefit. The idle time is of two types :—

1. Normal Idle Time;
2. Abnormal Idle Time.



Normal idle time is lost in the routine course of manufacture. It is unavoidable as it is not the result of inefficiency or negligence. say, e.g.

1. Time taken by worker from the gate of the factory to the place where he is to work,
2. Time taken to do the next job on the completion of job.
- 3; Tea breaks, machine maintenance time etc.

Abnormal idle time, on the other hand, is the result of abnormal conditions. It can be avoided by proper supervision and control. It may arise due to failure of power-supply or break-down of machinery; time lost because of non-supply of materials in time; strike by workers or inefficiency of management. Whenever, the operations are inter-connected, delay in completion of operation may lead to stoppage of work in the successive operation.

### Treatment of Idle Time in Cost Accounts

Abnormal idle time is a loss and is not a part of the total cost. It should be excluded from cost accounts and should be charged directly to costing Profit & Loss A/c.

Normal idle time can be treated as follows :—

(1) By inflating wage rate so that allowance can be made for the loss of time, e.g. If workers are paid Rs. 2 per hour for 6 hours and normal idle time one hour, the wage rate is

treated as  $\frac{2 \times 6}{5} = \text{Rs. } 2.40$  Paise per hour; or

(2) Lost normal idle time may be treated works overhead.

### SELF-CHECK TEST

1. Which of the statements given below are true?

- (i) It is not necessary to insist on piece basis workers coming on time to attend the work.
- (ii) If a worker works for 10 hours a day, his weekly hours being 48, he will be paid over-time for 2 hours *i.e.* for 4 hours at ordinary rates.
- (iii) Over-time is costly since wages have to be paid at double the rates for the over-time.
- (iv) Piece-basis workers are paid on the basis of output only.
- (v) It is possible to express wages payable to piece basis workers in terms of time also.
- (vi) If proper job cards are maintained, it is not necessary to have an elaborate system about recording of attendance.
- (vii) Job Cards are analysed into the wages Abstract for ascertaining the labour cost for each job.
- (viii) The whole task of preparing the wages sheet falls on the time-keeper.

- (ix) In the case of time-basis payment, the employer gains if the output rises and vice-versa.
- (x) Under the incentive plans, the worker gets the full benefit of the time saved by him.

(True (iii), (iv), (v), (vi), (ix))

2. A worker is paid Rs. 1.50 per hour. In one week he works for 53 hours. How much will be his total wage ?

(Rs. 87)

3. The standard time for a job is 20 hours and the worker is paid Rs. 1.20 per hour. The worker completes the work in 7 hours. Ascertain the earning of the worker under the four methods stated in the lesson.

(Rs. 19.20 ; Rs. 24.00 ; Rs. 21.60 , and Rs. 23.04)

4. Draw the form used for recording both the time of attendance and the time spent on various jobs.

(See Time and Jobs Card)



## LESSON 4

### OVERHEADS (I)

We have seen that out of the total expenses, some can be treated as direct and others have to be treated as indirect. To recapitulate, direct expenses are those which can be conveniently associated with and allocated to different products, jobs or other cost units. Obvious examples of direct expense are materials and labour. Indirect expenses are expenses which cannot be associated with individual jobs, products or cost units; they are incurred for the general benefit of production and activities as a whole.

One should realise that in a modern industrial concern the total of indirect expenses may be even more than the total of direct expenses. If, for example, one sees a modern fertilizers factory, one will see a very big automatic plant with comparatively few workers working there. The total of the expenses incurred on the running and maintenance of the Plant will be much more than the total wages bill. Wherever a big sales effort has to be made, or the production process is complicated, the total of indirect expense will be most significant element of total cost. In any case, indirect expenses can never be ignored for the purpose of ascertaining cost and also for fixing prices. If for example, the price of the product is based only on materials and wages, it is possible that the price recovered from customers will not be sufficient for meeting the indirect expenses in the factory, the general office and the sales office. For ascertaining the cost, therefore, it is necessary that the direct expenses should also be treated as part of the production cost and of the total cost.

This involves two basic steps :

- (1) The collection of the amount of overheads ; in other words, gathering information about the total amount to be spent by way of indirect expenses in various categories ;
- (2) Apportioning the amount of overheads over individual jobs and products.

*Categories :* Before we consider these two questions let us see the items comprised in various categories of indirect expenses. The categories are the following :

- (i) *Factory expenses*, i.e., expenses which are incurred in factory for the purpose of production.
- (2) *Office and Administration expenses*, i.e., expenses incurred for the maintenance of the office.
- (3) *Selling and Distribution expenses*, i.e., expenses which are incurred for the purpose of obtaining orders and complying with the orders.

In very big concerns, these categories may be subdivided into further categories. For example, factory expenses may be subdivided into materials handling charges and general factory administration. Office expenses may be distinguished from administrative expenses on the basis of decision making, the cost of the facilities and salaries of the managers and their immediate staff, who are concerned with arriving at decisions, to be carried by others, will be treated as administrative expenses. Office expenses will then consist of expenses on rest of the



staff working in the general office. Selling expenses may be distinguished from distribution expenses. The former consists of expenses which are incurred for the purpose of convincing customers that they should buy this firm's products. Distribution expenses comprise items which are concerned with moving the goods from the factory premises to the customer's premises.

Whether one item will be included in one category or the other will depend on the benefit which is derived from that particular expenses. For example, salaries paid to clerks working in the factory will be factory expenses, salaries paid to clerks working in the sales office will be selling expenses, the salaries paid to clerks concerned with maintenance of record of finished goods will be distribution expenses and salaries paid to clerks working in the general office will be office expenses. In the same manner, telephone charges in connection with sales works will be selling expenses and those in connection with production work is factory expenses. One should, therefore, realise that it is the service derived from an item from the expenses concerned that will determine whether the item will be treated as factory expenses, office expenses or selling expenses.

Let us now see the various items which are included in the three categories of expenses :

*Factory Expenses* : To compile the list of items comprised in this category, one should visualise before one's eyes the factory. All expenses concerned with the factory should be treated as factory expenses. The following will be the chief list of expenses :

1. Wages paid to indirect workers such as watch and ward staff, repair staff, foreman, etc.
2. Works Manager's salary and fees paid to Directors devoting their attention to Production problems.
3. Canteen and welfare expenses.
4. Contribution to any social security schemes such as the employees' State Insurance Corporation.
5. Provident Fund contribution by the employer, unless treated as direct by inclusion in the wages rate for costing purposes.
6. Carriage inward on material purchased, if such carriage has not been included in the cost of materials.
7. Materials of small value whose accounts are not kept.
8. Buying and store-keeping expenses including value of normal losses.
9. Normal idle time wages of direct workers if this has not been charged out to job through inflation of wage rates.
10. Factory Rent or Rates.
11. Insurance of factory premises, plant, etc.
12. Factory lighting.
13. Power and fuel (coal, gas, electricity, etc.)
14. Depreciation on plant, machinery, tools, factory premises and repair of these.
15. Works stationery and cost of works telephone.



*Office and Administrative Overheads* : All expenses relating to general administration (not concerned with production or sales) will be included in "office and administrative overheads". The usual items comprised in those overheads are the following :

1. Salaries of the General Manager, Finance Manager, the Accountant, the Secretary and their staff, etc.
2. Office rent and rates, and repairs and depreciation of office premises.
3. Depreciation and repairs of and power required for office equipment.
4. Insurance of office premises and equipment.
5. Fees of Directors (other than those concerned with sales or production),
6. Telephone, telegrams and postage.
7. Printing and Stationery.
8. Audit Fees.
9. Legal charges.
10. Bank charges.

*Selling and Distribution Expenses* : Selling expenses consist of those expenses which are incurred for the purpose of convincing a customer of desirability of placing an order with the firm. These expenses, therefore, consist of the following :

- (a) Advertising.
- (b) Major portion of the Sales Manager's salary and the salaries paid to the sales staff (according to the attention devoted to creation of market).
- (c) Cost of show rooms.
- (d) The salaries and travelling expenses and commission paid to salesmen.
- (e) Commission paid to agents.

Distribution expenses are expenses incurred in moving the goods from the company's godowns to the customer's premises. These expenses would comprise the following :

- (a) All finished goods godown expenses.
- (b) Packing.
- (c) Carriage outwards including freight on goods sent for central storage or local godowns.
- (d) Insurance in transit.
- (e) Bad Debts.
- (f) Costs incurred on reconditioning empties.

*Item that are excluded* : There are some expenses which are not included in cost accounts. These are basically of two types.

1. Financial items; and
2. Items relating to appropriation of profits.

In the first category we include all those items of expenses and incomes which arise simply because the firm may have resorted to borrowing or because the firm has spare funds,



The illustrative list of items which are excluded from cost accounts on this account are as follows :

- (i) Interest paid on loans raised.
- (ii) Interest or dividend received on investment in other firms.
- (iii) Profit earned or loss suffered on sale of investments or other fixed assets.
- (iv) Speculative losses.

Appropriation of profit will be in the form of drawing or dividends paid to shareholders. These are also excluded from cost accounts. Further, income tax is not treated as an expense, though, in financial accounts, income tax will be treated like as any other item of expense.

In addition to the above list of items which are excluded from cost accounts, we should remember that all abnormal expenses and losses, i.e., expenses and losses which need not have arisen or have arisen only because of inefficiency, mischief or misfortune, have to be ignored while computing costs. It is on this account that thefts of materials, or abnormal idle time of labour are excluded. If somebody in the firm is being paid a very high salary—then, in cost accounts, only the proper salary will be included. If, for the purpose of creating a secret reserve, the firm has written off an unduly large amount by way of depreciation, then the excess amount written off will be excluded while computing costs.

The whole idea is that costs should be arrived at on a basis which is normal and applicable to firms in general, so that comparison of cost in one period with cost in another period or cost in one firm with costs with another firm may be fruitfully made.

*Notional Expenses:* Certain expenses which are normally incurred by firms may not be incurred by a particular firm. For example, one of the partners may work as factory manager but he may not be paid a salary. Also, a firm may own its own premises and therefore may not pay rent. In such cases, for cost accounting purpose, it is necessary that a reasonable amount of salary or rent, as the case may be included in expenses. Further a firm may be using machinery, whose value has been written off completely in the books but is still serviceable. In financial accounts no depreciation will be charged on such machinery. But in cost accounts a reasonable amount of depreciation will be charged. Such expenses are called *notional expenses*—expenses which normally are incurred but for some reason are not incurred by a firm. The expenses are included while arriving at cost; the amount is also later on added to the profit as an abnormal item so that the firm knows the exact reason why the profit in the particular period is as high as it is.

*Interest:* Regarding interest there is a controversy. Some people are of the opinion that interest should not be included in cost accounts but others say that it is like any other expenses and therefore, should not be ignored while computing costs. Let us see the arguments on the two sides.

First we shall see that argument in favour of including interest in cost accounts. These arguments are as follows :

1. Interest is the remuneration for use of capital just as wages are the remuneration of labour. There is no question that wages have to be treated as part of costs; therefore, interest also should be similarly treated.



2. In many cases, the true costs of an activity cannot be ascertained without inclusion of interests. There are two products : one of them sells readily as soon as production is completed and the other has to be kept in stock for a few months before it can be sold. The cost of the products really is different because in the second case money has to be invested and expense incurred in the form of interest for keeping stock. To take another example, suppose one has a lakh rupees and invested it in business and earns Rs. 9,000 from it. This is usually treated as profit but a little consideration will show that the true profit is much less. The sum of Rs. 1 lakh can be invested in the debentures of a company or it can be deposited in a bank : an interest of about Rs. 7,000 can be easily earned. Therefore, the proper profit from the business is only Rs. 2,000 i.e., Rs. 9,000 less the interest which is lost.

3. Sometimes decisions are to be made involving different amount of capital. Therefore, the decisions cannot be made properly without considering interest. Suppose a work is being done by 20 workers and there is a proposal that instead of employing the men, a machine should be installed. While computing the costs of the work done by using the machine, it will be necessary to include in the costs, the interest which will be lost on the amount to be spent on acquiring the machine. Without this the comparison of costs of work done by manual labour and by machine will not be proper.

4. Sometimes materials are available in different conditions of readiness. For example, a big furniture manufacturing company buy timber from the market already seasoned. Another company may buy standing trees and cut them down. The company will have to wait for a long-time before the timber can be used because the trees have to be allowed to remain outside to be seasoned, so that when it is used, it is completely dry. In this case much money will remain invested in the stock and the cost of this sort of timber cannot be compared with the timber brought readily from the market, without including interest in the costs.

*The argument against inclusion of interest in costing are as follows :—*

1. One company may borrow money but another company may not. The first company will pay interest and the second company will not. If interest is included in costs, the cost of production in the first company will appear to be higher than the cost in the second company. This is not proper since cost of production should reflect changes in the level of efficiency. However, this argument can be met by including interest on the whole of the capital, whether, it is borrowed or whether it is raised from the owners themselves.

2. If interest is to be allowed, it will be necessary to ascertain the amount of the capital (which must be the total capital as stated in No. 1 above). For this purpose, it will be necessary to prepare balance sheet every now and then. Further, the balance sheet has to be prepared for each department separately, since the cost for each department has to be computed. In addition, it is also necessary to select a proper rate of interest. It should be remembered that rates of interest differ greatly from company to company—on account of the risk which is involved.

All this work will be too much for the benefit which may be derived from including interest in cost. On account of practical difficulties usually interest, is not included in cost accounts. It should be remembered that no interest, whether actually paid or not, should be



included. But this does not mean that when a decision is to be made, the question is to be ignored at that time—the question should be fully kept in mind.

*Depreciation and Repairs* : Since an asset normally renders uniform service throughout its life, it is proper that the total charge in respect of depreciation and repairs should also be uniform. If the method of depreciation followed is the Diminishing Value Method, the annual depreciation will be high in the beginning but will become less and less as years pass; repairs are very low in the beginning but the amounts will increase as the asset gets older. The total of the two will thus be almost the same every year.

However, in cost accounting usually the method followed is the Straight Line Method. The annual depreciation arrived at by the formula given below :

$$\frac{\text{Original Cost—Estimated Scrap Value}}{\text{Estimated life of the asset}}$$

In this method, the amount of the depreciation will be the same each year. But the amount of repairs, as already seen will be low to begin with but will be higher and higher later. The total of depreciation and repairs thus will not be uniform. Therefore, what is done is that the repairs for the whole life of the asset are estimated and then divided by the life of the asset to give an average amount of repairs. It is this amount that is considered in cost accounts—the average repairs plus the depreciation will then be quite uniform.

It should be noted that for all assets there should be a good systematic record to show various particulars and also to indicate the amount spent on repairs each year and also the amount spent by way of overhaul, etc.

If repairs carried out by the factory itself, the cost should be arrived at in the same manner as for outside, that is, the cost should comprise materials, labour and a proper share of the other common factory expenses.

*Rent* : Normally, firms have to pay rent for premises used by them. Therefore, even if a firm owns its own premises, a reasonable charge in respect of rent should be included in cost accounts. Rent will not be actually paid but in evertheless cost should be computed as if it is paid. This is an instance of notional expenses.

### **Estimating Overheads**

It is necessary in cost accounting that the work of compiling the cost should go on along with the work itself. In other words, when a job is being done, the cost being incurred on it should be ascertained simultaneously so that, if there is any loss or wastage, it is located and step taken to remove the cause. In case of materials and labour, the requisition slips and the jobs cards will enable the firm to know the amount spent. But in respect of overheads, this task is not so easy. First of all the amounts of overheads has to be estimated—even before the period begins, good concerns will estimate the overheads for the month of October sometimes in the month of September. Afterwards, the estimated overheads are apportioned over different jobs on products. We shall first see how the amount of overheads is estimated for a period.



The essential step in this regard is that the overheads should be categories into fixed and available categories. It has already been seen in Lesson 1 that some of the expenses are not at all affected by any change in the volume of activity. For example, if more goods are produced, rent or salaries will not be affected. Such expenses are incurred on time basis and are constant per month as per annum. These expenses are also called "Period Costs" or Fixed Costs.

There are other expenses, besides material and labour, which will change almost in the same proportion in which output changes. If more goods are produced, more power will be consumed; if the output falls and if the machines run for correspondingly less time, there will be a corresponding fall in the consumption of power. Such expenses are known as "Variable Expenses" and they are constant per unit. Suppose the output in one month is 1,000 units and the variable expenses in the same month total Rs. 6,000. In the next month, the output is 1,200 units. i. e., 20% higher; the variable expenses will also be 20% higher or Rs. 7,200. The amount per unit will be Rs. 6 in both the months.

In between fixed and variable expenses, there are many expenses which may be called semi-variable. These expenses do not change in the same proportion in which output changes. For example, if output is doubled by running two shifts, depreciation chargeable on machinery will not be doubled, it will be probably only 50% higher. This is an example of a semi-variable expense where the output has made the expense to go up but not in same proportion. These are so called since they have two elements—one fixed and other variable. To take an example of depreciation again, it consists of two parts one depending on efflux of time and the other on wear and tear that depending on time is fixed and other is variable; the total of the two becomes semi-variable. This will show that we can really split up the semi-variable expenses into fixed and variable categories.

If the overheads can be split into fixed and variable categories and if the relevant quantity of output is known, it is difficult to prepare an estimate of overheads for the coming month. This is shown in the example given below :

**Example :** The following information relates to July, 1994 :

Output	10,000 units
Materials	Rs. 40,000
Labour	30,000
Factory Overheads :	20,000
Variable	
Fixed	25,000

In August, the output is expected to increase by 2,000 units; prices of materials are expected to be 5% higher. Prepare an estimate of total expenditure to be incurred in August.



Answer

Estimate of Expenditure in August, 1994

	Rs.	Rs.
Materials :		
For 10,000 units	40,000	
For 12,000 units (i.e., 20% higher)	48,000	
Add: 5% increase in prices	2,400	50,400
Labour :		
For 10,000 units	30,000	
For 12,000 units (20% higher)	6,000	36,000
Factory Overheads :		
Variable—for 10,000 units	20,000	
for 12,000 units	24,000	
Fixed	25,000	49,000
Total :		1,35,400

**Departmentalisation of Expenses :** A factory usually is divided into departments since that makes the work convenient.

If it is not, the Cost Accountant will divide the factory into imaginary departments or if a department is very big, he will divide into a number of small sub-departments. These imaginary departments or sub-departments are called *cost centres*. A cost centre may be a collection of men, a collection of machines or a group of persons.

If overheads are collected department by department, there will be the undermentioned advantages :—

- (i) Since many expenses will be separately incurred for each department, such as foremen's salaries repairs and depreciation on machines, etc., it will make for greater accuracy for each department are estimated separately.
- (ii) The nature of work done in a department may be different from the work in other departments, the most suitable method of apportionment of overheads for work can be chosen separately for each department. In one department, the proper method may be that of job costing and another single or output costing.
- (iii) For exercising control over expenses in a department, obviously it will be necessary to lay down the target figures and the actual overheads for each department.

**Common Expenses :** There will be a number of expenses common to various departments and for ascertaining the expenses of each department, the common expenses will have to be apportioned over all departments. The basis for this purpose are mentioned below :



Expenses	Basis
Time-keeper's Office Pay-roll Office Labour Welfare, etc.	Number of Workers
Works Manger's salary	Estimated time devoted to each department.
Repairs and Maintenance	Either actual amount separately ascertained for each department <i>or</i> the machine hours in each department.
Depreciation	Either actual amount separately computed for each department <i>or</i> the value of machines in justify stalled in each department.
Power	Either separate meter reading <i>or</i> machine hours in each department.
Rent	Area occupied.
Lighting, etc.	Number of points.
Storekeeping	Value of materials used.

*Production and Service Departments* : In a factory some departments will be engaged directly in the production of the goods which the firm markets. For example, in a textile mill, spinning and weaving departments are engaged in the production of cloth. Such departments are called "Production Departments". There are other departments which exists only to serve other departments, to facilitate work in them, for example, boiler house which produces steam to drive machines. No one will have a boiler house unless there are machines to drive. Such departments are called "Service Departments". Expenses of the Service Departments are apportioned over Production Departments but to begin with, for ascertaining expenses, no distinction is made between them.

### SELF CHECK TEST

1. Point out the statements which are not true out of the following :—

- (i) Indirect expenses and overheads mean the same thing.
- (ii) Rent is an office expense.
- (iii) Office expenses are mostly fixed.
- (iv) Variable expenses change in the same proportion in which output changes.
- (v) Depreciation is a semi-fixed expenses since a part of it depends on time and another on wear and tear.
- (vi) Rent is included in costs even if it is not paid.
- (vii) Interest is like other expenses and treated as part of costs.
- (viii) Cost centres are imaginary departments created by the Cost Accountant to facilitate the work of estimation of overheads.
- (ix) Service departments are not directly concerned with production of goods and hence they are not important for estimating overheads.



(x) Expenses should be estimated department by department since that facilitates control.

(Statements (i), (ii), (iii), (vii) and (ix) are not true)

2. Fill in the blanks :

.....Expenses are included even they are not incurred; expenses that are included from costs are those connected with.....policy of the company..... of profits ..... expenses or losses such as.....depreciation written off, are also excluded.

(Notional, financial, distribution, Abnormal, Excessive)

3. In a factory annual output is 1,00,000, units variable overheads total Rs. 7,00,000 and fixed overheads Rs. 5,00,000. If the output rises to 1,30,000 units, what will be the total overheads? (Rs. 14,10,000)

4. The work in respect of overheads has two main aspects, what are they?

( Collection and Apportionment)

SELF CHECK TEST

- (i) Point out the statements which are not true out of the following (10)
- (ii) Indirect expenses are overheads when the same thing is a cost to the business (10)
- (iii) Rent is an indirect expense (10)
- (iv) Office expenses are usually fixed (10)
- (v) Variable expenses change in the same proportion as which output changes (10)
- (vi) Apportionment is a fair share of expenses that a part of it depends on time and an attention wear and tear (10)
- (vii) Indirect is like other expenses and treated as part of cost (10)
- (viii) Indirect expenses are necessary for the production of goods and services (10)
- (ix) Indirect expenses are necessary for the production of goods and services (10)
- (x) Indirect expenses are necessary for the production of goods and services (10)



## LESSON 5

### OVERHEADS (II)—APPORTIONMENT

After making an estimate of overheads, technically called collection of overheads, it is necessary to apportion them over various cost units, that is, ascertain the amount which should be added to the cost of jobs or products, etc., by way of overheads. It should be noted that it would be necessary to do so in respect of all types of overheads, factory overheads, administrative overheads and selling overheads. We shall first see the methods for apportioning factory overheads.

