

**UNIT – I****ACTIVITY BASED COSTING****Meaning of Activity-Based Costing (ABC):**

Activity-based costing (also popularly known as ABC) is a new and scientific approach developed by Rabin Cooper and Roberk Kaplan (1988) of the Harvard University for assigning overhead costs to end-products, jobs and processes.

It refines a costing system by focusing on individual activities as the fundamental cost objectives. In the course of accumulating costs, this system takes into consideration not only volume-related but also non-volume-related activities (i.e., support activities) such as material procurement, material handling, machine set-ups, etc.

In the words of Cooper and Kaplan, ABC systems calculate the costs of individual activities and assign costs to cost objects such as products and services on the basis of activities undertaken to produce each product or service. In this system overhead costs are assigned to activities or grouped into cost pools before they are charged to cost objects (i.e., products or services).

CIMA, London defines ABC as “cost attribution to cost units on the basis of benefits received from indirect activities e.g., ordering, setting up, assuring quality.”

Activity-based costing is not a distinct method of costing like job costing and process costing. It is only a modern tool of charging overhead costs in which costs are first traced to the activities and then to products or jobs.

Its main focus is on activities performed in the production of goods or services. Thus, activities become the focal point for cost accumulation. This costing system assumes that activities are responsible for the incurrence of costs and that a link should therefore be made between activities and products by assigning costs of activities to products or services based on individual product’s demand for each activity.

The heart of ABC is the activity concept and the basic premise of ABC approach is that a firm’s products or services are the results of activities and activities consume resources which incur costs. In short, in activity-based costing, overhead costs are first assigned to activities and then absorbed by cost objects on the basis of activities consumed by these cost objects.

The relationship between activities and products has been shown below:

The above figure shows that activities consume resources (for example, workers are paid to pack and ship finished goods to customers). Then, products that consume the activities (packing and shipping) are allocated the costs of those activities.

**Steps in Activity-Based Costing:**

There are two primary stages in ABC—first, tracing costs to activities, second, tracing activities to products or jobs.

The different steps in the two stages of ABC are given below:

**(i) Identification of the main activities:**

The first stage is to identify the functional areas or major activities involved in the production. In ABC system an organisation is viewed as a collection of activities.

All the major activities in the organisation are grouped under two categories, viz., volume-related activities (e.g., machine-related activities, labour-related activities) and non-volume-related or support activities like material ordering, material receiving, material handling, machine set-up, production scheduling, packing, despatch etc.

Both these categories are performed to design, produce, sell and distribute to individual products or services of the organisation. These activities convert input resources acquired from suppliers to output intended for customers. The number of activities in an organisation should neither be too large or too small. Total cost involved in the activity should be significant enough to justify to give an activity a separate entity.

**(ii) Creation of cost pool:**

The next step in activity-based costing is the creation of a cost pool for each major activity. Cost pool is like a cost centre or activity centre around which costs are accumulated. For example, the total of machine set-up might constitute are cost pool for all set-up related costs.

**(iii) Determination of the activity cost driver:**

The next step in the application of activity-based costing is the ascertainment of the factors that influence the cost of each major activity. The factors or the forces that cause costs are known as cost drivers. A cost driver not merely causes cost but also explains its behaviour.

Thus a cost driver is a factor which causes a change in the cost of an activity. Examples of cost drivers are number of machine set-ups, number of purchase orders, number of customer orders placed etc.

**(iv) Calculation of the activity cost driver rate:**

After cost pool is defined and cost drivers identified, the cost per unit of the cost driver is computed for that pool. This is called the pool rate. The pool rate links costs and cost drivers with the resource use.

**(v) Charging the costs of activities to products:**

This is the last step in application of activity-based Costing. Here, the costs of activities are traced to products on the basis of demand by products. The cost drivers are used to measure product demand of activities. For example, if the total costs of purchasing materials were Rs.1,00,000 and there were 1,000 purchase orders (the chosen cost driver) during the period.

The rate per purchase order is Rs.  $1,00,000 \div 1,000 = \text{Rs. } 100$ . If a particular product needs 2 purchase orders, charge to that product will be Rs.  $100 \times 2 = \text{Rs. } 200$ . If 10 units of the product are produced, cost per unit will be Rs.  $200 \div 10 \text{ units} = \text{Rs. } 20$ . In this way cost of other activities will be charged to product.

**Advantages of Activity-Based Costing:**

Activity-based costing has primarily developed on account of the limitations of traditional system of charging overhead costs. It became an increasingly important tool for a large majority of organisations throughout the world.

It offers the following advantages:

**(i) Determination of product/service cost:**

ABC is a modern tool of charging overhead costs in which costs are first identified with activities and then allocated to products or services based on appropriate cost drivers. Cost drivers reflect the cause and effect relationship between activity consumption and cost incurrence. As a result, it gives more accurate cost information for determination of product/service cost.

**(ii) Supplies cost information:**

It provides more accurate and reliable cost information about production and support activities and product costs so that the management can focus its attention on the products and processes with the most effective manner for increasing profit.