Before we take up the methods, it would be better to see *the criteria* by which the suitability of the methods will be judged. Basically we can say that :

1. The total amount of overheads charged to various cost units should not be very much different from the actual amount spent. Suppose, the total of overheads charged to all the cost units in a month is Rs. 16,600 but the actual amount of overheads is Rs. 20,000; the methods followed probably was not correct since there is a big difference. The method would also be wrong if the actual amount of overheads were much less than the amount charged to different products. Technically, the amounts added to the costs of job or products are called "Overheads Recovered" since the prices which the customers will enable the firm to recoup whether it spent by way of materials and labour and the amount charged to the job as overheads. When the total of the amount recovered is much higher than the actual amount spent, there is said to be "over-recovery". When the amount spent is much less than the amount recovered there is "under recovery". To recapitulate, one can say that the method for apportioning overheads should be such that there should be neither too much of over-recovery nor under-recovery. It should however be noted that, since cost accounting is based to a large extent on estimates, there is bound to be small difference between the amount spent on overheads and the amount recovered; such a difference is normal and no special treatment is necessary.

2. The amount charged to different jobs or products should be fair. For example, if by way of overheads Rs. 300 is charged to Job No. 1 and Rs. 200 is charged to Job No. 2, the amount should have been arrived at an equitable basis. This has three implications, indicated below :

- (a) The amount charged to different jobs or products should have relevance to the time spent. It is quite obvious that if job No. 1 takes 4 weeks to complete and job No. 2 only 2 weeks to complete, the overheads chargeable to job No. 2 should be only half of the amount chargeable to job No. 1.
- (b) Distinction should be made between jobs done by manual labour only and those done on machines. To the cost of the first category of the jobs nothing by way of machine expenses, such as power, depreciation, etc., should be charged. Of course, to the cost of second category of jobs, a proper share of the machine expenses should be charged.
- (c) Jobs done by skilled workers should be distinguished by jobs done by unskilled workers. It is known that unskilled workers cause good deal of



wear and tear and damage to materials and also need good deal of supervision. The overheads because of them are always more than the overheads due to skilled workers. This has an important point to remember while apportioning overheads.

A method which will satisfy all the points indicated above will be a proper method. We shall now discuss various methods for apportioning factory overheads.

### Methods of Apportionment of Factory Expenses

1. *A percentage on direct materials* : Either on the basis of the actual figures for the previous months or on the basis of estimate for the current month, the percentage of factory expenses to direct materials can be ascertained. For example, if the factory expenses are Rs. 30,000 and the direct materials total Rs. 1 lakh, the percentage of factory expenses to direct materials will be 30. This percentage is applied for ascertaining the amount which is to be added to the cost of various jobs by way of factory overheads. If a job consumes materials worth Rs 5,000 whatever the amount of labour, the factory expenses chargeable to

the cost of the job will be Rs 1,500 i.e.,  $5,000 \times \frac{30}{100}$

This method is quite simple but it has a number of disadvantages. This prices of materials go on fluctuating from time to time and, therefore, the total amount of overheads charged to various jobs will also fluctuate. Since factory expenses do not normally have much relationship with direct material consumed, the use of the method will lead to under or over recovery of factory overheads.

Another important point is that the consumption of material will not indicate the amount of time which is spent on completing a job. Therefore, to charge factory overhead on the basis of the materials will mean that the most important basis on which expenses are incurred, namely time, will be ignored. This may lead to overcosting or undercosting of jobs. Another important point to be remembered, while apportioning factory overheads, is the distinction between manual work and machine work and also between the work done by skilled workers and unskilled workers. These two points are also completely ignored in the method.

Therefore, this method is not a good method. It can be used only if materials form the bulk of the total cost and also if prices of materials do not fluctuate much. Perhaps, the best example would be the making sweets of various types.

2. *A percentage of direct labour* : In this method the percentage of factory expenses to labour is arrived at, either on the basis of estimates for the current month or on the basis of previous month's figures. If direct labour totals Rs. 60,000 and factory expenses are Rs. 30,000 it is clear that the latter are 50% of the former. The percentage is applied for computing the amount of factory overheads chargeable to different jobs. If on two jobs the amount of labour involved is Rs. 500 and Rs. 700, the factory overheads chargeable to the two jobs will be Rs. 250 and Rs. 350 respectively.

This method is also simple. It has one additional very good advantage—it automatically takes the element into account since generally wages is also based on the time element.



Further the total amount of factory overheads charge do not vary very much from one period to another, therefore; the total amount of factory overheads charged to various jobs on the basis of labour also will not fluctuate much. This may mean that if this method is used, there may not be much over-recovery or under-recovery of overheads.

However, this method does not take into account the other two points regarding the distinction between manual work and machine work and also between skilled work and unskilled work.

On the whole this method is quite good and if work done in a workshop is of the same nature roughly, and the proportion of manual work and machine work remains broadly the same, the use of this method gives satisfactory results.

A further refinement of this method is when total factory expenses are divided by the total number of direct labour hours. This will give an amount of factory expenses per direct labours hours. Factory expenses will then be charged to various jobs on the basis of actual time spent on the jobs. This method may be called "Productive Hour Method".

3. *A percentage on Prime Cost* : As for the two methods given above, a percentage can be calculated between factory overheads and prime cost. The amount to be charged to different jobs in respect of factory overheads will then be calculated on the basis of this percentage. Suppose on one job the materials are Rs. 500 and labour Rs. 300, making the prime cost Rs. 800, and the percentage of factory expenses to total prime cost is 20, then the factory expenses chargeable to the particular job will be Rs. 160.

Those who favour this method claim that part of factory expenses are connected with materials and the remaining expenses are generally connected with labour; therefore, the method which is based on the two, namely, materials and labour together, will give good results. But if the criteria given by us in the beginning is applied to this method, then it will be found that this method has almost all the defects which the first method, a percentage on direct materials, has. Since materials will be included in the prime cost and since prices of materials change very much, total prime cost may change and the recovery based on prime cost may also, therefore, change. Since the actual amount spent on overheads will not change much, there may be over-recovery or under-recovery. To the extent, materials are included in prime cost, the time element is diluted. Therefore, this method also ignores time element to a large extent. It also ignores the other two points, namely, distinction between manual work and machine work and between skilled work and unskilled work and, therefore, this method is not very useful.

It has been seen above that the methods given above have ignored some of the criteria mentioned by us. To give really good results two methods are recommended. These are Machine Hour Rate and Direct Labour Hour Rate. We shall discuss these below.

6. *Machine Hour Rate*: The idea behind the Machine Hour Rate method is simple. The attempt is to find out the amount of money spent when a machine runs for one hour. Then the amount ascertained is multiplied by number of hours for which the machine is used on a job to ascertain the amount chargeable to the job by way of factory expenses. Suppose, it is known that when a machine runs for one hour, it costs, Rs. 6 and that the machine was used



on a job for 25 hours ; the amount of factory expenses to be absorbed by the job will be Rs. 150, i.e,  $25 \times 6$ .

It should be noted that Machine Hour Rate will have to be computed for each machine or group of machines performing Jobs. So compute the rate what is necessary is that the machines should be treated as a small department and the various expenses apportioned to the machine just as the apportioned among departments. The following will be the more important expenses and their basis :—

<i>Expenses</i>	<i>Basis</i>
Rent	Area occupied by the machine.
Lighting	Number of points.
Supervision	Estimated time devoted to the machine.
Insurance	Value
Depreciation	Amount ascertained for each machine separately estimated amount for each machine separately.

First of all, the fixed expenses per month are added; the fixed expenses will comprise rent, supervision, insurance, etc. The total of fixed expenses are divided by the average monthly hours which are computed by first ascertaining the annual number of hours and then dividing the number by 12. The amount thus arrived at will be fixed expenses per hour. It may be noted that there may be no saving in such expenses if the machine remains idle. To this amount the variable expenses per hour will be added namely, depreciation per hour, repairs and maintainance per hour and also power. The total will become the Machine Hour Rate.

Usually, the wages paid to the machine operator are not included in the Machine Hour Rate since the wages will be treated as direct wages. Some firms include this amount also so that they know the total amount which will be spent if the machine is used on a job for one hour. If the wages are included, the Machine Hour Rate is termed as 'Comprehensive Machine Hour Rate'. Some firms do not include this amount also so that they know the total amount which will be spent if the machine is used on a job for one hour. If the wages are included, the Machine Hour Rate is termed as 'Comprehensive Machine Hour Rate'. Some firms do not include fixed expenses at all; by Machine Hour Rate they mean only the variable expenses per hour for the machine concerned.

**Example :**

A machine costing Rs. 10,000 is expected to run for 10 years at the end of which period its scrap value is likely to be 900. Repairs during the whole life of the machine are expected to be Rs. 1,800 and the machine is expected to run 4,380 hours per year on the average. Its power consumption is 15 units per hour, the rate per unit being 5 paise. The machine occupies one-fourth of the area of the department and has two points out of a total of ten for lighting. The foreman has to devote about one-third of his time to the machine. The monthly rent of the department is Rs. 300 and the lighting charges amount to Rs. 80 per month. The foreman is paid a monthly salary of Rs. 480. Find out the machine hour rate, assuming insurance is @ 1% p.a. and the expenses on oil, etc., are Rs. 9 per month.



**Solution :**

Constant (Standing or Fixed) expenses per month:	Rs.	Rs.
Rent (one-fourth of the total)	75.00	
Lighting (one-fifth of the total)	16.00	
Foreman's salary (one-third of the total)	160.00	
Sundry Expenses—Oil, waste, etc.	9.00	
Insurance (1% on the value of the machine per year)		8.33
Total constant expenses per month		<u>268.33</u>
Total number of hours per year	4,380	
Total number of hours per month	365	
Constant expenses per hour (Rs. 268.33 ÷ 365)		0.735

**Variable Expenses per hour :**

Depreciation :	Rs.	
Original Value of the machine	10,000	
Less Scrap Value	<u>100</u>	
	9,100	
	<u>910</u>	
Depreciation per year :		
Depreciation per hour (910 ÷ 4,380)		0.208
Repairs for the whole life : Rs. 1,800 and for one hour		0.041
Power for one hour : 15 units @ 0.05		<u>0.750</u>
Machine Hour Rate		<u>1.734</u>

**Illustration :**

From the data given below, Calculate the machine hour rate :—

	Per annum Rs.
Rent of the department (space occupied by machine 1/5 of the department)	780
Lighting (number of men in the department 12, two men engaged on this machine)	288
Insurance etc.	36
Cotton Waste, oil etc.	60
Salary of foreman (one-fourth of the foreman's time is occupied by this machine and remainder equally by the other two machines)	6,000



The Cost of machine is Rs. 9,200 and it has an estimated scrap value of Rs. 200.

It is ascertained from the past experience (i) that the machine will work for 1,800 hours per annum. (ii) that it will incur expenditure of Rs. 1,125 in respect of repairs and maintenance. (iii) that it Consumes 5 units of power per hour at the cost of 6 paise per unit and (iv) that the working life of the machine will be 18,000 hrs.

### Solution

#### Computation of Machine Hour Rate

Machine No.....

	Rs.
(a) <i>Standing Charges.</i>	
Rent (1/5th of the department) Rs. 780 × 1/5	156.00
Lighting (out of 12 only 2 persons are engaged on this machine i.e. 1/6 of Rs. 288)	48.00
Foreman's salary (He devoted 1/4th of his time i.e. 1/4 × 6,000)	1,500.00
Insurance etc.	36.00
Cotton, Waste, Oil etc.	60.00
	<hr/> 1,800.00 <hr/>
Hourly rate for Standing Changes (Rs. 1,800 ÷ 1800 hrs).	1.00
(b) <i>Machine expenses or Variables</i>	
Depreciation :—	
Cost of Machine	9,200
Less : Scrap.	200
Amount to be written off	Rs. <u>9,000</u>
Hourly rate for depreciation (Rs. 9,000 ÷ 18,000) hours.	0.50
Repairs and maintenance estimated total expenditure Rs. 1,125	
Hourly rate of (1,125 ÷ 18,000 Hrs)	0.06
Power 5 units @ 6 paise per unit	0.30
<b>Machine Hour Rate</b>	<hr/> <b>1.86</b> <hr/> <hr/>



**5. Direct Labour Hour Rate :** In this case also, the amount of factor expenses pertaining to each category of workers is ascertained and is worked out per hour of the labour covered by that particular category of worker. If there are six categories, there will be six Direct Labour Hour Rates, say, one for welders, another for fitters, and so on.

The expenses are apportioned to each category of workers treating them like a cost centre. The expenses when apportioned may look like the following :

Expenses per month :	Rs.
Supervision	500
Rent and lighting	110
Depreciation of tools	180
Sundry Stores	50
Total :	840

If there are 30 workers in the category concerned, the total number of hours per month will be 6,000 that  $30 \times 8 \times 25$  being the number of days worked on the average a month and 8 being the number of hours worked per day. Rs. 840 divided by 6,000 will give 14 paise per hour. When workers of this category work on a job, the factory expenses will be charged to that job on the basis of the number of hours spent on the job by workers of that multiplied by 14 paise.

The two methods taken together will give satisfactory result. If work is done by machines, the Machine Hour Rate will be applicable and, if work is done by manual labour, it will be the Direct Labour Hour Rate which will be applied. Since Direct Labour Hour Rate will be worked out for different categories of workers, the skill of workers will be fully taken into account. In this manner, the two methods should prove to be fool-proof.

It should, however, be noted that when we work out the Machine Hour Rate or the Direct Labour Hour Rate, we leave out the number of expenses such as work manager's salary or canteen expenses or the expenses connected with the general office of the factory etc. This is because it will be very inconvenient to try to apportion these expenses also when the Machine Hour Rate and on the Direct Labour Hour Rate are worked out. Since these expense are quite important, they cannot be left out when the cost of job or a product is ascertained. The total of such expenses, thus left out should be apportioned to different jobs or products on the basis of percentage of direct labour.

#### **Office and Administrative Expenses**

There are two views regarding these expenses :-

1. That these expenses should not form part of production cost since, basically, they are period costs and are not directly connected with production. They should be charged off against the revenues of the year and no part of such expenses should be added to the value of inventory of the finished goods. If this view is taken, the amount may be debited to Cost of



Sales Account ; the Finished Goods Stock Account may be debited but, if it is so done, care should be taken to see that no part of these expenses is carried forward the next year as part of the value of stock of finished goods.

2. That these expenses are like other expenses incurred by a firm and, therefore, there is no reason why they should be excluded from production costs. Administration is concerned with both production and sales ; therefore administration expenses should first be apportioned over these two functions. The part relating to production should be treated as factory overheads will be spread over the costs of various jobs and products, as already explained. The other part, relating to sales, should be treated as part of the selling and distribution expenses, to be treated in the same manner.

Such apportionment of administrative expenses over production may not be proper since, firstly, there is no recognised basis for doing so and, secondly, administration is concerned not only with production and sales but is also concerned with a number of other things, such as research and development, relation with government, etc.

If administrative expenses are to be included in production costs, it may be better not to apportion these expenses but to apportion the amount as a whole to the cost of jobs or products. Usually this is done on the basis of work costs, as illustrated below :

**Example :** The following information is given for 1993 :—

	Rs.
Materials	1,00,000
Direct Labour	80,000
Factory Expenses	1,20,000
Office and Administrative Expenses	60,000

Ascertain the cost of a job which is likely to require material of the value of Rs. 5,000 and wages to the extent of Rs. 3,000.

#### COST SHEET FOR 1993

	Rs.
Materials	1,00,000
Direct Labour	80,000
<b>Prime Cost</b>	<b>1,80,000</b>
Factory Expenses	1,20,000
<b>Works Cost</b>	<b>3,00,000</b>
Office & Administrative Expenses	60,000
<b>Cost of Production</b>	<b>3,60,000</b>



Percentage of Factory Expenses to Direct Labour—150%, i.e.,	$1,20,000 \times 100$
	80,000

Percentage of Office and Administrative Expenses to Work cost 20% i.e.,	$60,000 \times 100$
	3,00,000

**ESTIMATED COST OF JOB NO.....**

	Rs.
Materials	5,000
Direct Labour	3,000
Prime Cost	8,000
Factory Overheads—150% of Labour	4,500
Works Cost	12,500
Office Overheads—20% of Works Cost	2,500
Cost of Production	1,5000

**Selling and Distribution Expenses :** There are three methods for apportioning selling and distribution expenses to different products. These are the following :—

1. A percentage on works cost;
2. A percentage on selling price;
3. An estimated amount for each product.

The first method is not scientific since normally there is not much connection with the effort to produce something and the effort to sell it. There are numerous products, chiefly amongst cosmetics, where the production effort is almost negligible but the selling effort is big. Therefore, to apportion selling and distribution expenses on the basis of production costs would not be proper.

The second method also is not-scientific since, again the product does not indicate the selling effort involved. Necessities of life sell readily and they do not involve much by way of sales effort but there are many other products where a big sales effort has to be made. Price will not indicate what the effort has been. Therefore, to base selling and distribution expenses chargeable to a product on the basis of price would not give good result.

In the third method what is done is that the fixed expenses connected with sales, such as salaries, paid to the sales staff and sales manager, show-room expenses, expenses of the



finished goods godown, delivery van expenses, etc., are apportioned to different products on the basis of the effort devoted to each product. For example, the finished goods godown expenses will be apportioned on the basis of the average quantity stored of, or average area occupied by each product. In the same manner, delivery van expenses can be apportioned amongst the different products on the basis of average quantity delivered. After apportioning fixed expenses, the total is divided by the number of units of the product concerned to give the fixed expenses per unit. To this figure will be added the variable expenses which will be different from product to product. These expenses will be the commission paid to salesman, packing and freight, insurance in transit, etc. The total of the fixed expenses per unit and the variable expenses per unit will give the amount to be charged in respect of each product for selling and distribution expenses.

**Over and Under-Recovery of Overheads:** When the actual amount recovered, i.e. charged to the cost of individual jobs or products is less than the actual overheads incurred, there is under-recovery or under-absorption. In the other case, when the total amount recovered by way of overheads is in excess of the actual amount spent—it will be a case of over-recovery or over-absorption.

If the amount of over or under-recovery is small it should be treated as normal and transferred to the Costing Profit and Loss Account. If, however, the amount is big, it may be treated in one of the following three ways:—

- (i) It may be carried forward to the next year and adjusted against next year's overheads.
- (ii) It may be transferred to the Costing Profit and Loss Account.
- (iii) The cost of the jobs or products, as already arrived at, may be adjusted—reduced suitably if there has been over-recovery and increased in the case of under-recovery.

The third method is the best and logical. But the amount of over or under-recovery due to abnormal factors, such as the actual output being much different from the normal output, should be transferred to the Costing Profit and Loss Account. Only for the balance of over or under-recovery, costs should be adjusted.

### SELF-CHECK TEST

1. You are given the undermentioned information relating to 1993:—

	Rs.
Direct Materials	20,00,000
Direct Labour (8,00,000 hours)	10,00,000
Machine Hours (Nos.) 5,00,000	
Factory Overheads	12,00,000

In 1993 a job will be undertaken on which it is expected that the cost of materials will be Rs. 5,600 and the number of direct labour hours will be 5,000 (machine hours will be 5,000). The average wage rate will be Rs. 1.50 P. per hour, in the case of this job.



What will be the works cost of the job if the following methods of recovery of overheads are followed ?

- (i) % on Direct Materials
- (ii) % on Direct Labour
- (iii) % on Prime Cost
- (iv) Productive Labour Hour Rate
- (v) Machine Hour Rate

(Rs. 17,960 ; Rs. 25,400 ; Rs. 20,440 ; Rs. 22,100 ; Rs. 24,600.)

2. A factory furnishes the following information for 1992 :—

	Rs.
Direct Materials	15,00,000
Direct Labour	10,00,000
Factory Expenses	1,00,000
Office and Adm. Expenses	6,60,000.

In 1993 a job costing Rs. 4,000 in materials and Rs. 3,000 in labour will be undertaken. What should be the price quoted to the customer if the profit margin is to be 20% on the selling price ?

3. Actual overheads in a factory total Rs. 6,20,000 whereas the total amount recovered is Rs. 6,21,000. What should be done ?

(Credit Costing Profit and Loss Account by Rs. 8,000.)

(i) Cost of Material Consumed : Cost of material consumed is ascertained after making adjustment for the opening stock of raw material and closing stock of raw material. If the material consumed is of direct nature, it becomes a part of Prime cost and if it is an indirect material, it becomes a part of Factory overhead. The expenses incurred on purchase of material are added to the cost of material.

(ii) Cost of Labour : Direct or indirect labour employed in production should be identified separately. This can be easily done with the help of Time and Piece work records. Similarly Direct chargeable expenses should be separately identified as they shall form part of Prime cost.

Overheads are classified into three categories, Factory, Office & Administration, Selling and Distributive overheads for Computation of Works Cost, Cost of Production and total cost.



## LESSON 6

### SINGLE OUTPUT COSTING

Output costing is the form of unit costing used when the industry produces only one product, or essentially one product though it may be in two or three grades. Industries using output costing include, therefore, dairies, quarries, breweries, brickworks and cement works.

This is very simple form of costing. Since there is only one product, there is no point making involved calculations. Under this system relevant cost data collected from various records, such as Material Abstract, Wage Abstract Time records and Cost Ledgers, are totalled and divided by the number of units produced to find the cost per unit.

This method of costing does not require a separate set of records for cost accounting. The financial accounts themselves can be made in such a way as to furnish all the necessary information regarding materials used (both as regards quality and value) Direct labour, Direct Expenses and Indirect Expenses for each period.

#### Cost sheet

Cost sheet is a periodical document which is prepared weekly, fortnightly, monthly or quarterly. It is defined as, "A Statement which provides for the assembly of the detailed cost of a centre a cost unit". Cost sheet are prepared for the use of management (i) to compare the costs of any two periods and (ii) to fix the selling price of the product.

The total cost is analysed into Prime cost, Factory Cost, Office Cost or Cost of production. The cost sheet presents the total as well as cost per unit of product-produced during the period. It may be drawn with as much details regarding costs as required. Usually, a cost sheet contains the following :—

(i) **Cost of Material Consumed** : Cost of material consumed is ascertained after making adjustment for the opening stock of raw material and closing stock of raw material. If the material consumed is of direct nature, it becomes a part of Prime cost and if it is an indirect material, it becomes a part of Factory overhead. The expenses incurred on purchase of material are added to the cost of material.

(ii) **Cost of labour** : Direct or indirect labour employed in production should be identified separately. This can be easily done with the help of Time and Piece work records. Similarly Direct chargeable expenses should be separately identified as they shall form part of Prime cost.

Overheads are classified into three categories. Factory, Office & Administration. Selling and Distributive overheads for Computation of Works Cost, Cost of Production and total cost,







## Production Statement for 30th Sept., 1987

Previous year's Figures	Particulars	Total Units Cost per unit Rs.	Production Total cost
	Raw Material consumed		
	Direct Wages		
	Direct Expenses		
	(a) <i>Prime Cost</i>		
	Add : Works or Factory Overheads		
	(b) <i>Work Cost</i>		
	Add : Office or Administration Overhead		
	(c) <i>Cost of Production</i>		
	Add : Opening stock of finished goods		
	Less : Closing stock of finished goods		
	(d) <i>Cost of Goods Sold</i>		
	Add : Selling Distribution overheads		
	(e) <i>Cost of Sales</i>		
	Profit (% on C.P. or S.P.)		
	(f) <i>Selling Price</i>		

**Production Account**  
For the year ending...

Particulars	Amount Rs.	Particulars	Amount Rs.
To Direct Materials	.....	By Cost of Production	
To Direct Labour	.....	c/d	
To Direct Expenses	.....		
To Overheads Works	.....		
"    "    " Office	.....		
To Cost of production b/d		By Closing stock of	
To Opening stock of		furnished goods	
finished goods		" Cost of goods sold	
To Cost of goods sold		c/d	
b/d			
To Selling and Distri-			
bution Overheads			
To Profits (% on C.P. or			
S.P.)			



### Treatment of Stock, Scrap and Defective Goods

1. While preparing Cost sheet or statement of Production, Stock, Scrap and Defective goods require special attention. We are explaining them below :

**Treatment of stock :** It may be classified into three broad categories :—

- (i) Raw Material
- (ii) Finished Stock
- (iii) Work in Progress

**Stock of Raw-Material :** For computation of the raw-material consumed, in purchase value of raw-material is added and the value of closing stock of raw-material is deducted.

**Stock of finished goods :** In cost of production pertaining to a particular product, the opening stock of finished goods is added and closing stock is deducted to find out the cost of goods sold.

**Stock of work in Progress :** Work-in-Progress means incomplete part of work or product. Usually such goods bear proportionate share of factory overheads besides the cost of raw-material consumed, direct wages paid. The opening and closing stock of work in-progress are adjusted in the Cost sheet, while computing the Factory cost of goods manufactured during the accounting periods.

**Treatment Defective or Rejected Production :** The production that is not as perfect as the saleable product but is capable of being rectified and brought to the required degree of perfection provided some additional expenditure is incurred. The cost of rectification is treated to be additional works overhead. On the other hand the production ; that has been totally rejected and can not be rectified. The amount so realised by the sale of these goods is used to reduce the cost of factory.

#### Illustration 1 :

The following particulars have been extracted from the books of Manufacturing Co., Ltd, Calcutta for the year ending 31st March 1993.

	Rs.
Stock of Materials as on 1st April 1992	47,000
Stock of Materials as on 31st March 1993	50,000
Materials purchased	2,08,000
Drawing office salaries	9,600
Counting House salaries	14,000
Carriage inward	8,200
Carriage outwards	5,100
Cash discount allowed	3,400
Bad-debt written off	4,700
Repairs Plant Machinery and Tools	10,600



Rent, Rates, Taxes and Insurance (Factory)	3,000
Rent, Rates, Taxes and Insurance (Office)	1,000
Travelling Expenses	3,100
Travellers Salaries and Commission	8,400
Production Wages	1,40,000
Depreciation written off on Machinery Plant and Tools	7,100
Depreciation written off on furniture	600
Director's fees	6,000
Gas and Water charges (Factory)	1,500
Gas and Water charges (Office)	300
General Charges	5,000
Manager's salary	12,000

Out of 48 working hours in a week, the time devoted by the manager to the factory and office was on average 40 hours and 8 hours respectively throughout the accounting year. Prepare a statement giving the following information.

- Prime cost
- Factory on cost and Percentage on Production wages
- Factory Cost
- General on cost and Percentage on Factory cost
- Total cost.

**Solution :**

Statement showing Total cost for the year ending 31st March, 1993

Particulars	Amount Rs.	Amount Rs.
Stock on Materials (1.4.1992)	47,000	
Material Purchased	2,08,000	
Carriage Inwards	8,200	
	2,63,200	
Less :Closing stock of materials (31.3.1993)	50,000	
Material consumed	2,13,200	
Production wages	1,40,000	
<b>PRIME COST</b>		<b>3,53,200</b>



*Add : Factory overheads*

Drawing office salaries	9,600	
Repairs of Plant, Machinery and Tools	10,600	
Rent, Rates, Taxes and Insurance (Factory)	3,000	
Depreciation written off on Machinery Plants and Tools	7,100	
Gas and Water charges (Factory)	1,500	
Manager's salary ( $12,000 \times \frac{40}{48}$ )	10,000	41,800
<b>FACTORY COST</b>		<b>3,95,000</b>

*Add : General Overheads*

Counting House salaries	14,000	
Carriage outwards	5,100	
Bad debts written off	4,700	
Rent, Rates, Taxes and Insurance (office)	1,100	
Travelling Expenses	3,100	
Traveller's salaries and Commission	8,400	
Depreciation on furniture	600	
Director's fees	6,000	
Gas and Water charges (office)	300	
General charges	5,000	
Manager's salary ( $12,000 \times \frac{8}{48}$ )	2,000	50,200
<b>Total cost</b>		<b>4,45,200</b>



Percentage of Factory on cost to Production Wages

$$\frac{41,800}{1,40,000} \times 100 = 29.85\%$$

Percentage of General on cost to Factory Cost

$$\frac{50,200}{3,95,000} \times 100 = 12.7\%$$

Note : Cash discount have not been included as it is of financial nature.

### Treatment of Scarp and By-Products

Scrap is the incidental residue from certain types of manufacture usually of small amount and of low value, recoverable without further processing. The realisable (i.e. saleable value of the scrap may be deducted from the works cost. Similarly the realisable value of by-product obtained in the course of manufacture of a product should also be deducted from the works cost.

### Illustration 2 :

The following figures are collected from the books of an Iron Foundry after the close of the year.

	Rs.
Raw Materials	
Opening stock in the begining of the year	7,000
Purchases during the year	50,000
Closing stock at the kind of the year	5,000
Direct wages	10,000
Works overhead-50% of Direct wages	

Storesoverhead on material : 10% on the cost of material. 10% of the castings were rejected being not upto specification and a sum of Rs. 400 was realised on sale as scrap.

10% of the finished castings were found to be defective in manufacture and were rectified by expenditure of additional works overhead charges to the extent of 20% on the proportionate direct wages.

The total gross output of castings during the year 1,000 tons!

Find out the manufacturing cost of the salable casting per ton.



## Solution

## Statement of Cost

	Rs.	Quantity in Tons	Amount Rs.
Opening stock of Raw-Materials	7,000		
Add : Purchases during the year	50,000		
	<u>57,000</u>		
Less : Closing Stock	5,000		
Raw Material consumed			52,000
Direct Wages			10,000
Works Overhead (50% of Direct Wages)			5,000
Stores Overhead (10% on the cost of Materials)			5,200
Total cost of Gross output		1,000	72,200
Less : Sale of rejected castings		100	400
Total cost of Net output		900	71,800
Additional works overhead			
Cost of rectifying 10% of the furnished castings found defective to the extent of 20% of the proportionate direct wages :			180*
Manufacturing cost, saleable castings (per ton Rs. 79.98 or Rs. 80 per ton app )		900	71,980

\* 10% of finished casting is 90 tons. These 90 tons have been rectified by increasing works overheads to the time of 20% of the proportionate direct wages i.e.

$$\text{Rs. } 10,000 \times 20\% \times \frac{90}{1,000} = \text{Rs. } 180$$

## Illustration 3 :

The accounts of the Modern Engineering Co. Ltd. show the following details for the year ending 31st Dec. 1993

	Rs.
Materials used	17,50,000
Manual and machine Labour wages directly chargeable	13,50,000
Works overhead Expenditure	3,71,250
Establishment and General Expenses	2,32,500



Show the works cost and total cost, the percentage that the works overhead cost bears to the Manual and Machine Labour wages and percentage that the Establishment and General Expenses bear to the works cost.

What price should the company quote to manufacture a machine which, it is estimated, will require an expenditure of Rs. 7,500 in material and Rs. 6,000 in wages so that it will yield a profit of 25% on the total cost or 20% on selling price ?

**Solution :**

**Modern Engineering Co. Ltd.**

Summary of Expenditure		Estimate for Machine	
	Rs.		Rs.
Material used	17,50,000	Material	7,500.00
Manual and Machine Labour wages (direct)	13,50,000	Wages (direct)	6,000.00
<b>PRIME COST</b>	<u>31,00,000</u>	<b>PRIME COST</b>	<u>13,500.00</u>
Works overhead Expenses	3,71,250	Works Overhead @ 27.5% on Direct wages	1,650.00
<b>Works Cost</b>	<u>34,71,250</u>	<b>WORKS COST</b>	<u>15,150.00</u>
Establishment and General Expenses	2,32,500	Office overhead @ 6.7% on Works cost	1,015.05
<b>TOTAL COST</b>	<u>37,03,750</u>		<u>16,165.05</u>
		<b>COST OF SALES</b>	
		Profit @ 25% on	4,041.26
		<b>TOTAL COST</b>	<u>20,206.31</u>
		<b>SELLING PRICE</b>	<u>20,206.31</u>
% of Works overhead on the cost of Manual and Machine Labour Wages : 27.5% % of Establishment and General Expenses on Works Cost : 6.7%			

**Illustration 4 :**

The Spencer Engineering Company Ltd. manufactured and sold 10,000 Exhaust fans in 1992. From the following particulars obtained from the records of the company.



	Rs.
Cost of Materials	1,60,000
Wages paid	2,40,000
Manufacturing Expenses	1,00,000
Salaries	1,20,000
Rent, Rates and Insurance	20,000
Selling Expenses	60,000
General Expenses	40,000
Sales	8,00,000

The company plans to manufacture 1,400 Exhaust Fans in 1993. You are required to submit a statement showing the price at which Exhaust Fans would be sold so as to show a profit of 10% on the selling price. The following additional information is supplied to you.

- (i) The Price of materials will rise by 20 percent on previous year's level.
- (ii) Wages rate will rise by 5 percent.
- (iii) Manufacturing expenses will rise in proportion to combined cost of materials and wages.
- (iv) Selling Expenses per unit will remain unchanged.
- (v) Other expenses will remain unaffected by the rise in out-put.

**Solution :**

**Production statement of Exhaust Fans**

	Production in 1992 1,000 Units		Planned Production in 1993, 1,400 Unit	
	Total	Per Unit	Total	Per Unit
	Rs.	Rs.	Rs.	Rs.
Cost of Materials	1,60,000	160	2,68,800	192
Wages	2,40,000	240	3,52,800	252
<b>PRIME COST</b>	<b>4,00,000</b>	<b>400</b>	<b>6,21,600</b>	<b>444</b>
Manufacturing exp.	1,00,000	100	1,55,400	111
<b>FACTORY COST</b>	<b>5,00,000</b>	<b>500</b>	<b>7,77,000</b>	<b>555</b>
Office and General Expenses	1,80,000	180	1,80,000	128.57
<b>COST OF PRODUCTION</b>	<b>6,80,000</b>	<b>680</b>	<b>9,57,000</b>	<b>683.57</b>
Selling Expenses	60,000	60	60,000	42.86
<b>COST OF SALES</b>	<b>7,40,000</b>	<b>740</b>	<b>10,17,000</b>	<b>726.43</b>
Profit	60,000	60	1,13,000	80.71
<b>Selling Price</b>	<b>8,00,000</b>	<b>800</b>	<b>11,30,000</b>	<b>807.14</b>



**Illustration 5**

The following details have been obtained from the Cost records of Comet Paints Limited.

	Rs.
Stock of raw materials on 1st Sept., 1993	75,000
Stock of raw materials on 30th Sept., 1993	91,500
Direct Wages	52,500
Indirect Wages	2,750
Sales	2,11,000
Work-in-progress on 1st Sept., 1993	28,000
Work-in-progress on 30th Sept., 1993	35,000
Purchases of raw materials	66,000
Factory, Rent, Rates and Power	15,000
Depreciation of Plant and Machinery	3,500
Expenses on Purchases	1,520
Carriage Outward	2,500
Advertising	3,500
Office Rent and Taxes	2,500
Traveller's Wages and Commission	6,500
Stock of Finished Goods on 1st Sept., 1993	54,000
Stock of Finished Goods on 30th Sept., 1993	31,000

Prepare a Production Statement giving the maximum possible break up of Cost and Profit.

	Rs.
Selling Price	2,11,000
Cost of Sales	1,13,000
Profit	98,000
<b>COST OF PRODUCTION</b>	<b>6,80,000</b>
Office and General Expenses	1,80,000
<b>FACTORY COST</b>	<b>8,60,000</b>
Manufacturing exp.	5,70,000
Prime Cost	2,90,000



Solution :

**Come t Paints Limited**  
**PRODUCTION STATEMENT**  
*for the month ending 30th Sept., 1993*

Stock of Raw-Material (1st Sept., 1993)	Rs. 75,000	
Add Purchases	66,000	
Expenses on Purchases	1,500	
<b>Less : Stock of Raw Material (30th Sept., 1993 )</b>	<b>1,42,500</b>	
	<b>91,500</b>	
Material Consumed		51,000
Direct Wages		52,500
		<b>1,03,500</b>
<b>PRIME COST</b>		
Add : Work in progress (1st Sept., 1993)		28,000
Factory Overheads :		
Indirect Wages	2,750	
Factory rent, rates and power	15,000	
Depreciation of Plant and Machinery	3,500	21,250
<b>Less : Work in progress (30th Sept., 1993)</b>		<b>1,52,750</b>
		<b>35,000</b>
<b>WORKS COST</b>		<b>1,17,750</b>
Office and Administrative Overheads:		
Office Rent and Taxes		2,500
		<b>1,20,250</b>
<b>COST OF PRODUCTION</b>		
Add : Stock of Finished Goods (1st Sept., 1993)		54,000
<b>Less : Stock of Finished Goods (30th Sept., 1993)</b>		<b>1,74,250</b>
		<b>31,000</b>
<b>COST OF GOODS SOLD</b>		<b>1,43,250</b>
Selling and Distribution Overheads :		
Carriage Outward	2,500	
Advertising	3,500	
Traveller's Wages and Commission	6,500	12,500
<b>COST OF SALES</b>		<b>1,55,750</b>
<b>PROFIT</b>		<b>55,250</b>
<b>SALES</b>		<b>2,11,000</b>



## LESSON 7

### JOB COSTING

*Job costing as the name suggests, is employed in organisations which work on job basis, such as Engineering organisations, contractors, made to order suppliers or which manufacture identical products in batches etc. To recognise cost with each and every job or batch, job orders are allotted a distinctive number. Materials may be supplied to jobs from the stores or purchased Directly in case of special requirements. The total cost of materials will be available from the stores ledger, wages from the wages abstract while overheads, as is the practice in other cases, charged on an estimated or pre-fixed standard rate.*

Job costing or accounting for costs on a job means keeping complete records for the accumulation of various costs and thus ascertaining total cost on a particular job. By the term job here we mean a contract, a production order or even a batch of identical products which can be manufactured simultaneously or in a single run. Job costing is used mainly in industries which manufacture products or render services against specific orders.

Every order in job costing is treated as separate and thus it is not necessary that the same manufacturing operations be carried out or the same materials be utilised in respect of each job. More than one but identical orders or identical products may be combined together to form lots or batches, each such lot or batch constituting a job order. An order or a unit, lot, or batch of a product is generally a cost unit or a job. The cost of a job is determined under the various elements i.e., labour, material and overhead inasmuch details and with as much refinement or extent of analysis as necessary, but these are always related to a specific job or order. The period of a job may be less than, or extend to more than, one accounting year.

Two important facts about job costing should be borne in mind :—

- (a) Each order or job should be continuously identifiable from the raw material stage to the completed product.
- (b) The system is very expensive because it requires a lot of clerical work in estimating costs, designing and scheduling of production. It should, therefore, be adopted when absolutely warranted.

Job costing is generally used in the following three types of industrial or manufacturing organisations.

**Specialist Organisations :** These organisations are engaged in the manufacture of specialist or jobbing products or manufacture a number of products each according to the specification of the customer. Printing, engineering and body building units are best examples of such organisations. Such organisations do not connne (nemeses) to manufacturing any uniform product for sale in the market. Generally each job has its own specifications and require different manufacturing operations, materials, labour skill etc, etc.



**II. Small Organisations :** These are organisations which manufacture identical products in small quantities and, where each product run form a group or batch. In such cases the range of products is large and no product has a run long enough to establish a product line. Due to frequent changes in the products manufactured, job costing would be suitable for determining the cost of each of the products.

**III. Multi-product Organisation :** Multi-product Organisations are generally large sized joint stock companies with heavy investments in them. Such organisations are generally organised as multi-division or unit organisations, each division or unit specialising in the manufacture of a single product or service. So, in these organisations, it is advisable to maintain records for the jobs or products manufactured by each division at a time. Thus in an engineering organisation, a division may be manufacturing simple tools in batches, lathes in another division and other sophisticated machines in the third division, paper plants, cement plants, etc., etc., in yet other divisions. In such an organisation job costing would be followed on department job or batch wise.

In short, job costing is applicable to engineering concerns, construction companies ship-building, furniture making, hardware, machine manufacturing industries, repair shops, automobile garages, and several such other industries where jobs or orders can be kept separate.

As soon as an order is received by the sales department it is communicated to the production planning department. It is the job of the production planning department to prepare a well planned job schedule. In the job plan, the materials, machines, labour and other facilities required for efficient production are stated. Also it is specified as to when the job is to be started with, the job plan is prepared with the complete information about the availability of materials, men and machines for the completion of the job. This helps in avoiding wastages, machines lying ideal or over-burdened with production order. On the other hands job schedule indicates the various operations and their sequence while working on the job. This helps in increasing efficiency of men and machines as it eliminates unnecessary operation or doubts about operations, if any. It should be noted here that in job costing in-flow of costs closely follow the production programme.

### **Advantages and Limitations of Job Costing**

#### **Advantages**

(1) The various costs of the individual jobs are available regularly, so, an idea can be found about the trend of costs of each job as and when needed.

(2) As the total cost of a job is available as soon as the job is completed so a comparison can be made with selling price of the job executed. Such a comparison can be helpful in taking a decision if or not a particular type of job should be repeated or repeated on a revised price. It also gives sufficient information about the jobs or type of jobs which are most profitable.

(3) Cost of jobs completed in the immediate past can be known without much labour. Such cost, after necessary revisions whenever necessary can form suitable basis for quotations in future for similar jobs.



(4) Job costing facilitates the application of standard costing and budgetary control for proper cost control in the organisation.

(5) Job costing is most suitable for cost-plus jobs as the price is determined on the basis of actual costs of the job with a specified margin for profit.

(6) Wastages and defectives can be easily ascertained with specific jobs which helps in determining the responsibility for future control of such wastages and minimise defectives.

### **Limitations**

(1) The system is more expensive and labour consuming as accounts are to be maintained for each individual job of the organisation. Thus there is repetition of the accounting process resulting in more office work and as a consequence of this chances of errors are increased.

(2) Job costing tells only the actual costs working under specific conditions. It does not provide necessary and scientific information for costing of the jobs to be undertaken in future unless there is standard costing in the organisation.

(3) In case of economic and political changes which affect the policies or working of organisation, comparison of cost of a job for one period with that of another becomes meaningless. Also, costs may be distorted when the number of products in different batches varies.

### **Procedure for Cost Accounting**

Once the production plan is ready then it is incorporated into a production order. Production order, which is also called as the work order or job order record is issued to work shops on which they proceed with the commencement of the production according to the information and instructions contained in the order. Usually a production order contains all the relevant information regarding production, such as detailed particulars of the job or product, the number of units to be manufactured in case of batch production, date of commencement of the production, expected date of completion, details of materials required as per the bill of materials, the operations and the various shops involved in the completion of the job, and the route the job should take. In case details regarding the above stated information is large then only a summary of the details is given in the production order while the details are given in an annexure. Every production order is assigned a number either in simple words or in codes. In any case the numbers are assigned serially according to the date of production order or the orders received from the customers.

In case the production order is for a batch or lot then the number of units included in a batch or lot would depend upon factors like the nature of product, availability of plant and other facilities, setting up costs and convenience in manufacture. It is advisable to have a batch or lot of comparatively small easily controllable number of units as in that case lesser time will be required for its completion and the costs could be determinable more conveniently and frequently. The completion of costs may prove ineffective for managerial control in case the lot production takes an unduly long time for its completion.