**(iii) Better pricing decisions:**

By switching over from volume-base to activity-base, ABC helps in overcoming the problem of over-costing and under-costing as result of which management is able to make judicious pricing decisions in a more competitive business environment.

**(iv) Realistic:**

Under ABC distribution of overhead costs is done on the basis of activities which are considered to be more realistic. It is said to be an objective approach. The traditional costing uses more arbitrary bases for apportionment of overhead costs and is a subjective approach.

**(v) Control of cost:**

ABC gives better understanding of cost behaviour and a more rational approach to fixed and variable costs. It enables management to control many fixed overheads by exercising more control over those activities which cause these fixed overheads. This is possible since behaviour of many fixed overhead costs in relation to activities now become more visible and clear.

**(vi) Better performance measurement and cost reduction:**

Pooling of resource costs and use of suitable cost drivers highlights the problem areas leading to better performance measurement and cost reduction. Regrouping costs from traditional cost centres to activity cost pools focuses attention to inefficient operations where costs can be reduced.

**(vii) Improvement of cost objects:**

Manager's do not manage cost, they manage activities causes cost. Changes in activities lead to changes in cost. Therefore, if the activities are managed well, costs will fall and resulting products will be more competitive.

**(viii) Greater cost efficiency:**

ABC helps to identify unnecessary or non-value-added activities so that these may be weeded out and thus achieving greater cost efficiency.

**(ix) Better decision-making:**

It helps management in taking better decisions about product design, pricing, process technology, marketing product-mix and encouraging continual operating environments. ABC which is now being called Activity-Based Management (ABM) used cost information generated by ABC about an activity for controlling the activity itself rather than just using cost information of the final product.

**Problems with the ABC Approach:**

ABC is not free from certain weaknesses as argued by the critics. They are stated below:

- (a) ABC fails to obtain support at all levels of management about changing in work processes to make business more competitive.
- (b) Selection of multiple cost drivers to assign overhead costs to products or services is a difficult task. It involves trade-offs between accuracy and cost, as well as the difficulties of operating a more complex costing system.
- (c) Wrong selection of cost drivers would nullify the benefits of ABC.
- (d) Cost of change will be high as everything will have to be worked out from the scratch.

- (e) It rejects marginal cost analysis and the benefits thereof.
- (f) It takes no account of opportunity cost in decision-making.
- (g) The system will require a change due to changes associated with new products and new technology. This will put strain on the costing system,
- (h) It fails to capture the complexity of actual operations and took too long time to implement.
- (i) The system encourages allocation of non-product costs such as research and development to products while committed product costs such as factory depreciation are not allocated to products.

**Factors Influencing Application of ABC:**

ABC system was developed due to the following factors:

- a) High incidence of overhead cost due to increasingly automated production.
- b) High overhead costs are not proportional to the unit volume of individual products or services.
- c) Overhead costs for support functions such as product design, quality control, customer service, production planning and sales order are as important to the customer as physical process on the shop floor.
- d) Complexity has increased. Product ranges are wider, product cycles are shorter and demand for quality product is higher.
- e) Market place is now very competitive. As firms operating in this competitive environment adopt new strategies to achieve competitive excellence.
- f) Availability of computer and other technology has enhanced requirement for improvement in information gathering technology for decision making to gain competitive advantage.
- g) A significant automation that has made it increasingly more difficult to assign overhead costs to products using the traditional direct labour hour or machine hour basis.
- h) The demand of different products on resources is not uniform because of volume, process set-up, batch size or complexity. Use of an average overhead rate calculated using volume as denominator, for assigning overhead costs to products distorts the product cost, if the firm produces variety of products.

**Installation of ABC System:**

The steps involved in installation of ABC system are:

**1. Feasibility study:**

The installation of ABC requires a considerable efforts and costs. It is important to make cost-benefit analysis i.e., weigh the cost of the system against the likely benefits to be derived from it. The benefits from the ABC must exceed the amount spent on it.

Two types of costs are needed:

- (a) Development cost i.e., the cost of the development of the system and
- (b) Operational cost i.e., the cost of running of the system.

**2. Support of information technology:**

For implementation of ABC a lot of information is required to be generated. Therefore, IT infrastructure is to be built-up to provide necessary support.

**3. Co-operation of employees:**

The co-operation of employees is essential for implementing ABC successfully as they are closest to the process and more conversant with the problems.

**4. Staff training:**

The staff should be properly trained so that they can grasp the purpose of ABC. Group discussions, training programmes, case study demonstration etc. help considerably to create awareness of the concept of ABC to employees.

**5. Process specification:**

For identifying various stages of the production process, allocation of resources to each, processing time and bottlenecks, the senior executives should be interviewed. This will provide the basis from which a detailed listing of activities can be made in a structural manner. Once the activities have been inventoried screening is necessary to improve efficiency into the system.

**6. Activity definition:**

The listed activities should be rationalised for grouping them under similar categories of the production process and eliminating those considered irrelevant. A cost pool may be employed for every identified activity or sub-activity.

**7. Activity driver selection:**

It is very difficult to select a single activity driver which will cover all the transactions grouped together in an activity. However, multiple cost driver models could be developed with the available data. The inter-correlation of potential activity driver may be so strong that it matters little where one is selected.

**8. Costing:**

Generally, a single activity cost driver can be used to assign costs to the cost objects from the activity pools. For example, if the number of machine set-ups has been selected as a driver of process costs and the total set-up cost is Rs. 50,000 for four products A, B, C and D of a company, then the number of machine set-ups per product can be used to assign these costs.

If products A, B, C and D require 5 set-ups, 10 set-ups, 15 set-ups and 20 set-ups respectively, then the average cost per set-up will be Rs. 1,000 (i.e., Rs. 50,000 ÷ 50 set-ups). Total set-up costs can be distributed to product groups in proportion to use i.e., A Rs. 5,000, B Rs. 10,000, C Rs. 15,000 and D Rs. 20,000 and then assigned to individual units of product in proportion to the level of production units.

**Difference between Activity-Based Costing and Conventional Costing**

<i>Activity-Based Costing</i>	<i>Conventional Costing (or) Traditional Costing</i>
(1) It begins with identifying activities and then to producing the products	(1) It begins with identifying cost and then to producing the products
(2) It mainly focuses on activities performed to produce products	(2) It emphasises mainly on ascertainment of costs after they have been incurred
(3) Cost Drivers used for identifying the factors that influence the cost of particular activity	(3) Cost unit is used for allocation and accumulation of costs
(4) Overhead costs are assigned to Cost Centre or Cost Pools	(4) Overhead costs are assigned to production departments or service departments
(5) Overhead costs are assigned to products using Cost Drivers Rates	(5) Overheads allocated on the basis of departmental overhead allocation rate
(6) Variable overhead is appropriately identified to individual products	(6) Costs may be allocated or assigned either on actual cost incurred or on standard cost basis
(7) In ABC many activity based on Cost Pools or Cost Centres are created	(7) Overheads are pooled and collected department wise
(8) There is no need to allocate and redistribution of overhead of service departments to production departments	(8) The process of allocation and re-distribution of the costs of the service departments to production department is essential to find out total cost of production
(9) It assumes that fixed overhead costs vary in proportion to changes in the volume of output.	(9) It assumes that fixed overheads do not vary with changes in the volume of output.

**Illustration:**

A manufacturing company has three accounts clerks responsible for processing purchase invoices of suppliers. Each clerk is paid a salary of Rs. 1,50,000 per annum and is capable of processing 5,000 purchase invoices per year. In addition to the salary, the company spends Rs. 45,000 per year for printing of forms, postage etc. (assuming that 15,000 purchase invoices are processed).

During the year, 12,500 purchase invoices were processed. You are required to:

- Calculate the activity rate for the purchase order activity. Break the activity rate into fixed and variable components.
- Calculate the total activity availability and break this into activity usage and unused activity.
- Calculate the total cost of resources supplied and break this into activity usage and unused activity.

**Solution:**

$$1. \text{ Activity Rate} = [(3 \times \text{Rs. } 1,50,000) + \text{Rs. } 45,000] \div 15,000 = \text{Rs. } 33 \text{ per invoice}$$

$$\text{Fixed Activity Rate} = \text{Rs. } 4,50,000 \div 15,000 = \text{Rs. } 30 \text{ per invoice}$$

$$\text{Variable Activity Rate} = \text{Rs. } 45,000 \div 15,000 = \text{Rs. } 3 \text{ per invoice.}$$

$$2. \text{ Activity availability} = \text{Activity usage} + \text{Unused Activity}$$

$$15,000 \text{ invoices} = 12,500 \text{ invoices} + 2,500 \text{ invoices}$$

$$3. \text{ Cost of resources supplied} = \text{Cost activity used} + \text{Cost of unused activity}$$

$$\text{or, Rs. } 4,50,000 + (\text{Rs. } 3 \times 12,500) = (\text{Rs. } 33 \times 12,500) + (\text{Rs. } 30 \times 2,500)$$

$$\text{or, Rs. } 4,87,500 = \text{Rs. } 4,12,500 + \text{Rs. } 75,000$$



**Illustration:2**

Indian Pottery Company is noted for a full line of quality products. The company operates one of the plants in Mumbai. That plant produces two types of products: Indian design A, and contemporary B, Rajan the president of the company, recently decided to change from a volume-based costing system to an activity-based costing system. Before making the change company wide he wanted to assess the effect on the product cost of the Mumbai plant. This plant was chosen because it produces only two types of products, most other plants produced at least a dozen. To assess the effect of the change, the following data have been gathered :

Products	Quantity	Prime Cost	Machine Hours	Material Moves	Setups
Indian A	2,00,000	7,00,000	50,000	7,00,000	100
Contemporary B	50,000	1,50,000	12,500	1,00,000	50
Total Value (Rs.)	—	8,50,000	2,50,000	3,00,000	15,000

Rs. 2,50,000 is the cost of maintenance of machine.

Under the current system, the cost of maintenance, material handling and setups are assigned to the products on the basis of machine hours.

**Required**

- (1) Compute the unit cost of each product using the current unit-based approach.
- (2) Compute the unit cost of each product using an activity-based costing approach.