A production order usually contains information about the quantity of materials required and the time allowed for the operations. Sometimes even values of materials and



labour are indicated in which case a production order can also serve the purpose of a cost-sheet. Some organisations even indicate sales price, customer's name, shipping instructions etc., on the production order itself.

It is customary to prepare a production order in triplicate, one copy of it is sent to the stores for issuance of materials, another to the production department or workshop for commissioning the production programme and the third one to the costing department for compiling the cost of production on the job.

From the above discussion we can say that a production order is a written order issued to the production or manufacturing department to start the production on the job undertaken. This order is issued by the production planning department. For timely collection of the cost data on each job instructions are also issued simultaneously to the costing department to collect particulars of costs on execution of the job. Sufficient copies of every production order are prepared so that all the departments, who are in any way connected with the production work of the job, are supplied a copy each. A specimen of the usual production order is given at the end of this chapter. Additional columns may be provided for according to the requirements of the individual organisation.

In job order costing, each job forms an accounting unit to which materials, labour and overhead costs are collected by allotting job order numbers. This is done because several orders or jobs may be under the production process at the same time. The cost of each job completed for a given customer or the cost of each lot manufactured for stock and sale in future is summarised on an account sheet called a job order costsheet or merely a cost sheet. Such a cost sheet is designed to collect the cost of materials, labour and factory overheads applicable to a specific job.

Job numbers are placed on each material requisition and labour time ticket used in connection with the job. All the material requisitions and labour time tickets are totalled daily or weekly and are entered on the cost sheets. Thus a cost sheet eventually becomes a summary of all the costs involved in completing a job. Posting of data as and when they accumulate assists in control over the job while it is still in the process of manufacture.

A cost sheet is designed to summarise the amount of materials, labour and factory overheads to a specific job, although in some situations it is adequate to show the cost elements for the factory as a whole. Cost sheets differ in form, content and arrangement in each industry. Upper part of a cost sheets indicates job number, the name of the customer, a description of the items to be produced, the quantity, the date started and the date completed. In organisations with departmentalised operations, the cost sheet will show the materials, labour and factory overhead applied in each department or cost centre. Columns are provided in the cost sheet to record the predetermined (or estimated) costs alongwith the historical (i.e. actual) costs so that besides recording the actual cost a cost sheet serves as a means of preference evaluation and cost control.

Orders completed or jobs performed on the basis of customer specifications allow the computation of profit or loss on each job or order. If jobs constitute production in a lot then job order costing facilitates computation of cost per unit for purposes of inventory valuation.



It must be pointed out here that though the general principles and procedures of costing are also applicable to job costing still it would be prudent to discuss them in brief here with special reference to job costing.

**A. Cost of Materials :** To control the cost of materials effectively and thus avoid possible wastages in the manufacturing process, the production planning department prepares an estimate of the various materials, both direct and indirect, needed for the completion of the job. Such an estimate is usually prepared in the form of a *Bill of Materials*. The bill of materials is an authority to the production department to draw the materials, specified in the bill, either in the beginning itself or at various stages of production as may be necessary for the smooth flow of the work. The production department draws the necessary materials on the bill of materials, when it draws all the materials at one time, or draws on materials requisition forms if it draws the materials in parts. Also, if some materials are returned to the stores, the production department does so on a materials return form. Scrap and waste arising in the course of manufacture are returned in a similar manner. As in case of materials requisitions, the materials return notes bear the appropriate job order number. The materials requisitions and the materials return notes are costed in accordance with the usual methods of pricing materials.

A daily analysis of materials requisitions, materials return notes, and bills of materials is made and posted in the materials requisitions journal and from there to the general ledger. Direct material cost is posted on the cost sheet relating to the particular production order; indirect material cost is treated as overhead costs.

**B. Cost of Labour :** Accounting for cost of labour is comparatively simple in case of job costing as direct labour used on each job or order is by and large identifiable with each job. Accordingly, labour time is booked on time sheets, job cards or time tickets. Payments for labour may be made on any one of the usual methods like according to time, days, month, output or a combination of these. Also incentive schemes may be used for providing necessary motivation to the personnel. Thus, the cost of labour incurred on each job can be ascertained with the help of time and job cards. In case more than one jobs are in hand simultaneously then wages abstract for each job may be prepared which will show the total labour cost on each job. Indirect wages are treated as factory overheads.

**C. Factory Overheads :** For allocation of indirect costs incurred in the factory (also known as manufacturing overheads) two things are important :—

- (a) Establishment of cost centres, and
- (b) Establishment of overhead absorption rates.

The whole job or a part of it may be termed as a cost centre under job costing. The decision would be taken while keeping in mind the nature of job, operations involved and the scheduled time of completion. In any case the decision is taken while keeping in view the object that it should provide for timely and accurate cost data accumulation so that there is effective cost control and management.

The overhead absorption rates are applied either on the basis of past experience, or an estimate, or a standard rate or actuals.



In any case the overhead costs are accumulated against standing order numbers or cost centres.

**D. Work in Progress:** By work in progress we mean a job or units of product on which some work is yet to be performed before it can be treated a finished product or completed job. Work in progress is also named as work in process by some writers. The importance of computing the cost of work-in-progress arises from the fact that without it we cannot determine the actual cost of the job or units completed. When no unit on a production order has been completed, as is usual when the whole job is a single unit, then the entire cost booked on the order constitutes the work-in-progress. For finding out the total value or cost on the work in progress, the values of the total materials and labour actually used is added to by a per-determined rate of overhead absorption. The work in progress at the end of the year is shown as part of the closing stock in the trading account and the Balance sheet and it forms part of the opening stock for the following year.

For a proper and complete recording of the value of work-in-progress it is usual to open a work-in-progress account in the cost ledger. The said W. I. P. account is periodically debited with all costs direct and indirect--incurred in execution of the jobs. When a job is completed this account is credited by the value which relates to that job. Thus if the work-in-progress account pertains to only one job then it will be closed on the completion of the job but if it pertains to more than one job then this account will still show a balance relating to other uncompleted jobs.

The above discussed procedure of recording the cost is followed till the job is completed. When the job is completed a job completion ticket is prepared and forwarded to the production planning department as also to the cost office. The former takes necessary steps initiating another job in the workshop and thus utilise the available plant capacity and the labour force. The cost officer prepares a cost sheet of the completed job which will indicate the total cost of the job. If it is a case of batch or lot then the total cost divided by the number of units of the product manufactured would give cost per unit. Thus the job completion certificate certifies that no more manufacturing operations are to be carried on the job and no more expenditure are to be incurred on it and also that the cost sheet may now be closed.

#### **Job Ticket and Job Progress Advice**

In big organisations having job costing system, it is customary to prepare a job ticket on the completion of an operation on the job. Such a ticket indicates the operation number completed on a specified job. A job ticket is prepared on the completion of each operation and is issued to the production control department so that the whole production process is under a complete control and work in various workshops or machines be planned and controlled properly.

On the other hand a job progress advice is prepared on completion either of the job or a specified number of operations so that an inspection may be made for ensuring that the job is progressing satisfactorily in time and as to quality. Copies of such an advise are sent to the production planning and control department, production inspection department, cost control department etc., etc.



Cost comparisons and control in case of job costing is comparatively difficult as each job has its own specifications. Still it is advisable to adopt some suitable method for this purpose. One is comparing actual costs with the estimated once. Here also the control can be restricted only to costs of direct materials and labour as overhead costs are incurred for the organisation as a whole or for the department as a whole which may have undertaken more than one jobs at one time. So the absorption of overheads is only a guess work though certain principles are available for it. Another method is the use of standard costs. Standard costs provide a scientific basis for preparation of cost estimates of specific jobs and thus serve as a powerful tool for cost comparisons and taking necessary control measures. Thirdly, actual costs may be compared with the costs of earlier years or batches of production. It must be made clear here that an attempt to make cost comparisons would prove useless unless necessary steps for controlling the cost variances are taken in time.

#### Illustration 1:

A work order for 400 units of trousers has to pass through three different operations namely, drapering, stitching and finishing. The labour hour rates for the three operations are :—

Operation No. I—Rs. 1.00, operation No. II—Rs 1.50 and operation III—Rs. 0.50 while the total hours worked were 100, 400 and 200 respectively for operation Nos. I, II and III respectively.

The cost of materials supplied and wages for the execution of the work order were Rs. 10,000 and Rs. 4,000 respectively. After the work order has been completed, materials worth Rs. 400 are found to be surplus and are returned to stores.

Office overheads used to be 30% of works costs, but on accounts of all round rise in the cost of administration distribution and sale, there has been a 33 $\frac{1}{3}$ % rise in the office overhead expenditure.

Moreover, it is known that 10% of the production will have to be scrapped as not being up to the specification and the sale proceeds of the scrapped output will be only 30% of the cost of sales.



## PRODUCTION ORDER

Production Order No. &amp; Date :

Date Started :

Customer's reference No. :

Quantity on order :

Particulars of job :

Probable date of completion :

Department(s) :

Operations Schedule No. :

Bill of Materials No. :

Tools List No. :

Special Instruction :

Materials

Particulars	Code No.s	Quantity	Particulars	Code No.	Quantity

Labour

Date	Machine No.	Operation No.	Details	Time	Date	Machine No.	Operation No.	Details	Time

**Fig. : Production Order**







If the manufacturer wants to make a profit of 20% on sales price, find out the selling price of a unit of commodity ready for sale.

**Solution :** Statement showing the selling price of a unit.

	Rs.	Rs.
Materials used (Rs. 10,000—Rs. 400).....		9,600
Direct wages... ..		4,000
		<u>13,600</u>
<b>Prime Cost</b>		
<i>Works overhead at labour hour rates</i>		
Operation No. 1 for 100 hrs. @ Re. 1 per hour	100	
Operation No. 2 for 400 hrs. @ Rs. 1.50 per hour	600	
Operation No. 3 for 200 hrs. @ Rs. 0.50 per hour	100	800
		<u>14,400</u>
Works Cost.. ...		5,760
Office overheads at 40% of works cost		<u>20,160</u>
Office cost.....		
Less—sale proceeds of scrap (30% of 10% of Rs. 20,160)		605
		<u>19,555</u>
Total cost of the work order		4,889
Profit at 25% of total cost or 20% of sales price		<u>24,444</u>
Selling price of 400 trousers		61.11
Selling price of one trouser		<u>Rs. 61.00</u>

Or

Note : Cost calculations made to the nearest rupee.

### Illustration II

M/s Standard Eng. Co. Ltd., has undertaken a job No. SE/ 9/91 Cost ledger discloses you that the following expenses have been incurred on this job. You are required to prepare a job cost sheet and calculate the price to be charged from the customer in order to secure 30% profit on cost.

#### Additional Information based on normal capacity

	Departments		Total for the factory as a whole
	A	B	
Budgeted production in terms of direct labour hours	8,000	12,000	20,000
Budgeted variable overhead	12,000	14,400	
Budgeted fixed overhead			Rs. 20,000
<b>Job cost details</b>			
<i>Direct Materials</i>			
Cast Iron	10 kg. @ Rs. 1.50 per kg.		
Gun Metal	5 kg. @ Rs. 15 per kg.		



**Direct labour**

Department A.....20 Hrs @ Rs. 6.00 per hour  
 Department B.....15 Hrs @ Rs. 5.00 per hour

**Direct Expenses**

Special tools.....Rs. 45.00 (to be borne by the customer)

**Solution**

**Standard Eng. Co. Ltd.  
 JOB COST SHEET**

Particulars.....  
 Customer.....

Job No. SE/09/  
 Date of Delivery.....

Purchase order Ref :—

Particulars	Unit	Qty.	Rate	Total Cost
<b>(a) Direct Materials :</b>				
Cast Iron.....	Kg.	10	1.50	15.00
Gun Metal.....	Kg.	5	15.00	75.00
				90.00
<b>(b) Direct Labour</b>				
Department A	Hrs.	20	6.00	120.00
Department B	Hrs.	15	5.00	75.00
				195.00
<b>(c) Direct Expenses</b>				
Special tools (as agreed by the customer)				45.00
Prime Cost (a + b + c)				330.00
<b>Add :</b>				
<b>Applied variable overhead</b>				
Department A, 20 hrs. @ 1.50 per hour			Rs. $\left(\frac{12000}{8000}\right) = 1.5$	30.00
Department B, 15 hrs. @ Rs. 1.20 per hour			Rs. $\left(\frac{14400}{12000}\right) = 1.2$	18.00
<b>Applied Fixed overhead</b>				
35 hrs @ Rs. 1.00			Rs. $\frac{20,000}{20,000}$	35.00
<b>(d) Total overhead applied</b>				83.00
Total cost : (a + b + c + d)				413.00
Add : Profit 30% on cost				124.00
Total amount to be invoiced				537.00



## LESSON 8

### RECONCILIATION OF COST AND FINANCIAL ACCOUNTS

In big enterprises, where costs and financial accounts are kept separately, the net result (profit or loss) shown by cost records may not tally with the results obtained in the financial records. This difference in two sets or books may be due to certain reasons e.g., difference in the basis of valuation of stock, under or over absorption of overheads charges and items of expenses or loss included in one set of book only. In order to check the correctness of accounts, a reconciliation account is prepared. Such reconciliation account is prepared periodically.

Before we take the steps to reconcile the net results shown in cost books with those obtained from financial books, let us first examine the various reasons of difference in two profits :—

#### 1. Items included only in financial books.

The main items are as follows :

##### (a) *Purely financial charges*

- (i) Losses on the sale of investments, building etc ;
- (ii) Discount on issue of bonds, debentures etc ;
- (iii) Stamp duty and expenses on issue and transfer of shares ;
- (iv) Damages payable at law ;
- (v) Interest on bank loans, mortgages, debentures etc ;
- (vi) Penalties payable at law ; and
- (vii) Capital losses, etc.

##### (b) *Purely financial incomes*

- (i) Interest received on bank deposits,
- (ii) Dividend received,
- (iii) Share transfer fees,
- (iv) Rents receivable, and
- (v) Brokerage received, etc.

##### (c) *Appropriation of profits*

- (i) Charitable donations ;
- (ii) Taxes on income and profits ;
- (iii) Transfer to General Reserve or any other fund of accumulated profits e.g. Dividend Equalisation reserve ;
- (iv) Dividend paid ;



- (v) Capital Expenditure specifically charged to revenue ;
- (vi) Accounts written off, Goodwill, Preliminary Expenses, Underwriting Commission, Debenture discount etc.,

## II. Items included only in Cost Books

- (i) Interest on capital employed even when it is not actually paid ;
- (ii) Rent charges of premises owned by the firm, or the Company. It is also a notional cost like interest as (i) above.
- (iii) Salary for the proprietor where he works but does not charge salary.

## III. Different basis of inventory valuation

In the financial accounts the value of inventory to be shown in financial books is at the lower of cost or market price. As regards work in progress, the valuation may be at Factory cost or Total Cost of Production. In cost books, the basis of inventory valuation is invariably the actual cost. The value of materials on hand may also differ to a certain extent depending on the method adopted for pricing materials issued to production (LIFO, FIFO etc.).

## IV. Under or over absorption of overhead charges

In costing, the recovery of overhead is always based on an estimate or pre-determined ratio e.g., percentage on prime cost, percentage on sales etc., while in financial accounting, the actual expenses of overheads are recorded, with the result that there is either under absorption or overabsorption of overheads. The under recovery or over recovery of overheads may be taken to costing profit or loss account or may be carried to the next period. If these difference are written off to costing profit and loss account the profit figure will agree, otherwise, adjustment will have to be made on this account. In some costing system, administration overhead or selling and distribution overheads are ignored as a result of which the costing profit and loss account will show a greater profit or smaller loss than that shown by the financial accounts and thus requires reconciliation.

### Other Reasons

#### (i) *Different method of charging depreciation*

The methods of charging depreciation may be different in cost books as well as the financial books. The Financial books may have charged depreciation accounting to Fixed Instalment Method or Reducing Balance Method to meet the requirement of Income Tax rules. While in the cost account books, Machine Hour Rate or Production Hour or Unit Method, may have been followed.

#### (ii) *Abnormal gains or losses*

These gains or losses may be taken to costing profit or loss account or it may be excluded from the cost accounts altogether. In case if these are transferred to costing profit or loss account the profit or loss shown by cost books will agree with the profit or loss of financial books. In such case no adjustments are required on this account.

### Procedure for Reconciliation

The following steps should be taken to reconcile the profits derived from the cost and financial books so as to indicate the causes for discrepancies.



(i) *Ascertain*

- (a) Items which affected the financial results but were not included in cost accounts;
- (b) Items which affected the cost Accounts but did not occur in the financial accounts;
- (c) Items which affected both cost and financial accounts but differed in value in the two cases.
- (d) The basis of valuation of Raw materials, Finished goods and Work in progress adopted for Balance Sheet purpose and Compare such valuations as shown in Cost Books.
- (e) Any other claims which were shown in the financial as well as in the cost books but differ in their value.

After ascertaining the main points of difference in two sets of books, start with profit as per any set of books (cost or financial) as the case.

Taking the profit as per cost books as the base : —

*Add :*

- (i) Items of expenditure shown in Cost Accounts but not in Financial accounts.
- (ii) Items incomes shown in financial accounts but not in cost accounts.
- (iii) Amounts by which items of expenditure are shown in excess in Cost accounts in compare to the corresponding entries in the financial accounts.
- (iv) Amounts by which items of income are shown in excess in financial accounts in compare to the corresponding entries in cost accounts.
- (v) The amount by which the closing stock is over-valued in the Financial Accounts.
- (vi) The amount by which the opening stock is over valued in Cost Accounts.
- (vii) Over absorption of overheads in Cost Accounts.
- (viii) Over-charge of depreciation in Cost Accounts.

*Deduct :*

- (i) Items of expenditure shown in Financial Accounts but not in Cost Accounts.
- (ii) Items of Incomes shown in Cost Accounts but not in Financial Accounts.
- (iii) Amounts by which items of expenditure are shown in excess in financial accounts in compare to the corresponding entries in Cost Accounts.
- (iv) Amounts by which items of income are shown in excess in Cost Accounts in compare to the corresponding entries in Financial Accounts.
- (v) The amounts by which closing stock is under valued in Financial Accounts.
- (vi) The amounts by which opening stock is under valued in Cost Accounts.
- (vii) Under-absorption of overheads in Cost Accounts.
- (viii) Under charge of Depreciation in Cost Accounts.

*Note :* Reverse the treatment as show in above if profits of Financial Accounts is taken as the base.



### Memorandum Reconciliation Account

The reconciliation of costing and financial profits may also be presented in the form of an Account styled as "Memorandum Reconciliation Account". The base profit is credited to this Account. Items to be added are credited to this Account and those to be deducted are debited. The credit balance shown by this Account will be intended profit. However, this account is not maintained on Double Entry Principle.

The procedure will be more clear from the following illustrations.

#### Illustration 1 :

From the following figures prepare a Reconciliation Statement :—

	Rs.
Net Profit as per Financial Records	5,15,020
Net profit as per costing records	6,89,600
Interest on investment	32,000
Loss due to depreciation in stock value charged in financial Accounts only	27,000
Works overhead under-recovered in Cost Accounts	12,480
Bank Interest and Dividend Received	4,900
Obsolescence loss charged in Financial Accounts	22,800
Depreciation charged to Financial Accounts	44,800
Depreciation recovered in cost Accounts	50,000
Income Tax paid	1,61,200
Administrative overhead over recovered in Cost Accounts	6,800

Prepare a statement reconciling the profits shown in both the books.

#### Solution :

#### Statement of Reconciliation

Particulars	Rs	Rs.
Profit as per Financial Accounts		5,15,020
<i>Add</i>		
(i) Loss due to depreciation in stock value debited in financial books	27,000	
(ii) Works overhead under recovered in Cost Accounts	12,480	
(iii) Obsolescence loss charged in Financial books only	22,800	
(iv) Income tax debited in financial accounts and not in Cost Accounts	1,61,200	
		2,23,480
		7,38,500



		b/f
<i>Less</i>		7,38,500
(i) Interest on investment credited in financial books but not in cost accounts	32,000	
(ii) Bank interest and dividend credited to financial accounts only	4,900	
(iii) Over recovery of depreciation in Cost Accounts (50,000—44,800)	5,200	
(iv) Over recovery of Adm. overhead in Cost Accounts	6,800	48,900
Profit as per cost Accounts		6,89,600

**Illustration 2 :**

The financial profit and loss of a manufacturing company for the year ended 31st March 1987 is as follows :

**Profit and Loss Account**  
(for the year ended 31st March, 1994)

	Rs.	By Sales	Rs.
To Material consumed	5,00,000		12,40,000
To Carriage inwards	10,000		
To Direct Wages	3,40,000		
To Works Expenses	1,20,000		
To Administration Expenses	45,000		
To Selling and Distribution Expenses	65,000		
To Debenture Interest	10,000		
To Net Profit	1,50,000		
	12,40,000		12,40,000

The net profit shown by the Cost Account for the year is Rs. 1,62,700. Upon a detailed comparison of the two sets of account it is found that :—

- (a) The amount charged in the Cost Account in respect of over-head charges are as follows :—

Works overhead charges Rs. 1,15,000 Office overhead charges Rs. 45,900 selling and distribution expenses Rs. 66,400.

- (b) No charge has been made in the Cost Account in respect of Debenture interest.

**You are required to reconcile the profits as shown by the two sets of Account.**



## Solution

## Reconciliation Statement (as on 31 March, 1994)

Profit as shown by Cost Accounts	Rs. 1,62,700
Less : Under charge for Works over-head charges	5,000
	<hr/> 1,57,700
Add : Overcharge for Office overhead charges	900
Overcharge for Selling and Distribution expenses	1,400
	<hr/> 1,60,000
Less : Debenture interested omitted from Cost Accounts	10,000
Profit as shown by Profit and Loss Account	<hr/> 1,50,000 <hr/> <hr/>

Alternative solution :

## Memorandum Reconciliation Account as at 31-3-1994

To Works overhead charges under recovered cost	Rs. 5,000	By profit as per cost Books	Rs. 1,62,700
To Debenture Interest	10,000	By Office overhead charges recovered in excess	900
To Net Profit as per financial books	1,50,000	By Selling and Distribution Expenses recovered in excess	1,400
	<hr/> 1,65,000 <hr/>		<hr/> 1,65,000 <hr/>

## Illustration. 3

A Bicycle manufacturing company which commenced business on \* 1 January 1993, supplies you with the following information and asks you to prepare a statement showing the profit per bicycle. Wages and Materials are to be charged at actual costs, works overhead at 30% on Wages and Office overhead at 20% on Works Cost. You are also required to prepare a statement reconciling the profit as shown by the Cost Account with the profit shown by the profit and loss account for the year ended 31st December, 1993.