**Solution:**

- (1) Total overhead is Rs. 10,00,000. The plant wide rate is Rs. 16 per machine hour (Rs. 10,00,000 ÷ 6,25,000)

**Overhead is assigned as follows :**

$$\begin{aligned} \text{Indian A} &= \text{Rs. } 16 \times 50,000 = \text{Rs. } 8,00,000 \\ \text{Contemporary B} &= \text{Rs. } 16 \times 12,500 = \text{Rs. } 2,00,000 \end{aligned}$$

The unit costs for the two products are as follows :

$$\begin{aligned} \text{Indian} &= \frac{\text{Rs. } 8,00,000 + 7,00,000}{2,00,000} = \text{Rs. } 7.50 \\ \text{Contemporary} &= \frac{\text{Rs. } 2,00,000 + 1,50,000}{50,000} = \text{Rs. } 7.00 \end{aligned}$$

- (2) In the activity-based approach, the consumption ratios are different for all three overhead activities, so overhead pools are formed for each activity. The overhead rates for each of these pools are as follows :

$$\begin{aligned} \text{Maintenance} &= \frac{\text{Rs. } 2,50,000}{62,500} = \text{Rs. } 4 \text{ per hour} \\ \text{Material handling} &= \frac{\text{Rs. } 3,00,000}{8,00,000} = \text{Rs. } 0.375 \text{ per move} \\ \text{Setup} &= \frac{\text{Rs. } 4,50,000}{150} = \text{Rs. } 3,000 \text{ per setup} \end{aligned}$$

<b>Contemporary B :</b>		<i>Rs.</i>
Maintenance	= Rs. 4 x 12,500	= 50,000
Material handling	= Rs. 0.375 x 1,00,000	= 37,500
Setup Costs	= Rs. 3000 x 50	= 1,50,000
	Total Overhead	= <u>2,37,500</u>

**This produces the following unit costs**

<b>Indian A :</b>		<i>Rs.</i>
	Prime Cost	= 7,00,000
	Add : Total Overhead Costs	= 7,62,500
	Total Costs	= <u>14,62,500</u>
	Units Produced	= <u>2,00,000 units</u>

$$\text{Unit Cost} = \frac{\text{Rs. } 14,62,500}{2,00,000} = \text{Rs. } 7.31 \text{ per unit}$$

<b>Contemporary B :</b>		<i>Rs.</i>
	Prime Cost	= 1,50,000
	Add : Total Overhead Costs	= 2,37,500
	Total Costs	= <u>3,87,500</u>
	Units Produced	= <u>50,000 units</u>

$$\text{Unit Cost} = \frac{\text{Rs. } 3,87,500}{50,000} = \text{Rs. } 7.75 \text{ per unit}$$

**Overhead is assigned as follows :**

<b>Indian A :</b>		<i>Rs.</i>
Maintenance	= Rs. 4 x 50,000	= 2,00,000
Material handling	= Rs. 0.375 x 7,00,000	= 2,62,500
Setup Cost	= Rs. 3000 x 100	= 3,00,000
	Total Overhead	= <u>7,62,500</u>

**Illustration: 3**

Alpha Limited has decided to analyse the profitability of its few new customers. It buys bottled water at Rs.90 per case and sells to retail customers at a list price of Rs.108 per case. The data pertaining to five customers are :

<i>Particulars</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
Case Sold	4,680	19,688	1,36,800	71,550	8,775
List selling price	Rs. 108	Rs. 108	Rs. 108	Rs. 108	Rs. 108
Actual selling price	Rs. 108	Rs. 106.20	Rs. 99	Rs. 104.40	Rs. 97.20
Number of purchase Orders	15	25	30	25	30
Number of customer Visits	2	3	6	2	3
Number of Deliveries	10	30	60	40	20
Kilometers traveled Per delivery	20	6	5	10	30
Number of expedited Deliveries	0	0	0	0	1

**Its five activities and their cost drivers are :**

<i>Activity</i>	<i>Cost Driver Rate</i>
Order taking	Rs. 750 per purchase order
Customer visits	Rs. 600 per customer visit
Deliveries	Rs. 5.75 per delivery k.m. travelled
Product handling	Rs. 3.75 per case sold
Expedited deliveries	Rs. 2,250 per expedited delivery

**Required**

- (i) Compute the customer level operating income of each of five retail customers now being examined (A,B,C,D, and E); comment on the results.
- (ii) What insights are gained by reporting both the list selling price and the actual selling price for each customer?
- (iii) What factors Alpha Ltd. should consider in deciding whether to drop one or more of five customers?

**Solution:**

<i>Particulars</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
Revenues at List Price	5,05,440	21,26,304	1,47,74,000	77,27,400	9,47,700
Less : Discount	Nil	35,438	12,31,200	2,57,580	94,770
Revenues at Actual Price	5,05,440	20,90,866	1,35,43,200	74,69,820	8,52,930
Less : Cost of Goods sold at Rs. 90 per unit	4,21,200	17,71,920	1,23,12,000	64,39,500	7,89,750
<b>Gross Margin (A)</b>	84,240	3,18,946	12,31,200	10,30,320	63,180
<b>Customer Level Operating Cost</b>					
Order taking @ Rs. 750	11,250 (750 x 15)	18,750 (750 x 25)	22,500 (750 x 30)	18,750 (750 x 25)	22,500 (750 x 30)
Customer Visits @ Rs. 600	1,200	1,800	3,600	1,200	1,800
Delivery Vehicles (Rs. 5.75 per Km)	1,150	1,035	1,725	2,300	3,450
Product handling Rs. 3.75 per case	17,550	73,830	5,13,000	2,68,313	32,906
Expected runs (Rs. 2250 per run)	—	—	—	—	—
<b>Total Costs (B)</b>	31,150	95,415	5,40,825	2,90,563	62,906
<b>Customer Level Operating Income (A) – (B)</b>	53,090	2,23,531	6,90,375	7,39,757	274

(i) Customer D is the most profitable customer, despite having only 52.30% of the unit volume of customer C. A major exploitation is that customer C receives at Rs.9 discount per case while customer D receives only at Rs.3.60 discount per case.

Customer E is less profitable, in comparison with the small customer A being profitable. Customer E received a discount of Rs.10.80 per case, make more frequent orders, requires more customer visits and requires more delivery kms, in comparison with customer A.

(ii) Separate reporting of both the listed selling price and the actual selling price enables Alpha Ltd. to examine which customer receives different discount documents and how sales people may differ in the discounts they grant. There is a size pattern in the discount across the 5 customers, except for customer E.

<i>Sales Volume</i>	<i>Discount Per Case</i>			
C (1,36,800 Cases)	12,31,200	÷	1,36,800	= Rs. 9
D (71,550 Cases)	2,57,580	÷	71,550	= Rs. 3.60
B (19,688 Cases)	35,438	÷	19,688	= Rs. 1.80
E (8,775 Cases)	94,770	÷	8,775	= Rs. 10.80
A (4,680 Cases)	4,680	÷	4,680	= Rs. 0

The reasons for the Rs. 10.80 discount for customer E should be explored.

(iii) Dropping customers should be the last resort taken by Alpha Ltd. Factors to be considered include: What is the expected future profitability of each customer? Are the currently unprofitable (E) or low profitable

(A) customers likely to be highly profitable in the future?

What costs are avoidable if one or more customers are dropped?

Can the relationship with "problem" customers be restructured so that there is a 'win win' situation?

## UNIT – II

### PROCESS COSTING

Process Costing is a method of costing. It is employed where each similar units of production involved in different series of process from conversion of raw materials into finished output. Thus, unit cost is determined on the basis of accumulated costs of each operation or at each stage of manufacturing a product. Charles T. Horngren defines process costing as "a method of costing deals with the mass production of the like units that usually pass the continuous fashion through a number of operations called process costing."

The application of process costing where industries adopting costing procedure for continuous or mass production. Textiles, chemical works, cement industries, food processing industries etc. are the few examples of industries where process costing is applied.

#### **Characteristics of Process Costing**

- (1) Continuous or mass production where products which passes through distinct process or operations.
- (2) Each process is deemed as a separate operations or production centres.
- (3) Products produced are completely homogenous and standardized.
- (4) Output and cost of one process are transferred to the next process till the finished product completed.
- (5) Cost of raw materials, labour and overheads are collected for each process.
- (6) The cost of a finished unit is determined by accumulated of all costs incurred in all the process divided by the number of units produced.
- (7) The cost of normal and abnormal losses usually incurred at different stages of production is added to finished goods.
- (8) The interconnected processes make the final output of by-product or joint products possible.

#### **Advantages**

The main advantages of process costing are :

- (1) Determination of the cost of process and unit cost is possible at short intervals.
- (2) Effective cost control is possible.
- (3) Computation of average cost is easier because the products produced are homogenous.
- (4) It ensures correct valuation of opening and closing stock of work in progres~ in each process.
- (5) It is simple to operate and involve less expenditure.

**Disadvantages**

- (1) Computation of average cost does not give the true picture because costs are obtained on historical basis.
- (2) Operational weakness and inefficiencies on processes can be concealed.
- (3) It becomes more difficult to apportionment of joint costs, when more than one type of products manufactured.
- (4) Valuation of work in progress is done on estimated basis; it leads to inaccuracies in total costs.
- (5) It is difficult to measure the performance of individual workers and supervisors.

**Difference between Job Costing and Process Costing**

<i>Job Costing</i>	<i>Process Costing</i>
(1) Production is against specific order from the customers.	(1) Production is a continuous process based on future demand.
(2) Variety of products are produced according to specifications.	(2) Homogenous products are produced in large scale.
(3) Output and costs are not involved in any transactions from one job to another.	(3) Output and costs are transferred from one process to another process.
(4) Cost control is more difficult because each job is different from other.	(4) Effective cost control is possible because production is standardized.
(5) Cost ascertainment and determination of unit cost can be possible only when job is completed.	(5) Costs are collected and accumulated at the end of the accounting period.
(6) There is no question of work in progress at the beginning or end of the period.	(6) Work in progress is always there because production is continuous.