The types of bicycles are manufactured namely Model A and B. There were no bicycle in stock or in the course of manufacture at the end of the year and the number of bicycles sold during the year were Model A 1200 and Model B 840.

The particulars given are as under :—

	MODEL A	MODEL B
Material as per bicycle	80	100
Wages per bicycle	40	60
Selling price per bicycle	200	300

Prepare the necessary Statement showing the actual profit for the year, if the works indirect expenses were Rs. 80,000 and office indirect expenses Rs. 70,000.



Solution :

## Statement of cost and Profit as per cost books

	MODEL A		MODEL B		Total A & B
	Output & Sales 1200		Output & Sales 840		
	Per Unit	Total	Per Unit	Total	
	Rs.	Rs.	Rs.	Rs.	Rs.
Material	80	96,000	100	84,000	1,80,000
Wages	40	48,000	60	50,400	98,400
Prime cost	120	1,44,000	160	1,34,400	2,78,400
Works overhead (80% Wages)	32	38,400	48	40,320	78,720
Works cost	152	1,82,400	208	1,74,720	3,57,120
Office overhead (20% on Works Cost)	30.40	36,480	41.60	34,944	71,424
Total cost	182.40	2,18,880	249.60	2,09,664	4,28,544
Profit	17.60	21,120	50.40	42,336	63,456
Selling Price	200	2,40,000	300	2,25,000	4,92,000

Profit as per Cost Books Rs. 63,456

## Trading Profit &amp; Loss Account

	Rs.		Rs.
To Material consumed	1,80,000	By Sales	4,92,000
To Wages	98,400		
To Works Indirect Expenses	80,000		
To Office Indirect Exp.	70,000		
	63,600		
To Net Profit	4,92,000		4,92,000

## Reconciliation Statement

Particulars	Rs.	Rs.
Profit as per cost books		63,456
Add: Office overhead Over-recovered in Cost Books (i.e. 71,424-70,000)		1,424
Less: Works Overhead under-recovered (i.e. 78,720-80,000)	1,280	
	1,280	64,880

Profit as per financial Books Rs. 63,600



## LESSON 9

# PROCESS COSTING

In industries where a product is the outcome of working on different processes, departments or stages of production and when each such process, stage or department is distinct and well defined there the method of costing applied is known as process costing. All the cost incurred for working on each process, stage or department are accumulated separately and the total of all of them represents the cost of the product. Thus, the cost of the product at each stage of manufacture is found out. The output of a process becomes the input of the following process and the work of each process is highly interrelated and the inefficiency at any one of the various processes may adversely effect the manufacturing work at all the following processes. Thus in process costing the finished product of a process becomes the raw material of the immediately following process.

Process costing helps to ascertain the cost of the product at each process, operation or stage of manufacture, where process are carried on having one or more of the following features :

1. Where the product is produced in one single process.
2. Where the product of one process becomes the material of another process or operation.
3. Where there is simultaneous production, at one or more process, of different products, with or without by-products.
4. Where, during one or more processes or operations of a series, the products, or materials, are not distinguishable from one another, as, for instance, when finished products differ finally only in shape or form.

The system of process costing is different from job costing inasmuch as in job costing costs are accumulated for each individual job separately whereas process costing provides for showing the cost of the many products and of-products or joint products, if there are any.

In most cases process costing requires fewer forms, and less details, than are needed for job costs, but a closer analysis of operations is needed. For example, there is not the need for the allocation of labour to so many order numbers, and material is issued in bulk to departments, rather than to many specific jobs. In continuous processes, as in a coal distillation plant, the men are occupied continuously on each process.

Process costing is used by firms having a continuous flow of identical products, where it is not possible to distinguish one unit from another. The amount of production is determined to a large extent by supply and demand for the product, rather than by a specific order. The cost per unit is averaged over a period e.g, a week or a month.



In particular, process costing can advantageously be practiced in the following types of industries :

Chemical works	Textiles, weaving, spinning, etc.
Soap making	Food products
Box-making	Canning factories
Distillation process	Cooking works
Paper Mills	Paint, ink and varnishing etc.
Biscuit works	Meat products factory
Oil refining	Milk dairy

### Characteristics of Process Costing

1. The cost of a unit of product, computed under process costing system is always an average cost as it is not possible to identify each and every unit of the output distinct from the whole output of the process. The output in the process flows as a whole.

2. It is not uncommon to have by products or joint products under a process. Thus in a sugar factory the waste of sugar cane crushing may be used as by-product for the coal distillary industries. Again in a tea-industry, the processing for quality tea may provide dust tea as a joint product. The costs for the tea must be apportioned on a legal and rational basis.

3. Wastage, possibly due to chemical reaction or evaporation, is unavoidable but this must be reduced to a figure as near as possible to the theoretical minimum which can in many cases be computed from the specification or chemical analysis of the product.

4. In case the main or by-products require further processing before they are in a saleable state then the cost of such processing must be accumulated separately.

5. In order to arrive at average costs accurately it is necessary to measure production at various stages of manufacture.

### General Principles of Cost Accumulation

A. Before the input is converted into a finished product it has to pass from different processes, operations or departments. Each departments or process is separate from others but are interrelated in a way such as that the output of a process becomes the input or raw material of the next one. It is quite likely that in addition to the output of the preceding process or department some additional or special raw materials is put into the following process or processes. The processes or departments may be separated by (i) jurisdiction or supervision (ii) similarity of works performed, and (iii) physical allocation of men and machines in the plant.

B. Both direct and indirect costs are accumulated by processes or departments at regular intervals. For this purpose a separate account is opened for each process or department. Sometimes process cost-sheets of the type of job cost-sheets, are also used for cost computation.



C. Indirect costs or overheads are apportioned to each process or department as also for each product (if there are joint or by-products) on some standard and acceptable basis.

D. If there occurs a loss, wastage or spoilage in any process then that is to be accounted for as the cost of that process. It is a usual practice to segregate any such loss, wastage etc. into normal and abnormal, the former being a normal burden on the process cost while the later are treated in a costing profit and loss account.

E. In process costing, production of each process is recorded in terms of physical units or quantity and cost per unit is arrived at by dividing the total cost by the output of the process.

F. In case there is any work-in-process of a process or department then the same is converted into equivalence of effective units. Thus if there are 40 units of a process as work-in-process which are complete upto 50% then we can treat them as equivalent to 20 units and costed accordingly.

G. As the emphasis is on departments or processes rather than on individual products, fixation of suitable cost centres for the purpose of determination of process costs should be carefully done.

H. The units of output are determined in terms of physical units like numbers, tons, kilograms, meters, litres, etc.

### The Elements of Production Cost

**Materials :** As it is usual in a process type industry that the raw materials is mainly feeded at the stage of process so raw materials is issued by the stores on materials requisition and the cost of such materials is charged to the concerned process or department account. If no material is to be used in the following processes then the total cost of the preceding process is charged to the following process but if some material is added at the following process or processes then the cost of that material is charged to the concerned process.

In case of process costing, distinction is not made in the treatment of direct and indirect materials and both are charged to the concerned process account. Materials are issued from the stores on materials requisition and accounted for according to the procedure discussed in the chapter on materials.

**Labour :** Generally, the cost of direct labour is a very small part of the cost of production in industries adopting process costing. With the introduction of more and more automatic machinery the direct labour element becomes smaller and smaller, while the overhead element increases.

As is with materials, for labour cost too no distinction is made in the costs of direct and indirect labour. Wages sheets are prepared department or process wise. Wages of workers, who work for more than one process or department, are allocated according to the time spent on each process or department. Idle time, if any, should be segregated and booked to overhead expenses under a separate standing order number.

**Direct Expenses :** Each item of expenditure which can be directly attributed to a process will be debited to the relative process account. An example of direct expense is the expense on designing the shape of the product or the cost of the die in a moulding industry.



**Manufacturing Overheads :** As most of the expenses in process costing are direct, the overhead element of total cost is normally very high, great care will be needed to ensure that each process is charged with a reasonable share of the production overhead. As a result overhead rates are required to be worked out only for each cost centre (process or department) and not for specific jobs, or orders. Usually, variable overhead for the process is kept separate and charged direct while fixed overhead is charged on the basis of overhead rates.

If production is fairly stable and the amount of fixed factory overhead is not very significant, recovery is usually made on the basis of actual overhead rates unlike in the case of jobs where production not being uniform, pre-determined rates are used so as to smooth out fluctuations. Pre-determined overhead rates will, however, be applicable in process costing also under the following circumstances :

- (a) Where production is not stable;
- (b) Factory overhead constitutes a fairly significant portion of the costs;
- (c) When the process yields joint products.

As in job costing, it is usual to prepare a cost sheet in process costing system also. The process cost sheet is prepared on actual time basis which covers the usual time taken for the processing of raw materials into finished product. Besides giving customary details of a cost sheet, the process cost sheet indicates the costs under various elements at each process and the quantity of both input and output, thus making it easy to compute the various costs for the total output.

#### **Advantages of Process Costing**

1. Accounting procedure is simple and less time and effort consuming.
2. Because most of the expenses are direct and overhead rates generally pre-determined so costs can be computed at regular intervals.
3. Figures of both actual and budgeted costs are available at short intervals so an analysis, and hence control process, becomes easy.
4. As generally overhead rates are fixed in advance on some logical and rational basis so price estimates, if and when needed, can be prepared at short notice and with a good degree of accuracy.

#### **Limitation of Process Costing**

1. Process costing system provides with only average costs so an accurate analysis of actual costs cannot be made and compared with those budgeted.
2. Costs revealed are only historical in nature inasmuch as only the costs incurred are revealed after the process is over. This limitation is with other types of costing also.
3. Costing becomes more or less approximations when costs are incurred for by-products and joint products along with the main product.
4. There is a difficulty in the cost estimation of work-in-progress as well. The costing of work-in-progress under process costing is done mostly on estimated basis which introduces further inaccuracies in costs.



### A Comprehensive Example

The records of M/s A-One Products Ltd., reveal the following cost data in relation to their product. The company follows the process costing system.

Materials 1,000 units	=	Rs. 10,000
Labour	=	Rs. 5,000
Direct Expenses	=	Rs. 3,000
Overhead Expenses	=	Rs. 9,000
Output during the year is 900 units		

The cost computation would be as under :

#### Cost Sheet of Production X (Process I)

	Unit	Rs.		Units	Rs.
Raw materials	1000	10,000	Normal Wastage	100	...
Labour		5,000	Output	900	27,000
Direct Expenses		3,000			
Overheads		9,000			
	<u>1000</u>	<u>27,000</u>		<u>1000</u>	<u>27,000</u>

In case the product is to be transferred to process No. 2 after the completion of the above process then there can be two possibilities that (a) the whole of output of the first process is transferred to 2nd process and (b) that only a part of the output of first process is transferred to 2nd process while a part is retained in stock. The cost computation in the two situations would be as under :

(a) Where the whole of the output of 1st process is transferred to the 2nd process the position would be as under :

	Units	Rs.
Transferred from process I	900	27,000
Further : Materials added		8,000
Wages paid		4,000
Normal loss 5%		1,000
Other direct expenses incurred		
Overheads apportioned 10% of prime cost.		



The cost computation in this case would be as under :

**Process—II**

	Units	Rs.		Units	Rs.
Transferred from Process I	900	27,000	Normal loss 5% of input	45	—
Materials		8,000	Output	855	44,000
Wages		4,000			
Other direct expenses		1,000			
Overheads 10% of Rs. 40,000 (27,000 + 8,000 + 4,000 + 1,000) being the prime cost		4,000			
	900	44,000		900	44,000
	==	==		==	==

The cost per unit would be Rs.  $44,000 \div 855 = \text{Rs. } 51.46$ .

If the output of process II are transferred to one more process or process number three then the method of costing followed in process two would be repeated.

If only a part of the output of process I, say in our example only 500 units, are transferred and the balance is retained in stock then the costing would be done as under. It is presumed here that figures of process II as given in case (a) above remain unchanged.

**Process II**

	Units	Rs.		Units	Rs.
Transferred from Process I	500	15,000	Normal loss 5% of input	25	—
Materials		8,000	Output	475	30,800
Wages		4,000			
Other direct expenses		1,000			
Overheads : 10% of Rs. 28,000 (15,000 + 8,000 + 4,000 + 1,000) being the prime cost		2,800			
	500	30,800		500	30,800
	==	==		==	==

Cost per unit would be Rs.  $30,800 \div 475 = \text{Rs. } 65$  per unit.



**Losses in Process :** It is usual that some loss, scarp, and/or wastage occurs in process industries, so it is essential that accurate records are maintained to enable control of these items to be effected. The cost department must be kept well informed through the medium of scrap tickets, material credit notes, and loss reports.

Every executive in action, the supervisors and foremen must be educated about the relevance and importance of properly and timely recording of any such process losses. Any laxity on their part would tend to affect the costs adversely.

It is generally possible to estimate in advance the normal loss in processing the raw material to finish product under normal working conditions. The estimate is made either on the basis of past experience, some arithmetical formula or by observation. But if the actual working conditions are better or worse than the normal then it is quite necessary to revise the normal loss figures while keeping in mind such a difference in working conditions. The real process loss would be more if a loss occurs at an advanced stage of processing. It is because of the fact that materials which have been processed and are then found to be defective and scrapped, have incurred their share of labour and variable overhead upto the point of rejection, so obviously the financial loss to the firm increases with each stage of production. Process loss is often caused by such factors as evaporation and that loss inherent in large-scale production, but may often include scrap and waste already defined. This is considered to be the normal process loss.

Abnormal process loss consists of deficiencies of finished products due to carelessness, bad plant design or operation, or other errors. This type of loss or wastage should receive close investigation by the management.

In process industries it is important both to reconcile the total yield of products in weight or volume and also to ascertain, if the process yields both main and by-products, that these are produced in accordance with the chemical analysis of the product entering the process.

The accounting treatment of normal losses differ. In the first case the cost of any normal loss is absorbed in the cost of production of good products, while a separate account is opened for abnormal losses, to which is debited the cost of material, labour and appropriate overheads incurred by the wastage. Abnormal losses should be written off to the costing profit and loss account.

**Waste :** Waste is that part of materials which has no value and it cannot be reused and remains after the materials has been put into process. Waste, forming part of the normal loss would be absorbed by the good production, but if it forms part of the abnormal loss then the cost will be transferred from process account to abnormal loss account.

**Scrap :** Scrap, on the other hand is that part of materials which remain or comes out of the manufacturing process after the materials have been put into process and may be reused as materials in subsequent processes or has some saleable value. The problem of scrap is more complex than that of waste, and may be treated as follows :

1. Scarp resulting from one process which is to be utilised in another process should be credited to the first process at the value at which it was originally debited, and debited to the relative stores account. This value is thus related to the market price of the good material.



On issue to the next process it is valued at the same price as that which it would have been charged if bought specifically for the purpose. This method is advantageous in that if a comparison of the cost of production of the firm is to be made with the cost of having the product produced elsewhere, accurate costs will be obtainable.

2. If the scrap cannot be utilised in subsequent process but have saleable value then the process account should be credited with the value realisable or realised.

3. If the scrap has only nominal value then it may be sold periodically and the amount realised credited to factory overheads account. This method would be both convenient and economic considering the normal value of scrap.

The treatment of normal and abnormal loss discussed above is explained below with the help of an illustration.

#### Illustration 1:

In the manufacture of 'Gamma' chemicals 1000 lbs of material at 40 p. per lb were supplied to the first process. Labour costs amounted to Rs. 100 and production overheads of Rs. 50 were incurred. The normal process loss has been 10% of which half can be disposed of as scrap at Rs. 0.20 per lb. The actual production was only 850 lbs.

#### Solution

#### Process I

	Cost per		Amount	Cost per		Amount	
	lb.	lb.	Rs.	lb.	lb.	Rs.	
Direct material	1000	0.40	400	Normal loss	100	0.10	10
Direct labour			100	Abnormal loss	50	0.60	30
Production overhead			50	Process & output	850	0.60	510
	<u>1000</u>		<u>550</u>		<u>1000</u>		<u>550</u>

Normal loss is calculated as follows :

Estimated loss 10% of input of 1000 lbs. = 100 lbs.  
 Half can be sold as scrap = 50 lbs.  
 50 lb sold at Rs. 0.20 per lb. = Rs. 10

Abnormal loss is calculated as follows :

Estimated production = 900 lbs  
 Actual production = 850 lbs  
 Abnormal loss = 50 lbs



Cost of normal production = Rs. 550 - 10 = Rs. 540

Cost of normal production per lbs. = Rs.  $\frac{540}{900}$  = Rs. 0.6

Cost of abnormal loss = 50 × Rs. 0.60 = Rs. 30

However, some of the abnormal loss will probably possess scrap value, so if we assume for purposes of illustration that half can be sold, then 25 lb at Rs. 0.20 per lb will be realised.

In the abnormal loss account will appear the debit of Rs. 30 transferred from process No. 1, while on the credit side will be shown Rs. 5 realised on sale of scrap. The net cost of the abnormal loss thus would be Rs. 25 only.

**Abnormal Gain :** As compared to abnormal loss, abnormal gain may occur when the actual loss in process is less than the normally estimated loss. The difference of actual loss with that of normal loss, if favourable, would be termed as abnormal gain. The value of the gain will be calculated in a similar manner to an abnormal loss discussed above and then posted to an abnormal gain account.

**Illustration 2:** K Dyes and Chemicals Ltd. manufacture a Chemical named "K.D.". In its manufacture 1,200 units of raw materials are supplied at the first process stage. The said materials are supplied at Rs. 4 per unit. Labour costs are Rs. 600 and production overheads Rs. 300 for processing the materials. The normal process loss has been estimated at 10% which can be sold at Re. 1 per unit. The actual production is 1,120 units.

	Unit	Cost per unit	Amount		Units	Cost per units	Amount
Direct material	1,200	4	4,800	Normal Loss	120	1	120
Direct Labour			600	Process two output transferred	1,120		5,787
Production overhead			300				
Abnormal gain	40		207				
	<u>1,240</u>		<u>5,907</u>		<u>1,240</u>		<u>5,907</u>

Normal loss is calculated as follows :

Estimated loss 10% of input of 1200 units = 120 units realisable at Re. 1 per unit = Rs. 120.

**Abnormal Gain = Actual production - Normal production**

= 1120 units - 1080 units = 40 units.



Cost of normal production Rs. 5700—170 Rs. 5580

or Rs.  $\frac{5580}{1080}$  (Per Unit)

Cost of abnormal gain = Rs.  $\frac{5580}{1080} \times 40$  Rs. 207

In the abnormal gain account will appear the credit of Rs. 207 transferred from process No. 1 while on the debit side will be shown an item of Rs. 40 being the scrap value of 40 units of abnormal gain. Thus the net abnormal gain will be only Rs. 167 which will be transferred to the Profit and Loss Account.

#### Abnormal Gain Account

	Rs.		Rs.
Process I	40	Process I	207
Profit and Loss A/c	167		
	<u>207</u>		<u>207</u>

#### Illustration 3:

The product of a manufacturing concern passes through two processes A and B and then to Finished stock. It is ascertained that in each process normally 5% of the total weight is lost and 10% is scrap which from Processes A and B realises Rs. 80 per ton and Rs. 200 per ton respectively.

The following are the figures relating to both the processes :

	Process A	Process B
Materials in tons	1,000	70
Cost of materials in rupee per ton	125	200
Wages in rupees	28,000	10,000
Manufacturing expenses in rupees	8,000	5,250
Out-put in tonnes	830	780

Prepare Process Cost Accounts showing cost per ton of each process. There was no stock or Work in-Progress in any process.

Solution :

#### Process A Account

Dr.	Units Tons	Per Ton	Amount			Units Tons	Per Ton	Cr.	
			Rs.	Rs.				Rs.	Rs.
To Materials	1,000	125	1,25,000		By Normal loss (5%)	50			
To Wages			28,000		By Scrap. (10%)	100	80	8,000	
To Manufacturing expenses			8,000		By Out-put to Process B	830	180	1,49,400	
					By Abnormal loss	20	180	3,600	
	<u>1,000</u>		<u>1,61,000</u>			<u>1,000</u>		<u>1,61,000</u>	



## Process B Account

Dr.	Units	Per Ton	Amount		Units	Per Ton	Amount
	Tons	Rs.	Rs.		Tons	Rs.	Rs.
To Out-put from Process A	830	180	1,49,400	By Normal less (5%)	45	—	—
To Materials	70	200	14,000	By Scrap (10%)	90	200	18,000
To Wages	—	—	10,000				
To Manufacturing expenses	—	—	5,250	By Out-put	780	210	1,63,800
To Abnormal gains	15	210	3,150				
	915		1,81,800		915		1,81,800

## Illustration 4:

A product passes through three processes A, B and C. The normal wastage of each process is as follows; Process A—3 per cent, Process B—5 per cent, and process C—8 per cent.

Wastage of Process A was sold at 25p. perunit, that process B at 50 p. perunit and of process C at Re. 1 per unit 10,000 units were issued to process A in the beginning of October 1993 at a cost of Re. 1 per ton. The other expenses were as follows:

	Process A	Process B	Process C
	Rs.	Rs.	Rs.
Sundry Materials	1,000	1,500	500
Labour	5,000	8,000	6,500
Direct expenses	1,050	1,188	2,009
Actual Out-put Was	9,500 units	9,100 units	8,100 units

Prepare the Process Accounts, assuming that there were no opening a closing stocks. Also give the Abnormal Wastage and Abnormal Gain Accounts.