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### Process Losses

Process Losses may be defined as the loss of material occur at different stages of manufacturing process. The following are the types of losses unavoidable during the course of processing operations such as:

- (1) Normal Process Loss
- (2) Abnormal Process Loss
- (3) Abnormal Process Gain
- (4) Spoilage
- (5) Defectives

(1) *Normal Process Loss*: The cost of normal process loss in practice is absorbed by good units produced under the process. This is known as Normal Process Loss or Normal Wastage. For example, evaporation, scrap, stamping process etc. The amount realized by the sale of normal process loss units should be credited to process account.

(2) *Abnormal Process Loss*: The cost of an abnormal process loss unit is equal to the cost of good unit. The total cost of abnormal process loss is credited to process account from which it arises. This is known as Abnormal Process Loss. Such loss may be caused by breakdown of machinery, false production planning, lack of effective supervision, substandard materials etc., Cost of abnormal process loss is not treated as cost of the product. In fact, the total cost of abnormal process loss is debited to Costing Profit and Loss Account.

#### **Computation of Abnormal Loss:**

$$\text{Value of Abnormal Loss} = \frac{\text{Normal Cost of Normal Output}}{\text{Normal Output}} \times \text{Units of Abnormal Loss}$$

Where :

$$\begin{aligned} \text{Quantity of Abnormal Loss} &= \text{Normal Output} - \text{Actual Output} \\ \text{Normal Output} &= \text{Input} - \text{Normal Loss} \end{aligned}$$

If actual output is less than normal output to balance represents Units of Abnormal Loss.



(3) *Abnormal Process Gain*: Abnormal Process Gain may be defined as unexpected gain in production under normal conditions. The process account under which abnormal gain arises is debited with abnormal gain. The cost of abnormal gain is computed on the basis of normal production.

(4) *Spoilage*: Normal Spoilage (Le., which is inherent in the operation) costs are included in costs either by charging the loss due to spoilage to the production order or by charging it to production overhead so that it is spread over all the products. Any value realized from the sale of spoilage is credited to production order or production overhead account as the case may be. The cost of abnormal spoilage is charged to Costing Profit and Loss Account. When spoiled work is the result of rigid specification, the cost of spoiled work is absorbed by good production while the cost of disposal is charged to production overhead.

(5) *Defectives*: Defectives that are considered inherent in the process and are identified as normal can be recovered by using the following method.

Charged to goods products

Charged to general overheads

Charged to departmental overheads

If defectives are abnormal, they are to be debited to Costing Profit and Loss Account.

### Problem

Following figures show the cost of A product passes through three processes. In March 1000 units were produced. Prepare the process accounts and find out per unit of each process.

	Process I Rs.	Process II Rs.	Process III Rs.
Raw materials	50,000	30,000	20,000
Wages	30,000	25,000	25,000
Direct Expenses	7,000	3,000	5,000

Overhead expenses were Rs. 12,000 and it should be apportioned on the basis of wages.

### Solution:

#### Process I Account

Particulars	Units	Amounts Rs.	Particulars	Units	Amounts Rs.
To Raw Materials	1,000	50,000	By Process II A/c	1,000	91,500
To Wages		30,000	(Output transferred		
To Direct Expenses		7,000	@ Rs.91.50 per unit)		
To Overheads					
$\left[ \frac{6}{16} \times 12,000 \right]$		4,500			
	1,000	91,500		1,000	91,500

**Process II Account**

<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>	<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>
To Process II A/c (Transferred from Process I)	1,000	91,500	By Process III A/c (Output transferred @ Rs.153.25 per unit)	1,000	1,53,250
To Raw Materials		30,000			
To Wages		25,000			
To Direct Expenses		3,000			
To Overheads $\left[ \frac{5}{16} \times 12,000 \right]$		3,750			
	1,000	1,53,250		1,000	1,53,250

**Process III Account**

<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>	<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>
To Process III A/c (Transferred from Process II)	1,000	1,53,250	By Finished Stock (Output transferred @ Rs.207 per unit)	1,000	2,07,000
To Raw Materials		20,000			
To Wages		25,000			
To Direct Expenses		5,000			
To Overheads $\left[ \frac{5}{16} \times 12,000 \right]$		3,750			
	1,000	2,07,000		1,000	2,07,000

**Problem**

A product passes through three processes X, Y and Z to its manufacture. From the following details, ascertain the cost of the product at the end of each stages of production.

	<i>Process X Rs.</i>	<i>Process Y Rs.</i>	<i>Process Z Rs.</i>
Raw Materials	25,000	30,000	20,000
Wages	15,000	20,000	10,000
Manufacturing Expenses	5,000	8,000	7,000
Output in Units	10,000	11,200	13,000
Opening Stock (units in Previous Process)	—	7,000	5,000
Closing Stock (Units in Previous Process)	—	5,000	3,000

**Solution:****Process X Account**

<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>	<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>
To Raw Materials	10,000	25,000	By Process Y (@ Rs.4.5 per unit transferred to Process Y)	10,000	45,000
To Wages		15,000			
To Manufacturing Expenses		5,000			
	10,000	45,000		10,000	45,000

**Process Y Account**

<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>	<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>
To Opening Stock (@ Rs.4.5 per unit) ]	7,000	31,500	By Wastage	800	—
To Process X	10,000	45,000	By Process Z Production [ 1,34,500 - 22,500 ]		
To Raw Materials		30,000	11,200	11,200	1,12,000
To Wages		20,000	= Rs. 10 per unit		
To Manufacturing Expenses ]		8,000	By Closing Stock ] (@ Rs. 4.5 per unit)	5,000	22,500
	17,000	1,34,500		17,000	1,34,500

**Process Z Account**

<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>	<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>
To Opening Stock (@ Rs. 10 per unit) ]	5,000	50,000	By Wastage	200	—
To Process Y	11,200	1,12,000	By Closing Stock ] (@ Rs. 10 per unit)	3,000	30,000
To Raw Materials		20,000	By production @ Rs. 13 ] per unit	13,000	1,69,000
To Wages		10,000			
To Manufacturing Expenses ]		7,000			
	16,200	1,99,000		16,200	1,99,000

**Problem**

In Process A, 1,000 units were introduced at a cost of Rs. 20,000, the other expenditure incurred in the process were materials Rs. 10,000 and wages Rs. 5,000. 10% is the normal loss during production and possess a scrap value of Rs. 3 each. The output of process A was only 800 units. Find out the value of Abnormal Loss.

**Solution:****Process X Account**

<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>	<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>
To Units Introduced	1,000	20,000	By Normal loss 10%	100	300
To Materials		10,000	By Abnormal loss	100	3,855.55
To Wages		5,000	By Next Process (or) ] Cost of Output	800	30,844.45
	1,000	35,000		1,000	35,000

**Working Notes:****(1) Calculation of Cost per Unit**

	<i>Units</i>	<i>Amounts</i>
Cost of inputs introduced	1,000	35,000
Less : Normal unit wastage sold @ Rs. 3 per unit	100	300
Total Cost of 900 units	900	34,700

$$\text{Cost per unit} = \frac{34,700}{900} = \text{Rs. } 38.55$$

$$\text{Value of 800 units} = 800 \times \text{Rs. } 38.55 = \text{Rs. } 30,840$$

**(2) Calculation of Abnormal Loss**

$$\begin{aligned} \text{Value of Abnormal Loss} &= \frac{\text{Normal Cost of Normal Production}}{\text{Normal Output}} \times \text{Abnormal Loss (units)} \\ &= \frac{34,700}{900} \times 100 = \text{Rs. } 3,855.55 \end{aligned}$$

**Problem**

A batch of 1,000 units was produced in a process at a cost of Rs. 1,850. The normal process loss of 10% of, production. It is ascertained that the actual process loss was of 150 units. The scrap is normally sold to a contractor at Re. 0.50 per unit. You are required to prepare (1) Process Account and (2) Abnormal Loss Account.

**Solution:****Process Account**

<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>	<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>
To Production	1,000	1,850	By Normal Loss (10%)	100	50
			By Abnormal Loss	50	100
			By Finished Goods (@ Rs.2 per unit)	850	1,700
	1,000	1,850		1,000	1,850

**Abnormal Process Loss Account**

<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>	<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>
To Process A/c	50	100	By Scrap Value (@ Re.0.50 per unit)	50	25
			By Cost Profit and Loss A/c		75
	50	100		50	100

**Working Notes****Calculation of Abnormal Loss**

$$\begin{aligned} \text{Value of Abnormal Loss} &= \frac{\text{Normal Cost of Normal Production}}{\text{Normal Output}} \times \text{Abnormal Loss in Units} \\ &= \frac{1,850 - 50}{900} \times 50 \\ &= \frac{1,800}{900} \times 50 = \text{Rs. } 100 \\ \text{Abnormal Process Loss} &= \text{Rs. } 100 \end{aligned}$$

**Problem**

In process Y, 75 units of a commodity were transferred from process X at a cost of Rs. 1,310. The labour and overhead expenses incurred by the process were Rs.190. 20% of the units entered are normally lost and sold @ Rs. 4 per unit. The output of the process was 70 units. Prepare process Y Account and Abnormal Gain Account.

**Solution:****Process Y Account**

<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>	<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>
To Process X A/c To Labour and Overhead Expenses To Abnormal Gain A/c	75  10	1,310  190 240	By Normal Loss A/c (20%, 15 units sold @ Rs. per unit By Finished Output	15  70	60  1,680
	85	1,740		85	1,740

**Abnormal Gain Account**

<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>	<i>Particulars</i>	<i>Units</i>	<i>Amounts Rs.</i>
To Normal Loss A/c (Loss of Income) To Costing P & L A/c	10  —	40  200	By Process Y A/c	10	240
	10	240		10	240

**Working Notes****(1) Normal Output :**

Units Introduced	=	75
Less : Normal loss in units	=	<u>15</u>
Normal Output	=	60 units
Less : Actual Output	=	<u>70</u> units
Abnormal Gain	=	<u>10</u> units

**(2) Value of Abnormal Gain :**

$$= \frac{\text{Normal Cost of Normal Output}}{\text{Normal Output}} \times \text{Units of Abnormal Gains}$$

$$= \frac{\text{Rs. 1,440}}{60} \times 10 = \text{Rs. 240}$$

**Joint Product and By-Product**

Generally in many industries two or more products are produced from a common feature of production process. These products may be grouped into joint products or by-products, based on the value of product, profitability of the product, objectives and policies of the concern. Joint products and byproducts are equally important because of major difficulty to identify the cost of inputs separately and specifically. When costs incurred after the point of separation are known as "post split off" or "subsequent costs." It is therefore, equal importance should be given to further processing after the point of separation.