## Solution

## Process A Account

Dr.					Cr.	
	Particulars	Units	Rs.	Particulars		Units
To Units issued @ Re. 1 per unit	10,000	10,000		By Normal Wastage 3% of 10,000 units sold @ 25 p. per unit	300	75
„ Sundry Material	—	1,000		„ Abnormal Wastage	200	350
„ Labour	—	5,000		„ Process B. (out-put transferred)	9,500	16,625
„ Direct Expenses	—	1,050				
	10,000	17,050			10,000	17,050



Dr.

## Process B Account

Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process A (out-put received)	9,500	16,625	By Normal Wastage 5% of 9,500 units sold at 50 p per unit	475	238
„ Sundry materials		1,500	„ Process (out-put transferred)	9,100	27,300
„ Wages		8,000			
„ Direct expenses		1,188			
„ Abnormal gains	75	225			
	9,575	27,538		9,575	27,538

Prepare the Process Accounts, assuming that there were no opening a closing stocks.

## Process C Account

Dr.

Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process B (out-put received)	9,100	27,300	By Normal Wastage 8% of 9,100 units sold Re. 1 per unit	728	728
„ Sundry materials		500	By Abnormal Wastage	272	1,156
„ Wages		6,500	By Furnished stock (out-put)	8,100	34,425
„ Direct expenses		2,009			
	9,100	36,309		9,100	36,309

## Calculation of Abnormal Wastage and Abnormal Gains

$$\text{Process A Cost of Abnormal Wastage} = \frac{16,975}{9,700} \times 200 = \text{Rs. } 350$$

$$\text{Process B Cost of Abnormal Gain} = \frac{27,075}{9,025} \times 75 = \text{Rs. } 225$$

$$\text{Process C Cost of Abnormal Wastage} = \frac{35,581}{8,372} \times 272 = \text{Rs. } 1,156$$



## Abnormal Wastage Account

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Process A	200	350	By Sales of Wasted units		
„ Process C	272	1,156	200 units of A @ 25p. per unit		50
			272 units of C @ Re. 1 per units		272
			By Costing Profit & Loss Account		1,184
		1,506			1,506

## Abnormal Gain

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Shortfall in Normal Wastage of 75 units @ 50 p. each		38	By Process B.	75	225
To Costing Profit & Loss Account		187			
		225		75	225

Note: Actual Wastage in Process B. is only loss units but the process has been credited with the sale proceed of normal wastage, i.e. 475 units. The shortfall in the sale of normal wastage of 75 units @ 50 p. each has, therefore, been debited to Abnormal Gain Account.



## LESSON 10

# MARGINAL COSTING

Marginal costing is not a system of cost ascertainment such as job costing or process costing etc., but it is a special technique concerned particularly with the effect which fixed overheads has on the running of business. The importance of this technique lies in the information which it provides to the management in tackling managerial problems.

### Marginal Cost

The Institute of Cost and Management Accountants, England defined the term marginal cost as, "The amount at any given volume of output by which aggregate costs are changed, if the volume of output increased or decreased by one unit."<sup>1</sup>

Blocker gave an exhaustive definition of the term marginal cost. According to him, "Marginal cost is the increase or decrease in total cost which results from producing or selling additional or fewer units of product or from a change in the method of production distribution such as the use of improved machinery, addition or exclusion of a product or territory or selection of an additional sales channel."<sup>2</sup>

"Marginal costing is the ascertainment of marginal costs and the effect on profits of changes in volume or type of output by differentiating between fixed and variable costs."<sup>3</sup>

The technique of marginal costing (also known as differential costing or incremental costing) is based on the assumption that all elements of costs (may be factory, office or selling) can be classified into fixed and variable costs. Semi-variable costs are also classified into fixed and variable costs. The variable costs (marginal costs) are treated as the cost of the product. Fixed cost do not change with increase or decrease in output upto a certain level of output *i.e.*, these costs remain constant per unit of times. For example, salary of general manager or rent of office will remain the same whether production, is 1000 units or 1500 units. While the variable costs vary in proportion, to increase or decrease in production. For example when the production is increased from 1000 units to 1,500 units, the cost of raw material will also increase by one half time.

"Other things being equal, the fixed overhead will, remain fixed in total during changes in production achieved, and the rate per unit will constantly vary ; whereas the variable overhead will remain constant per unit of production and vary in total." Wheldon. Let us study the behaviour of fixed and variable costs with the help of an example given below :

No. of Unit	Variable cost per Unit	Total variable cost	Fixed Cost	Fixed Cost per unit	Total Cost	Total Cost Per Unit
100	20	2,000	12,000	120	14,000	140
200	20	4,000	12,000	60	16,000	80
300	20	6,000	12,000	40	18,000	60

1. Marginal costs is determined with respect to a certain number of units of a product or a batch rather than a single unit.
2. Blocker and Weltmore : Cost Accounting.
3. Wheldon's : Cost Accounting and Costing Methods.



We see in the above example as the fixed cost is spread over a larger number of units, per unit cost continues to fall but the total variable cost continues to rise, but per unit cost remain the same.

### Contribution

The difference between the selling price and the marginal cost of sales is called as contribution. Suppose selling price of a unit is Rs. 30 and its variable/marginal cost is Rs. 20, contribution per unit will be Rs. 10. This difference of Rs. 10 is a contribution towards fixed expenses and once these fixed expenses are met then towards profits. Every unit sold gives a margin of Rs. 10. This amount is not net profit because our calculation did not include fixed costs. Suppose fixed costs are Rs. 2,000, that means 200 units  $\left(\frac{2000}{10}\right)$  need to be produced to cover fixed costs. So upto 200 units, this margin of Rs. 10 per unit is a contribution towards fixed costs. If the sales exceed 200 units, the contribution on additional units is no longer required to meet fixed costs but it is profit. So

$$\text{Contribution} = \text{Selling Price} - \text{Marginal Cost}$$

$$\text{or Contribution} = \text{Fixed Costs} + \text{Profit}$$

$$\text{or Contribution} - \text{Fixed Costs} = \text{Profit}$$

How does the technique of marginal costing differ from the conventional methods of costing i.e. Total cost method? We shall try to make it clear by comparing the two methods with the help of an example.

Old Method		Marginal Cost Methods	
Direct Materials	30,000	Direct Materials	30,000
Direct wages		Direct Wages	
Deptt. X 12,000		Deptt. X 12,000	
Deptt. Y 8,000	20,000	Deptt. Y 8,000	20,000
	<hr/>		<hr/>
Prime cost	50,000	Variable Factory Overheads	
Factory Overheads		Deptt. X 4,000	
Deptt. X 10,000		Deptt. Y 6,000	10,000
Deptt. Y 6,000	16,000		<hr/>
	<hr/>	Factory Marginal Cost	60,000
Production cost	66,000	Variable Administrative	
Administrative, Selling and		Selling and Distributive	
Distributive Overheads 20%		Overheads	3,700
on Factory Cost	13,200		<hr/>
	<hr/>	Total Marginal Cost	63,700
Total cost	79,200	Contribution towards	
Profit	20,800	fixed costs and Profit	36,300
	<hr/>		<hr/>
Sales	1,00,00	Sales	1,00,000
	<hr/>		<hr/>
		Contribution	36,300
		Less Fixed Costs	
		Production 6000	
		Administrative 9500	15,500
			<hr/>
		Profit	20,800
			<hr/>



No doubt, the old method looks simpler and the position can be easily understood as it exists, but this method fails to provide the much needed valuable information for taking managerial decisions. What the profits would be if the sales volume is increased or decreased? It is precisely here the importance of the technique of marginal costing lies—it does assist management in taking managerial decisions.

It is clear from the above illustration that the total cost includes fixed overheads whereas the marginal cost includes only the prime cost and variable overheads but does not include fixed costs. Fixed costs are stated in lump sum. Under this method, the contribution has a direct relation with sales, because contribution is a fixed percentage of sales ( $\frac{36,300}{1,00,000} \times 100$  in our example) at different levels. Thus for desired sales figures, the profit and contribution can be easily worked out.

### Marginal Cost Equation\*

For the sake of convenience, it is possible to make an equation in general term as follows :

$$\text{Sales—Direct and Variable costs} = \text{Fixed Costs} + \text{Profit}$$

and this is shortened to  $S - V = F + P$

if in any problem, they know three factors, they can find out the fourth one.

The knowledge of contribution margin is much useful to management in taking certain decisions which can be summarised below :

1. While accepting new orders, only those may be accepted which yields the maximum contribution,
2. While selecting a product mix, the products which give maximum contribution are to be selected, and
3. While selecting the alternative methods of production, that method which gives maximum contributions to be selected.

### Break Even Point

Break even point or a profit of no point no loss is that point where total sales are equal to total costs. At this point, contribution is equal to fixed expenses. That's why it is a point of no profit no loss. The *B.E.P.* can be calculated as follows :

$$\text{B.E.P. in Units} = \frac{\text{Total Fixed Expenses}}{\text{contribution per unit}}$$

This point is also that point of operation wherefrom profits begin. Naturally, profits will begin only if the volume/production volume are firstly sufficient to recover the fixed costs and then above that will be contribution towards profit. The calculation of *B.E.P.* can be better understood with the help of an illustration.

**Illustration :** Calculate the break even point, if the fixed expenses for the year are Rs. 80,000. The variable expenses are Rs. 4 per unit and the selling price per unit is Rs. 20.



**Solution :**

$$\text{B.E.P. (in units)} = \frac{\text{Total Fixed expenses}}{\text{Contribution per unit}}$$

$$\text{or} = \frac{\text{Total Fixed expenses}}{\text{Selling price} - \text{Variable expenses}}$$

$$\text{or} = \frac{80,000}{20 - 4}$$

$$\text{or} = \frac{80,000}{16} = 5,000 \text{ units}$$

$$\begin{aligned} \text{B.E.P. (in Rs.)} &= \text{Output} \times \text{Selling Price} \\ &= 5,000 \times 20 \\ &= \text{Rs. } 1,00,000. \end{aligned}$$

Break even point based on budget totals :

$$\text{B.E.P. (in Rs.)} = \text{Total Fixed expenses} \times \frac{\text{Sales price per unit}}{\text{Contribution per unit}}$$

$$= 80,000 \times \frac{20}{16} = \text{Rs. } 1,00,000$$

**Profit Volume Ratio (P/V ratio)**

This is one of the most important ratio for a businessman for studying the profitability of business operation. P/V ratio is a ratio of contribution to sales and it may also be called as C/S, ratio<sup>1</sup>. The P/V ratio is calculated by the following formula

$$\text{P/V ratio} = \frac{S - V}{S}$$

$$\text{or} = \frac{\text{Contribution}}{\text{Sales}}$$

$$\text{or} = \frac{\text{Fixed expenses} + \text{Profits}}{\text{Sales}} \quad \text{i.e. } \frac{F + P}{S}$$

$$\text{or} = \frac{\text{Sales} - \text{Variable Cost}}{\text{Sales}} \quad \text{i.e. } \frac{S - V}{S}$$

If the result so derived is multiplied by 100 the product will be a percentage and this may be desired too. The break even point can also be calculated with the help of P/V ratio.

$$\text{B.E.P.} = \frac{\text{Total Fixed Costs}}{\text{P/V ratio}}$$

Now let us try to understand these calculations with the help of an example. Suppose variable cost per unit is Rs. 15 and selling price per unit is Rs. 25. Fixed costs amount to Rs. 40,000. You have to calculate P/V ratio and B.E.P.

1. If the term P/V had not become so firmly established C/S, or Contribution/Sales would be a better one. Wheldon.



**Solution :**

$$\text{P/V ratio} = \frac{S - V}{S}$$

$$\text{or} = \frac{25 - 15}{25} = \frac{10}{25} = 40\%$$

$$\text{P/V ratio in\%} = \frac{S - V}{S} \times 100 = \frac{10}{25} \times 100 = 40\%$$

$$\text{B.E.P.} = \frac{\text{Total Fixed Cost}}{\text{P/V Ratio}}$$

$$\text{or} = \frac{40,000}{40\%} = \frac{40,000}{40} \times 100 = \text{Rs. } 1,00,000.$$

This P/V ratio can be further used for knowing the level of output or sales to earn a desired amount of profit. Similarly it can also be used to know the variable costs simply by expanding the formula discussed above. As you know :

$$\text{B.E.P.} = \frac{\text{Fixed Costs}}{\text{P/V ratio}}$$

We can know the value of sales to earn a desired amount of profit as below :

$$\text{Desired Sales} = \frac{\text{Fixed Costs} + \text{Desired Profit}}{\text{P/V ratio}} \quad \text{or} \quad \frac{F + P}{P/V}$$

$$\text{Variable Costs} = \text{Sales} (1 - \text{P/V ratio}).$$

Continuing out illustration suppose (A) we want to know variable costs and also (B). What would be the sales volume to earn a profit of Rs. 50,000.

$$(a) \text{ Variable costs} = 1,00,000 (1 - 40\%)$$

$$= 1,00,000 \left( \frac{1 - 40}{100} \right)$$

$$= 1,00,000 \left( \frac{60}{100} \right)$$

$$= 60,000$$

$$(b) \text{ Sales to earn a profit of Rs. } 50,000$$

$$\text{Desired Sales} = \frac{\text{Fixed Costs} + \text{Profit}}{\text{P/V Ratio}}$$

$$= \frac{40,000 + 50,000}{40\%}$$

$$= \frac{90,000 \times 100}{40}$$

$$= \text{Rs. } 2,25,000$$



### Importance of P/V Ratio

By now it's clear that P/V ratio is ratio of contribution to sales value. Business houses continuously strive to increase the P/V ratio because by doing so the contribution towards meeting fixed overheads and profit is increased. This P/V ratio can be increased by :

- (i) Increasing the selling price per unit ;
- (ii) Reducing the direct and variable costs by improved methods of production, and
- (iii) Switching the production to the lines showing a higher P/V ratio.

It should be noted that a reduction in the fixed costs does not affect the P/V ratio, though it increases the total profit. The effect of reduction in selling price is always to reduce the P/V ratio, to raise the break even point and to shorten the margin of safety.

### Uses of P/V Ratio

After calculating the P/V ratio, it is often possible to make a good use of it for solving managerial problems. Let us see how it answers managerial enquiries.

#### Illustration 1 :

Given :	Period I	Sales	Rs. 15,000	Profit	Rs. 400
	Period II	Sales	Rs. 19,000	Profit	Rs. 1,150

#### Calculate :

- (a) P/V Ratio ;
- (b) the profit if sales are Rs. 12,000.
- (c) the sales required to earn a profit of Rs. 2000 and Rs. 6000.
- (d) Assume that Fixed Costs changes are nil.

#### Solution :

- (a) The P/V ratio

		Rs.		Rs.
Period I	Sales	15,000	Profit	400
Period II	Sales	19,000	Profit	1,150
		4,000		750

The change in Sales and Profit to Rs. 4000 and 750 respectively. Now we can use these changes to know the P/V ratio :

$$\text{P/V ratio} = \frac{\text{change in Contribution}}{\text{change in Sales Value}}$$

$$\text{or} = \frac{750}{4000} = \frac{3}{16}$$

$$\text{or} = 18.75\%$$

- (b) Profit if Sales are Rs. 12,000.



The decrease in Sales from the Period II is Rs. 7,000. Therefore Profit on sales of Rs. 12,000 will be :

Profit on Sales of Rs. 19,000—18.75% on the decrease of sales of 7,000.

or  $1150 - 1312.5 = -162.50$

Loss = 162.50

(c) Sales required to earn a profit of Rs. 2000

$$\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sales Value}}$$

$$\text{Sales Value} = \frac{\text{Contribution}}{\text{P/V ratio}}$$

$$\text{or} = \frac{* \text{Fixed Cost} + \text{Desired Profit}}{\text{P/V ratio}}$$

$$\text{or} = \frac{2412.50 + 2000}{18.75\%}$$

$$\text{or} = \text{Rs. } 23,533.33$$

Sales required to earn a profit of Rs. 6000

$$= \frac{2412.50 + 6000}{18.75\%}$$

$$= 44,866.66$$

#### P/V ratio and reduction in Price

Sometimes prices may be reduced in order to encourage more sales but this has to be done carefully because the effect of price reduction is to increase the break even point and reduce the P/V ratio. For example, if the sales are at the rate of 10,000 per month at the rate of Rs. 5 per unit. The total revenue is 50,000. The fixed costs are Rs. 10,000 per month and variable cost is Rs. 3 per unit. Sales department proposes to reduce the price by 10%.

A reduction in prices by 10% will reduce or Sales revenue by Rs. 5000 and this will have to be recovered either by additional sales, and or by reduced costs. Suppose the second alternative is not possible at present.

As we know :

$$S - V = F + P$$

Dividing both by S.

$$\frac{S - V}{S} = \frac{F + P}{S}$$

\*Fixed Cost = Contribution - Profit

$$\text{Contribution by the I Period Sales is } 15,000 \times \frac{18.75}{100} = 2812.50$$

$$\text{Fixed Cost} = 2812.50 - 400 = \text{Rs. } 2412.50.$$



$$\text{or } = \frac{F+P}{P/V}$$

The Profit in our example is

$$\begin{aligned} P &= S - V - F \\ &= 50,000 - 30,000 - 10,000 \\ &= 10,000 \end{aligned}$$

and it is always assumed that this profit has to be maintained by the management.

Now, the P/V ratio has fallen from :

$$\begin{aligned} &\frac{3}{5} \text{ to } \frac{4.5-3}{5} \\ \text{or } &40\% \text{ to } 33\frac{1}{3}\% \end{aligned}$$

The new figures of sales will therefore have to be :

$$\frac{F+P}{P/V \text{ ratio}} \text{ or } \frac{10,000 + 10,000}{33\frac{1}{3}\%} = 60,000$$

That is now, 13333.3 units will have to be sold to maintain the same old profit of Rs. 10,000.

From the above illustration, it is evident that if management proposes to reduce prices by 10% the sales must rise by 1/3 to maintain the amount of profit earned before the reduction of price. The effect of price reduction is always to reduce the P/V ratio, to raise the B.E.P. and to shorten the margin of safety. It is therefore a serious decision to make.\*

### Margin of safety

The margin of safety is the difference between actual sales and the sales at break even point. It is always desirable to keep the sales above the break even point. The margin of safety at break even point is nil. If the margin of safety is small any fall in sales may be a serious matter.

The management should take immediate steps to improve the unsatisfactory margin of safety, which may be the following :

- (i) Take steps to reduce variable costs ;
- (ii) Take steps to reduce fixed costs ;
- (iii) Take steps to increase selling price ; and
- (iv) increase the sales volume.

Margin of safety can be expressed as :

$$\text{Margin of safety} = \text{Sales Volume} - \text{Sales at Break even point.}$$

**Illustration 2:** Selling price per unit is Rs. 15. Variable cost per unit is Rs. 9. Fixed Cost is Rs. 2400.



Management proposes to reduce the selling price by Rs. 3. What will be the effect of this decision on P/V ratio.

B.E.P. and margin of safety ?

**Solution :**

$$\text{P/V ratio} = \frac{\text{Contribution margin}}{\text{Selling Price}} = \frac{6}{15} \times 100 = 40\%$$

If the selling price is reduced by Rs. 3, the P/V ratio will come down as below :

$$\text{New P/V ratio} = \frac{12-9}{12} = \frac{3}{12} = 25\%$$

Hence the effect of reduction in price will be a fall in P/V ratio from 40% to 25%. And now we shall see how it would affect B.E.P.

$$\begin{aligned} \text{B.E.P.} &= \frac{\text{Fixed Cost}}{\text{Contribution per unit}} \\ &= \frac{2400}{(15-9)} = \frac{2400}{6} = 400 \text{ units.} \end{aligned}$$

Any reduction in selling price bound to raise the B.E.P.

$$\begin{aligned} \text{New B.E.P.} &= \frac{2400}{(12-9)} = \frac{2400}{3} \\ &= 800 \text{ Units.} \end{aligned}$$

Hence the Break even point has gone up by 400 units. This can also be calculated in other way.

$$\begin{aligned} \text{B.E.P.} &= \frac{\text{Fixed Cost} \times 1}{\text{P/V ratio}} \\ &= \frac{2400}{40\%} \text{ Rs. } 6000. \\ &= \frac{6000}{\text{S.P. per unit (15)}} = 400 \text{ Units} \end{aligned}$$

$$\begin{aligned} \text{New B.E.P.} &= \frac{2400}{25\%} = \text{Rs. } 9600 \\ &= \frac{9600}{12 \text{ (proposed S.P.)}} = 800 \text{ Units} \end{aligned}$$

$$\begin{aligned} \text{Margin of Safety} &= \text{Sales Volume} - \text{Sales at B.E.P.} \\ &= 1000 - 400 \text{ Units} = 600 \text{ Units.} \end{aligned}$$

When the selling price is reduced margin of safety is also reduced.

$$\text{New margin of safety} = 1000 \text{ Units} - 800 \text{ Units} = 200 \text{ Units.}$$

Hence margin of safety has gone down by 400 units.

#### When to sell below Marginal Cost

Normally, selling price should not be fixed below marginal cost or equal to marginal cost because it does not make any contribution. If this policy is prolonged, the company



will run into difficulties. Selling price below total cost may be justified in the following cases :—

1. As a tactical move to eliminate the weaker competitors from the market.
2. To popularise a new product in the market.
3. To help in the sale of a conjoined product which is making considerable profits.
4. To dispose of perishable goods.
5. To meet the trade crises. It is better to incur some losses during the period of crises rather than closing down the business.
6. To prevent loss of future orders because other products or firms may take its place and then it may become difficult to recover the trade.
7. To maintain production and keep the employees occupied.
8. To follow a policy of differential selling. Products may be sold in the foreign markets at a price below total cost to attract foreign business

### Key Factor

A key factor is that factor which limits the volume of production. Every business house wants to earn maximum profits but there are certain factors which limit this objective. Usually, sales is the key factor. Sometimes, a product may be in more demand than its production and in such cases production is limited by some other factors, like plant capacity shortage of raw material, labour etc.

When a key factor exists, the best position is reached when contribution margin per unit of key factor is maximum. For instance, if an industry is established in a new industrial town and there a particular type of skilled labour is in scarcity. Suppose there is a move to increase production requiring labour of that kind and that labour is not found. The limiting factor in this case becomes the availability of labour and not the sales.

### Break Even Charts

A break even chart is a graphic presentation of marginal costing. It shows the varying costs along with varying sales revenues. It shows the break even point and also indicates the estimated profit or loss at different levels of activity. No doubt, break even analysis is primarily a mathematical technique but it can be depicted in the break even chart with some clarity. 'As an aid to management, and in order to obtain a clearer view of the position of a business, it is often, desirable to construct what is known as a break even chart'. (Wheldon)

There are two ways of preparing break even charts, shown in Fig. 1 and Fig. 2. In either case the Y axis (vertical) corresponds to sales and costs, and the X axis (horizontal) to output. Now we shall try to explain these two methods with the help of an illustration given below :



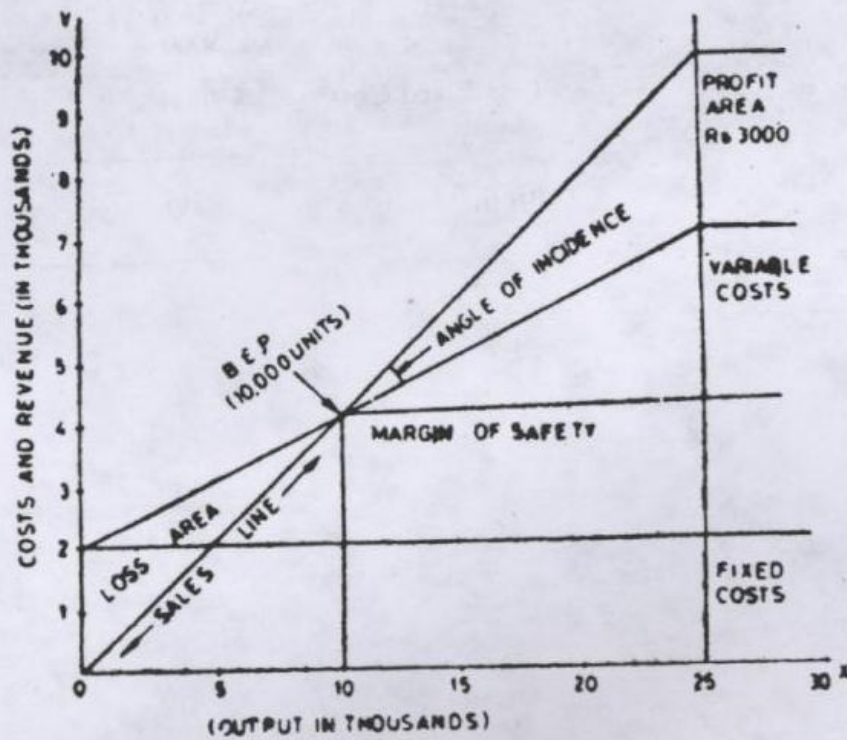
## Illustration :

Production	Fixed Costs (Rs.)	Variable Cost per unit (Rs.)	Sales (Rs.) (40 per unit)
5,000	2,000	20	2,000
10,000	2,000	20	4,000
15,000	2,000	20	6,000
20,000	2,000	20	8,000
25,000	2,000	20	10,000

From the above data calculate the break even point and also the profit if sale is of 25,000 units.

## First Method

On the X axis of the graph is plotted the number of units produced, sold and the Y axis are shown costs and sales revenues.



(Break Even Chart I)



Fixed cost line is drawn parallel to X axis which shows that fixed cost remains the same with any volume of production. The variable cost line is drawn over the fixed line. This line can also be called as total cost line because it starts from the point where fixed cost has been incurred and variable cost is zero. Sales values at various levels of output are plotted, joined and the resulting line is the sales line. The point of intersection of sales line and total cost line is the break even point. It is that point where total cost is equal to total revenue. In our example the-B.E.P. is 10,000 units or Rs. 4,000. If the sales volume is more than B.E.P., it will result in profit and if production is less than this point, it will result into loss. Loss and profit areas have been shown in the chart. Let us verify the break even chart with the help of formula.

By formula.

$$\text{Sales at B.E.P.} = \frac{\text{Fixed Cost}}{\text{Contribution}}$$

$$= \frac{200}{.20}$$

$$= 10,000 \text{ Units}$$

$$\text{or } = 10,000 \times .40 = 4,000 \text{ Rs.}$$

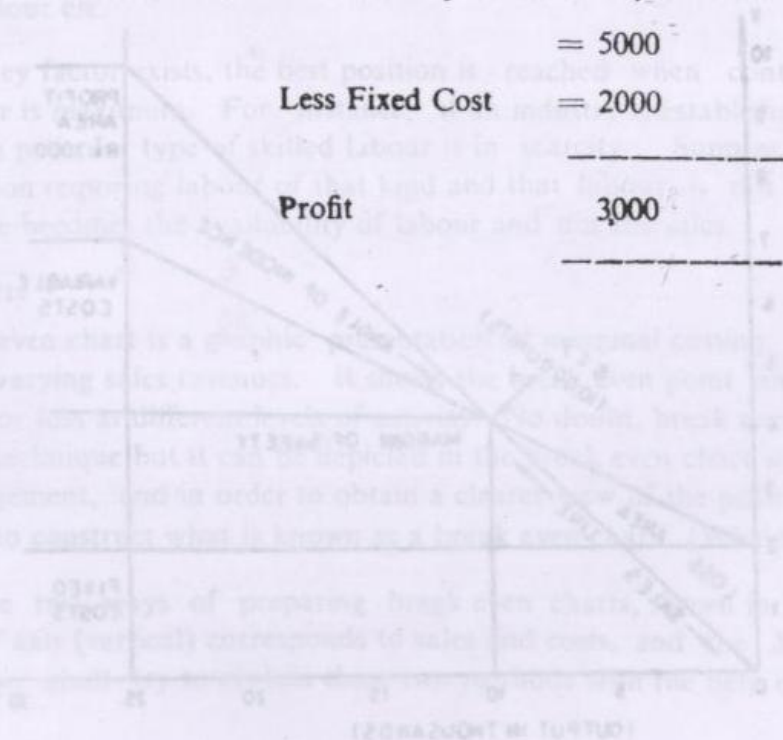
Profit when output is 25,000 Units.

$$\text{Contribution made by 25,000 units @ .20 per unit} = 25,000 \times .20$$

$$= 5000$$

$$\text{Less Fixed Cost} = 2000$$

$$= 3000$$

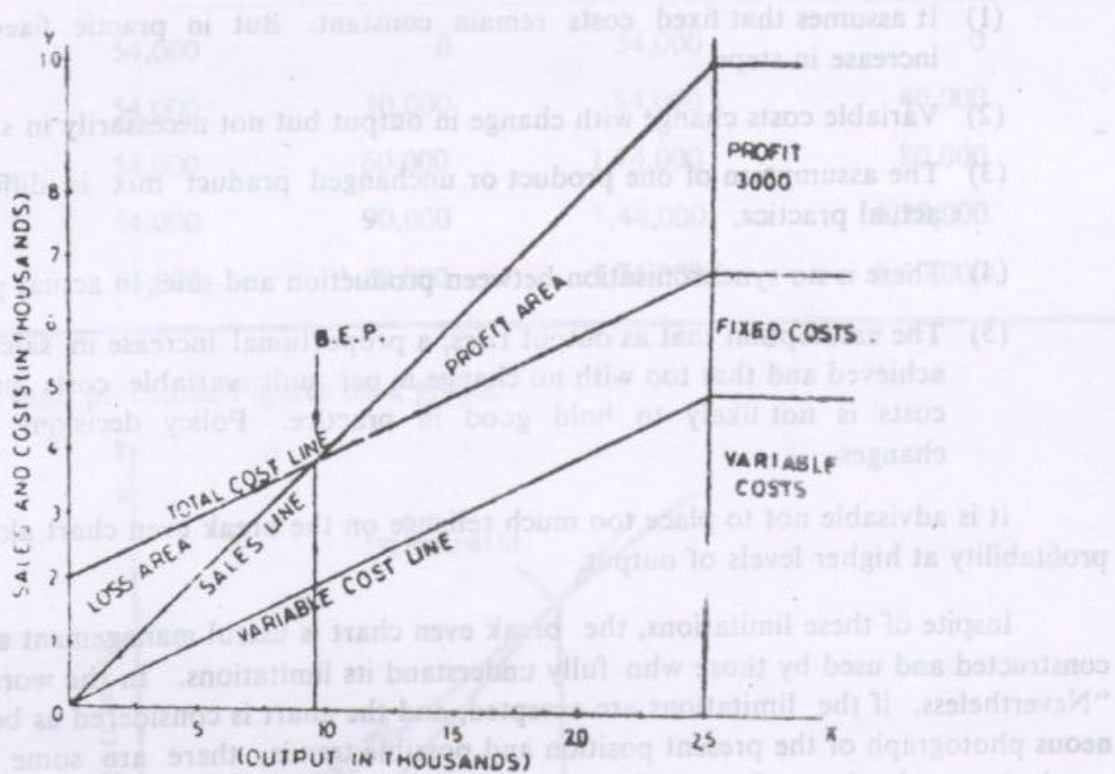


(Break Even Chart I)



### Second Method

In the second method, the variable cost line is plotted first and then fixed cost line is drawn over the variable cost line. The resulting line is the total cost line because it represents both fixed cost and variable cost at different levels of output. This is shown in break even chart II.



This method is better in comparison to the first method because it indicates the recovery of fixed costs at various levels of production before profits are realised. Contributions made at various levels of output are automatically disclosed in the chart.

#### Assumptions in preparing break even charts

The assumptions underlying break even charts are as under :—

- (1) All costs can be separated into fixed costs and variable costs.
- (2) Fixed costs remain fixed with changes in volume of output.
- (3) Variable cost fluctuates in direct proportion to volume of output.
- (4) Selling price remains constant.
- (5) Output and Sales will be synchronised. *i.e.*, there will be no opening or closing stock.
- (6) Operating efficiency will remain the same.
- (7) There is only one product or in the case of multiple products, the product mix will remain unchanged.



### Limitations of Break Even Charts

A break even chart is based on a number of assumptions which may not hold good. In actual practice, the break even charts are unlikely to look like straight line graphs. Straight lines are possible only when all the assumptions hold good. Limitations of break even charts can be summarised as under :—

- (1) It assumes that fixed costs remain constant. But in practice fixed costs tend to increase in steps.
- (2) Variable costs change with change in output but not necessarily in same proportion.
- (3) The assumption of one product or unchanged product mix is difficult to find in actual practice.
- (4) There is no synchronisation between production and sales in actual practice.
- (5) The assumption that as output rises, a proportional increase in sales revenue can be achieved and that too with no change in per unit variable costs or in total fixed costs is not likely to hold good in practice. Policy decisions often cause such changes.

It is advisable not to place too much reliance on the break even chart alone to judge the profitability at higher levels of output.

In spite of these limitations, the break even chart is useful management aid provided it is constructed and used by those who fully understand its limitations. In the words of Wheldon, "Nevertheless, if the limitations are accepted, and the chart is considered as being an instantaneous photograph of the present position and possible trends, there are some very important conclusions to be drawn from such a chart.

**Problem :** From the following figures prepare a break even chart and find out the B.E.P.

Variable cost per unit	Rs. 15
Fixed costs	Rs. 54,000
Selling price per unit	Rs. 20

What should be the selling price per unit, if the break even point is brought down to 6000 units ?

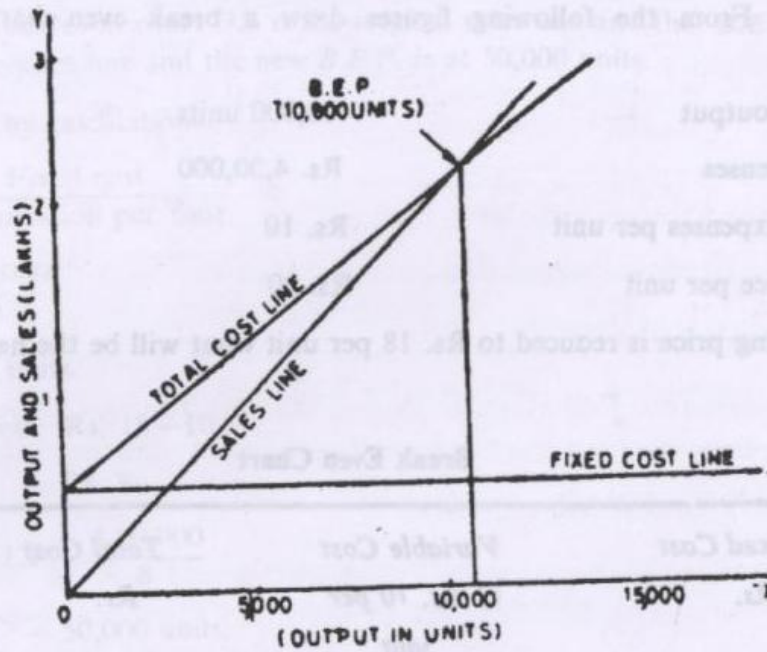


Solution :

**Break Even Chart**

Units	Fixed Costs Rs.	V. Cost @ Rs. '15 per unit	Total Cost Rs.	Sales @ Rs. '20 per unit
0	54,000	0	54,000	0
2000	54,000	30,000	84,000	40,000
4000	54,000	60,000	1,14,000	80,000
6000	54,000	90,000	1,44,000	1,20,000
8000	54,000	1,20,000	1,74,000	1,60,000

Now we shall plot these Figures on a graph.



(Break Even Chart III)

Verification by calculations :

$$\begin{aligned} \text{B.E.P.} &= \frac{\text{Fixed cost}}{\text{Contribution per unit}} \\ \text{or} &= \frac{54,000}{5} \\ &= 10,800 \text{ units.} \end{aligned}$$



Selling price if B.E.P. is to be brought down to 6000 units

$$\text{B.E.P.} = \frac{\text{Fixed cost}}{\text{Contribution per unit}}$$

$$\text{or, contribution} = \frac{\text{Fixed cost}}{\text{B.E.P.}}$$

$$\text{or, contribution} = \frac{54,000}{6,000}$$

$$= 9 \text{ per unit}$$

Selling price = Variable cost + contribution

$$\text{or, Rs. } 15 + \text{Rs. } 9$$

$$\text{or, Rs. } 24.$$

So new selling price to give a break even point of 6000 units is Rs. 24.

**Problem.** From the following figures draw a break even chart showing break even point :

Budgeted output	80,000 units
Fixed expenses	Rs. 4,00,000
Variable expenses per unit	Rs. 10
Selling price per unit	Rs. 20

If the selling price is reduced to Rs. 18 per unit what will be the new break even points ?

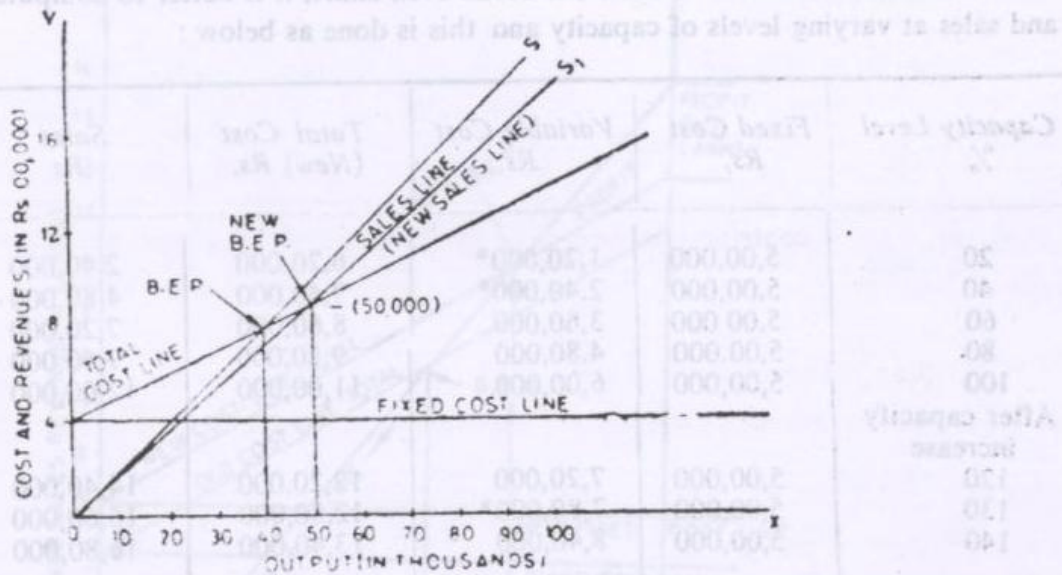
**Solution :**

**Break Even Chart**

Units	Fixed Cost Rs.	Variable Cost @ Rs. 10 per unit	Total Cost Rs.	Selling price @ Rs. 20 per unit
0				
20,000	4,00,000	2,00,000	6,00,000	4,00,000
40,000	4,00,000	4,00,000	8,00,000	8,00,000
60,000	4,00,000	6,00,000	10,00,000	12,00,000
80,000	4,00,000	8,00,000	12,00,000	16,00,000



Now we shall plot these figures on the graph paper.



In the above break even chart  $OS$  is the original sales line and the  $B.E.P.$  is at 40,000 units.  $OS'$  is the new sales line and the new  $B.E.P.$  is at 50,000 units.

Let us verify it by calculations.

$$B.E.P. = \frac{\text{Fixed cost}}{\text{Contribution per unit}}$$

$$\text{or } = \frac{4,00,000}{10}$$

$$= 40,000 \text{ units.}$$

$$\text{New contribution} = \text{Rs. } 18 - 10$$

$$= \text{Rs. } 8.$$

$$\text{New B.E.P.} = \frac{4,00,000}{8}$$

$$= 50,000 \text{ units.}$$

**Problem.** Following figures relate to a manufacturing company.

Annual sales at 100% effective capacity Rs. 12,00,000

Fixed overheads Rs. 4,00,000

Total variable costs Rs. 6,00,000

It is proposed to increase the capacity by acquisition of 30% additional space and pl which will result in increase of fixed overheads by Rs. 1,00,000 per annum.

Plot the foregoing figures on a single break even chart and determine from the chart what capacity utilisation the same profit as before will be produced after the extensions been made.

**Solution :** Before we draw the break even chart, it is better to compute the total costs and sales at varying levels of capacity and this is done as below :

Capacity Level %	Fixed Cost Rs.	Variable Cost Rs.	Total Cost (New) Rs.	Sales Rs.	Total Cost (Old) Rs.
20	5,00,000	1,20,000*	6,20,000	2,40,000	5,20,000
40	5,00,000	2,40,000*	7,40,000	4,80,000	6,40,000
60	5,00,000	3,60,000	8,60,000	7,20,000	7,60,000
80	5,00,000	4,80,000	9,80,000	9,60,000	8,80,000
100	5,00,000	6,00,000	11,00,000	12,00,000	10,00,000
After capacity increase					
120	5,00,000	7,20,000	12,20,000	14,40,000	
130	5,00,000	7,80,000*	12,80,000	15,60,000	
140	5,00,000	8,40,000	13,40,000	16,80,000	

$$* \left[ 6,00,000 \times \frac{20}{100} \right], \left[ 6,00,000 \times \frac{40}{100} \right], \left[ 6,00,000 \times \frac{130}{100} \right]$$

**Verification :**

$$S - V = \text{Fixed Expenses} + \text{Profit}$$

$$1,20,000 - 6,00,000 = 4,00,000 + \text{Profit.}$$

$$2,00,000 = \text{Profit.}$$

Therefore contribution at 100% capacity is Rs. 6,00,000.

After extensions the fixed overheads shall become.

Rs. 5,00,000 (Rs. 4,00,000 + 1,00,000).

The contribution which was earlier Rs. 6,00,000 should now be Rs. 7,00,000 for having the same profit as before (Rs. 5,00,000 + Rs. 2,00,000) i.e., Fixed expenses + profits.

A contribution of 6,00,000 is obtained from a capacity utilisation of 100%.

∴ contribution of 7,00,000 shall be received from the capacity utilisation of

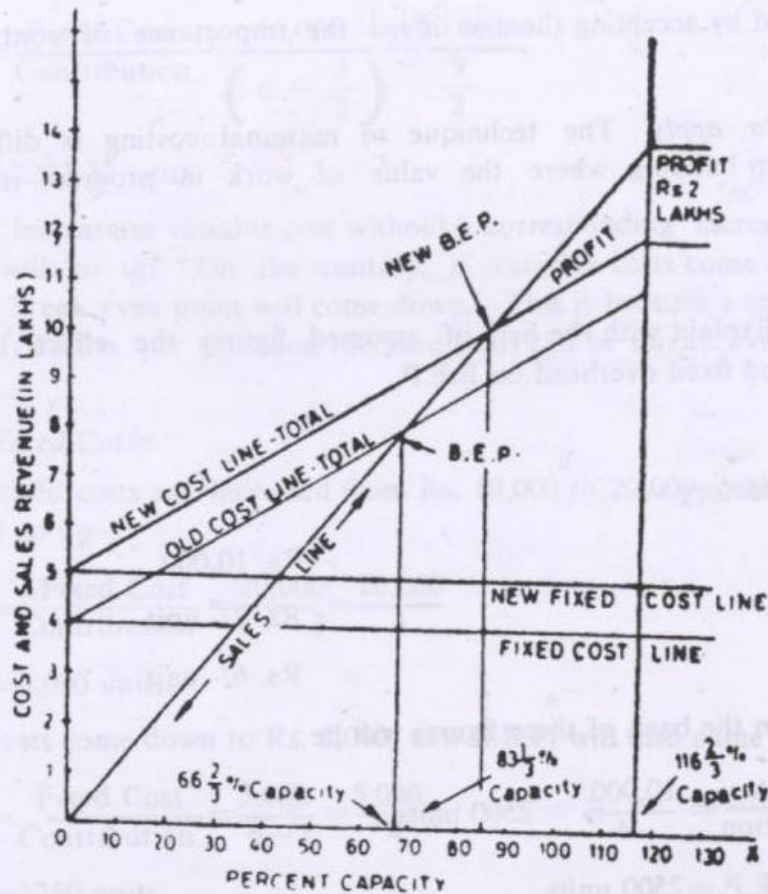
$$\frac{100}{6,00,000} \times 7,00,000 = 116\frac{2}{3}\%$$

Therefore the capacity should be used to 116 $\frac{2}{3}$ % to have the same profits as before.

Please see that the plant capacity is increased by 30% now. That means the present 100% capacity is equal to the old 130% capacity. Therefore capacity utilisation in terms of

$$\text{expended capacity is} = \frac{116\frac{2}{3} - 100}{130} = 89.75\%$$





At 116 $\frac{2}{3}$ % capacity (or 89.75% in items of expanded capacity) the same amount of profit shall be earned after the extensions have been made.

### Limitations of Marginal Costings

1. *Artificial classification.* Marginal costing assumes that all expenses can be classified into fixed and variable expenses. It is difficult to analyse all costs into fixed and variable elements. Certain expenses are partly fixed and partly variable and their separation is based on assumptions and not on facts. It also ignores the important fact that certain expenses like bonus to workers, perquisites to employees have no relation to volume of output or with the time factor because these are results of purely management decisions. In reality, all costs are variable in the long run.

2. *Time factor.* Time factor is not given due care because this technique ignores fixed expenses which are connected with time factor. Fixed expense has to be given due attention if comparison of two jobs is to be made. Suppose marginal cost of two jobs is identical, but job A takes twice the time job B, naturally the cost of job A should be more but this fact is not disclosed under marginal costing system.

3. *Faulty decisions.* If fixed costs are completely ignored, decisions taken by management are bound to be deceptive. With the introduction of costly automatic machine, the importance of fixed costs is increasing day by day.

4. *Controllability.* The importance of controlling fixed costs is completely ignored. No doubt, fixed costs can also be controlled by budgetary control but by placing them in a

separate category and by accepting them as fixed the importance of controllability of fixed costs is undermined.

5. *Difficult to apply.* The technique of marginal costing is difficult to apply in industries such as ship building where the value of work in progress is high in relation to turnover.

### Typical Problems

**Problem 1.** Explain with the help of assumed figures the effect of changes in sales price variable cost and fixed overhead on B.E.P.

**Solution :**

Suppose in a factory—

Fixed costs	Rs. 10,000
Variable costs	Rs. 2/- unit
Selling price	Rs. 6/- unit

Now B.E.P. on the basis of these figures will be

$$\frac{\text{Fixed costs}}{\text{Contribution}} = \frac{10,000}{4} = 2500 \text{ units.}$$

$$\text{B.E.P.} = 2500 \text{ units.}$$

### Effect of change in Selling price

Suppose the selling price is increased from Rs. 6 to Rs. 7 then the new break even point will be—

$$\text{New B.E.P.} = \frac{10,000}{7-2} = \frac{10,000}{5} = 2000 \text{ units.}$$

Suppose the selling price is reduced to Rs. 5 then the new B.E.P. will be—

$$\text{New B.E.P.} = \frac{10,000}{(5-2)} = \frac{10,000}{3} = 3333.33 \text{ units.}$$

Hence we can conclude that with an increase in selling price, other costs remaining constant, break even point will come down. On the contrary, if the selling price is reduced, it will reduce the contribution per unit and hence break even point will shoot up.

### Effect of change in variable cost

Suppose the variable cost is increased from Rs. 2 to Rs. 3 the new B.E.P. will be—

$$\text{B.E.P.} = \frac{\text{Fixed Cost}}{\text{Contribution}} = \frac{10,000}{(6-3)} = \frac{10,000}{3}$$

$$\text{New B.E.P.} = 3333.33 \text{ units.}$$

Suppose the variable cost is reduced from Rs. 2 to Rs. 1.50 then the new B.E.P. will be



$$\text{New B.E.P.} = \frac{\text{Fixed Cost}}{\text{Contribution}} = \frac{10,000}{\left(6 - \frac{3}{2}\right)} = \frac{10,000}{\frac{9}{2}}$$

= 2222.22 units.

Thus with an increase in variable cost without a corresponding increase in selling price, break even point will go up. On the contrary, if variable costs come down, other factors remaining the same, break even point will come down. This is because a reduction in variable costs increases contribution per unit and the fixed costs can be spread over a smaller number of units.

#### Effect of change in Fixed Costs

Suppose the fixed costs and increased from Rs. 10,000 to 20,000, other factors remaining the same B.E.P. will go up—

$$\text{New B.E.P.} = \frac{\text{Fixed Cost}}{\text{Contribution}} = \frac{20,000}{6 - 2} = \frac{20,000}{4}$$

= 5,000 units.

If the fixed costs come down to Rs. 5,000, new B.E.P. will also come down—

$$\text{New B.E.P.} = \frac{\text{Fixed Cost}}{\text{Contribution}} = \frac{5,000}{6 - 2} = \frac{5,000}{4}$$

= 1250 units.

Hence with an increase in fixed costs, other factors remaining the same break even point goes up and with a fall in fixed costs break even point also comes down. The whole thing can be summarised as :

Increase in variable cost	B.E.P. increases
Decrease in variable cost	B.E.P. decreases
Increase in selling price	B.E.P. decreases
Decrease in selling price	B.E.P. increases
Increase in fixed cost	B.E.P. increases
Decrease in fixed cost	B.E.P. decreases

**Problem 2.** From the following figures determine the B.E.P. :

	Rs.
Selling price per unit	10
Direct material per unit	3
Direct labour per unit	2
Fixed overheads	10,000
Variable overheads are 100% on direct labour cost. Sales are at 5% trade discount.	
Determine the net profits, if sales are 10% and 25% above the break even point.	

**Solution :**

	Rs. P.
Selling price per unit less 5% T.D.	9.50
Less variable costs :	
Direct material per unit	3.00
Direct labour per unit	2.00
Variable over heads per unit	2.00
	7.00
Contribution per unit	2.50

$$\text{B.E.P.} = \frac{\text{Fixed cost}}{\text{Contribution}}$$

$$= \frac{10,000}{2.50}$$

$$= 4,000 \text{ units}$$

Sales at B.E.P. are  $= 4,000 \times 10 = \text{Rs. } 40,000$

When sales are 10% above the B.E.P. the contribution

	Rs.
$= 2.50 \times 4400$	= 11,000
Less Fixed Cost	= 10,000
	= 1,000
Net Profit	1,000

When sales are 25% above the B.E.P. the contribution

	Rs.
$= 2.50 \times 5000$	= 12,500
Less Fixed Cost	= 10,000
	= 2,500
Net Profit	2,500

**Problem 3.** The Containers and Cases Private Limited produces and markets containers. Due to competition company proposes to reduce the selling price. If the present level of profit is to be maintained, indicate the number of units to be sold if the proposed reduction in selling price is :

- (a) 5%, (b) 10% and (c) 15%



The following additional information is available :

	Rs.	Rs.
Present sales turnover (30,000 units)		3,00,000
Variable cost (30,000 units)	1,80,000	
Fixed costs	<u>70,000</u>	
		<u>2,50,000</u>
Net Profit		<u>50,000</u>
		=====

**Solution :**

	Rs.
5% Reduced selling price	9.50
10% Reduced selling price	9.00
15% Reduced selling price	8.50

Contribution at various selling prices :

	Present price	Reduced prices		
		5%	10%	15%
	Rs.	Rs.	Rs.	Rs.
Sale price	10.00	9.50	9.00	8.50
Variable cost	6.00	6.00	6.00	6.00
Contribution per unit	<u>4.00</u>	<u>3.50</u>	<u>3.00</u>	<u>2.50</u>
	====	====	====	====

Total contribution needed

Fixed expenses	70,000	$\frac{1,20,000}{4}$	$\frac{1,20,000}{3.50}$	$\frac{1,20,000}{3}$	$\frac{1,20,000}{2.50}$
Profit at present	<u>50,000</u>				
Contribution	<u>1,20,000</u>				
Desired units		30,000	34,286	40,000	48,000

B. Com. III Year

COMMERCE

Paper XII Cost Accounting

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ACADEMIC SESSION 2013-14

1. Give the method of costing and the unit of cost in the case of industries mentioned below :

- (i) Shipping
- (ii) Ship-building
- (iii) Vegetable Ghee
- (iv) Water Supply
- (v) Hospital
- (vi) Bicycles
- (vii) Road transport
- (viii) Wholesale trade
- (ix) Building construction

25

2. From the following information, state the per unit cost of production (total production 1,00,000 units and the total profit).

	Rs.	
Direct Materials	1,50,000	
Direct Wages	1,00,000	
Factory Expenses	80,000	
Selling Expenses	60,000	
Office Expenses	50,000	
Sales (9,00,000 Units)	4,50,000	25

3. Distinguish between direct and indirect expenses, and between fixed and variable expenses.

25

4. Define Cost Accounting and give its advantages.

25



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### ACADEMIC SESSION 2013-14

Attempt any two questions :—

1. Write up the Stores Ledger Account under the FIFO and LIFO basis for the following transactions :—

Jan.	15	Purchased	100	units	@ Rs. 5.00 each
	31	"	25	"	Rs. 5.25 "
Feb.	4	Issued	80	"	
	14	Purchased	50	units	@ Rs. 5.75 each
Mar.	6	"	50	"	Rs. 5.50 "
	20	Issued	80	"	
	27	"	40	"	

Also ascertain the value of the stock in hand on LIFO basis on weighted average basis. 50

- What do you understand by Maximum level, minimum level and ordering level of stores and stocks? What factors are taken into accounts in fixing these limits?
- (a) Describe a Bin Card and explain the various particulars which should be given in this Card.  
(b) What do you understand by perpetual inventory system? What are its advantages and how is it applied?

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**ACADEMIC SESSION 2013-14**

**LABOUR**

Attempt any two questions :—

1. The standard time for a job No. 153 is 25 hours and the hourly rate Rs. 1:40. The worker completes it in 18 hours. State the hourly earning of the worker on :

(i) Time basis ; (ii) Piece basis ; (iii) Halsey basis and (iv) Rowan basis.

2. Write notes on ;

(i) Over-time

(ii) Direct Labour

(iii) Piece-work Card

(iv) Deductions from Wages.

3. Give the procedure for preparing the wages-sheet.

4. Compare the time basis and the piece-basis for paying wages.



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ACADEMIC SESSION 2013-14

OVERHEADS (I)

1. How will you categorize the undermentioned expenses into the various types of overheads? 25

- (i) Pay-roll Expenses
- (ii) Canteen Expenses
- (iii) Expenses of the Delivery Van
- (iv) Office Stationery
- (v) Power
- (vi) Lighting
- (vii) Telephone and Postage
- (viii) Store-keeper's Salary
- (ix) Depreciation on Accounting Machines
- (x) Catalogues.

2. How will you treat the following in Cost Accounts? 25

- (i) Maternity Leave Pay
- (ii) Laboratory Expenses
- (iii) Bad Debts
- (iv) Neon Sign
- (v) Exhibition Expenses.

3. (i) What are cost centres?

(ii) What are the basis for apportioning common expenses over various departments?

(iii) Why should expenses be estimated by department?

4. On the basis of the information given below for 1993 prepare an estimate for 1994 in which output is likely to be 1,40,000 units

Output	1,20,000 units
Materials used	Rs. 10,80,000
Labour	Rs. 7,20,000
Factory Overheads—Fixed	Rs. 4,00,000
Variable	Rs. 3,60,000
Office Overheads	Rs. 2,80,000

It is expected that in 1994 wages rates will be 5% higher as compared to 1993 25







3. What are the main group into which the cost involved in a manufacturing business are sub-divided? In illustration of your reply group the following component charges :—

Bank Charges	Manager's Salaries	
Coal, Coke and Power	Materials and Charges thereon	
Depreciation, Plant	Office Salaries	
Drawing Office Charges	Rent, Factory	
Foremen's Wages	Repairs to Plant	
Labour	Traveller's Salaries	20

4. The World Bank has invited global tender. Prepare a cost sheet of structural to find out the tender price to be quoted with the help of the following information :—

Total production	1,000 tons
	Rs.
Cost of Raw Material	20,00,000
Carriage Inwards	20,000
Direct Wages	10,00,000
Indirect Wages in Works	1,00,000
Salary of Works Director	5,000
Office Expenses	2,00,000
Salary of Managing Director	20,000
Directors Fees	15,000
Selling & Distribution Overheads	2,00,000
Expenses on Testing Laboratory for Works	10,000
Payment of Income Tax	3,00,000
Dividend paid	3,00,000

Assume a profit margin of 40% on total cost. 20

5. Form the following information compute machine hour rate of charging overhead :—

Cost of machine Rs. 55,000	
Estimated Scrap Value Rs. 3,400	
Effective Working life 1,00,000 hours.	
Repairs estimated during the life of the machine Rs 7,500	
Standing charges of shop for 4 weeks—Rs. 8,550	
Hours worked in four-weekly period 1200	
Number of machines in shop bearing equal charge 30	
Power used by each machine—5 units per hour costing 5 Paise per unit.	20



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Paper XIII Cost Accounting

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Q. 1 Denne output costing. Mention the undertakings to which it is most suited.

Q. 2 What are cost sheets ? What are their advantage ? How do they differ from Production Account ?

Q. 3 The Accounts of Zeenat Manufacturing Company for the year ended 31st Dec. 993 show the following :

	Rs.
Drawing office salaries	6,500
Counting Houae salaries	12,600
Cash discounts allowed	2,900
Carriage and Cartage outwards	4,300
Bad-debts written off	7,150
Repairs of Plant, Machinery & Tools	6,500
Rent, Rates, Taxes and Insurance (Factory)	8,500
Rent, Rates, Taxes and Insurance (Office)	2,000
Sales	4,61,000
Stock of materials—31st Dec. 1992	60,800
Stock of materials-31st Dec. 1993	46,000
Material purchased	1,85,000
Travelling expenses	2,100
Traveller's salaries and Commission	7 700



Productive salaries and Commission Productive wages	1,26,000
Depreciation written off on Plant, Machinery and Tools	6,500
Depreciation written off on office furniture	300
Director's fees	6,000
Gas and Water (Factory)	1,200
Gas and Water (Office)	400
Manager's salaries (3/4th Factory 1/4th office)	10,000
General Expenses	3,400

Prepare statements giving the following informations :

- Materials consumed
- Prime cost
- Factory overhead and percentage on wages
- Factory cost
- General overhead and its percentage on Factory cost.
- Total cost, and
- Net Profit.

Q. 4. M/s A,B, Shoes Co manufactures two types of Shoes A and B. Production costs for the year ended 31st March 1993 were.

	Rs.
Direct Material	15,00,000
Direct Wages	8,40,000
Production Overhead	3,60,000
	<hr/>
	27,00,000
	<hr/>

There was nowork-in-progress at the beginhing or at the end of year. It is ascertained that (a) Direct Material in type A shoes consists of twice as much as that in type B shoes. (b) The direct wages for type B shoes were 60% of those of type A shoes. (c) Production overhead was the same per pair of A and B type (d) Administrative overhead for each type was 150% of direct wages. (e) selling cost was Rs. 1.50 per pair ( f ) Production during the year were : Type A 40,000 pairs of which 36,000 were sold : Type B 1,20,000 pairs of which 1,00,000 were sold selling price was (g) Rs. 44 for type A and Rs. 28 for type B per pair. Prepare a statement showing Cost and Profit.

*Hints* Distribute production overhead in the ratio of Production as charge for each pair is same.

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Paper XII Cost Accounting

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### ACADEMIC SESSION 2013-14

1. What do you mean by job costing ? What are its advantages and limitations ?
2. Explain the procedure of recording the various costs in job costing system.
3. Explain with specimen rulings wherever possible :
  - (a) Production Order,
  - (b) Cost Sheet,
  - (c) Job Ticket,
  - (d) Bill of Materials.
4. The following figures have been obtained from the cost records of M/s Job Works Ltd. for the year 1993

	Rs.
Cost of Materials	80,000
Wages	40,000
Factory overhead	30,000
Distribution Expenses	15,000
Administrative Expenses	30,000
Selling Expenses	25,000
Profl.	34,000
	-----



( ii )

A work order has been executed in 1994 and the following expenses have been incurred ;

	Rs.
Cost of Materials	8,000
Wages	5,000

Assuming that in 1994 the rate for factory overhead has gone up by 20% distribution charges have gone down by 10% and selling and administration charges have gone up by 12½%, at what price should the product of the job be quoted so as to earn the same rate of profit on the selling price ?

Distribution, administration and selling expenses are based on the factory cost.

5. M/s Bharat Engineers supply you the following information recorded in their cost ledger relating to Job BE/ATR/21/93 .

Material.....Rs. 3,900.

#### Wages

Department A	.....70 Hrs. @ Rs. 3 per Hr.
„ B	.....100 Hrs. @ Rs. 2 per Hr.
„ C	.....20 Hrs. @ Rs. 2 per Hr.

Overhead expenses for these three departments were estimated as follows :

#### Variable overhead :

Department A Rs. 5,000 for 5000 Labour Hours

Department B Rs. 3,000 for 1500 Labour Hours

Department 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 the said job and the price to give profit of 25% on cost.

B. Com. III Yr.

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## Paper XII Cost Accounting

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## ACADEMIC SESSION 2013-14

1. Why is reconciliation of cost and Financial accounts necessary and under what circumstances & reconciliation Statement can be avoided.
2. Discuss the accounting procedure that is usually adopted in order to reconcile cost and financial accounts at the end of an accounting period.
3. 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 overhead under recovered in costing	3,120
Administrative overhead recovered in Excess	1,700
Depreciation charge in Financial records	11,200
Depreciation recovered in cost	12,500
Interest received but not included in costing	8,000
Obsolescenc loss charged in financial records	5,700
Income tax provided in financial records	750
Stores adjustments (credit in financial books)	475
Depreciation of stock charged in financial books	6,750



4. From the following particulars prepare :

- (i) A statement of cost of manufacture for the year 1993
- (ii) A statement of profit as per cost accounts and
- (iii) Profit and loss account in the financial books and show how your would attribute the difference in the profit as shown by (ii) and (iii)

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	45,000
Stock of finished goods at the end	15,000
Wages	75,000

Calculate the Factory on cost at 25% on Prime Cost and Office on cost at 75% on factory on cost.

Actual works expenses amounted to Rs. 58,125 and and Actual Office evpenses amounted to Rs. 45,750.

The selling pr.ce was fixed at a profit of 25% on on cost.

**Ans.** (Profit as per cost books Rs. 97,500 and prfit as per financial records Rs. 98,625)

B. Com. III Yr.

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COMMERCE

Paper XII Cost Accounting

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**ACADEMIC SESSION 2013-14**


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1. What do you mean by process costing? What are its characteristics and general principles?
2. Explain in brief the costing procedure for various elements of costs under process costing. What are the advantages and limitations of process costing?
3. There may be both normal and abnormal losses in a process costing industry but the treatment of the two is different and needs careful attention? Elucidate this statement with the help of an illustration.
4. The following particulars for the last process are given :

	Units	Rs.
Transfer to the last process at cost 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 is absorbed @ 40% of direct materials Allowance for normal loss is 20% of Units Worked the scrap value is Rs. 5 per unit.



You are required to prepare :

- Last process account.
- Normal Wastage account.
- Abnormal effective account.

5. M Ltd. processes a parent material used in buildings the material is produced in their consecutive grade—soft, medium and hard.

	Process I	Process II	Process III
Raw material used	1,000 tonnes	Rs. 200	
Manufacturing Wages and expenses	87,500	39,500	10,710
Weight loss (% of input of the process)	5%	10%	20%
Scrap (sale price Rs. 50 per tonne)	50 tonne	30 tonnes	51 tonnes
Sale price per tonne	350	500	800

Management expenses were Rs. 17,500 and selling expenses Rs. 10,000 Two thirds of the out-put of Process I and one-half of the out-put of Process II are passed on to the next process and the balances are sold. The entire out-put of process III is sold. Prepare the three process accounts and a statement of profit. Make approximations where necessary.

B. Com. III Yr.

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## Paper XII Cost Accounting

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## ACADEMIC SESSION 2013-14

1. (a) From the following particulars draw a Break even chart and find out the break even point :
 

Variable Cost-per unit	Rs. 15
Fixed expenses	Rs. 54,000
Selling price per unit.	Rs. 20
- (b) What should be the selling price per unit, if the break-even point should be brought down to 6,000 units?
2. A Company has fixed expenses of Rs. 90,000 on with sales at Rs.3,00,000 earned a profit of Rs. 60,000. Calculate the Profit/Volume ratio. If in the next-period, the Company suffered a loss of 30,000, Calculate the sales volume. (b) What is the margin of safety for a profit of Rs. 60,000 in (a) above ?
3. The Profit/Volume ratio of Harsa Ltd. is 50% and the margin of safety is 40%. You are required to work out two net profit and the break—even point of sales volume is Rs. 10,00,000.
4. Company A and B both under the same management make and sell the same type of product. (Their budgeted profit and loss account for January to June 1993 are as under :



( ii )

	Rs.	Company A Rs.	Rs.	Company B Rs.
Sales		3,00,000		3,00,000
<b>Less</b> Variable Cost	2,40,000		2,00,000	
Fixed Cost	30,000	2,70,000	70,000	2,70,000
Profit		30,000		30,000

You are required to

- Calculate the Break Even point for each.
- Calculate the sales Volume at which each of the Companies will make a profit of Rs. 10,000.
- Assess how their profitability will change with increase or decrease in Volume.

5. From the following data, Calculate

- P/V ratio
- Profit, when sales are Rs. 2,00,000, and
- New Break-Even-Point, if selling price is reduced by 20%.

Fixed Expenses Rs. 40,000

Break Even Point Rs. 1,00,000