**Joint Products**

When two or more products are produced simultaneously from the use of a single raw material which is equally important. Such a product can be a joint product which is more important if produced from the same raw material. This product is also called as Main Product. On the other hand, if the products are not of the same importance called as "By-Products". For example, crude oil is the main product which can be processed in to petrol, kerosene, oil tar etc. as by-products.

**Features of Joint Products**

The following are the important features of joint products:

- (1) Joint products are produced from the sample raw materials.
- (2) They are produced from the common features of manufacturing process.
- (3) Joint products are of equal importance and value.
- (4) They may require further processing after their split off or point of separation.

### Objectives of Joint Product Costing

The following are the important objectives of joint product costing:

- (1) To facilitate product costing of inventory valuation and income determination.
- (2) To ascertain the profitability of each product.
- (3) To facilitate to make or buy decisions.
- (4) To provide information to fix the prices of product.
- (5) To evaluate the change of product mix and output variations.
- (6) To determine cost per unit, cost allocation and cost ascertainment.
- (7) To ensure effective cost control.

### Methods of Apportionment of Joint Products

The following are the important methods commonly used for apportionment of joint costs up to the point of separation.

- (1) Average Unit Cost Method
- (2) Physical Unit Method
- (3) Survey Method
- (4) Contribution Margin Method
- (5) Standard Cost Method
- (6) Market Value Method
  - a) Market Value at Point of Separation
  - b) Market Value After Further Processing
  - c) Net realizable Value or Reserve Cost Method

**(1) Average Unit Cost Method:** Under this method, average cost per unit of the finished product is calculated by the total joint costs up to the point of separation is divided by the total production of all the products or outputs. This method is very simple and conveniently applicable where the resultant products can be expressed in common units.

**(2) Physical Unit Method:** Under this method, the joint costs are allocated or apportioned to joint products on the basis of relative physical units of output of each joint product till split-off occurs. These physical units refer to weight or measure such as pounds, tonnes, gallons, bales, volume etc. This method is suitable where the joint products will be measurable in the same units. This method cannot be applied when joint products consist of different types of units like liquids and solids.

**(3) Survey Method:** Survey Method is also termed as "Points Value Method." In this method, joint costs are allocated on the basis of percentage or points value is assigned to each

products according to their relative importance. This method is also taken into various relevant factors such as volume, mixtures, selling price, technical engineering and marketing processes. The ratio of joint costs can be calculated by physical quantities of each products are multiplied with the weightage points.

**(4) Contribution Margin Method:** This method is also called as "Gross Margin Method." According to this method joint costs are allocated or apportioned as fixed cost and variable cost incurred at the point of separation. Joint fixed costs are apportioned on the basis of contribution of each product whereas variable portion of joint costs are apportioned according to the volume of units produced.

**(5) Standard Cost Method:** Under this method, joint costs are apportioned on the basis of standard costs. For this, standard costs are determined in advance for all joint products based on past experience, technical aspects, operational efficiency and cost factors of each products etc.

**(6) Market Value Method:** This method is also termed as "Relative Sales Value Method." According to this method, the number of units of each product manufactured is multiplied by the product's selling price to obtain the sales value of product. The portion of total joint costs allocated to each product is equal to the ratio of the sales value of each product's total market value. Here, there are various kinds of market value methods:

- (a) Market Value at the Separation Point
- (b) Market Value After Further Processing
- (c) Net Realizable Value

*(a) Market Value at Separation Point:* Under this method, the market value of the joint products at the split off point is ascertained on the basis of dividing joint cost. Weightage is also given to the quantities of each product:

*(b) Market Value After Further Processing:* In this method, joint cost are apportioned according to the ratio of final selling price of each product.

*(c) Net Realizable Value:* This method is also called as "Reverse Cost Method." Under this method, the estimated profit, selling and distribution expenses and post separation costs are reduced from the sales value of each joint products. A ratio is established on the basis of which the total costs before separation point is apportioned. Subsequent costs are added to arrive at product costs.



**By –Products**

The term by-product is also known as "Minor Product." It refers to any product of comparatively less value that is incidentally manufactured along with the main products. In other words, if the products produced are not as of equal importance, then the products of significantly low value are known as "byproducts." Accordingly, they are jointly produced with other main products and remain inseparable up to the point of split off or point of separation.

**Accounting Treatment or Method of Valuation of By-products**

The object of valuation of by-products cost accounting is to assign a portion of the total costs to each by-products. This is important to calculate the unit product cost and prepare the profit and loss account and balance sheet. Following are the important methods employed in this connection:

**(1) Non-Cost Methods or Sales Value Methods:**

- (a) Other Income Method.
- (b) Adding Sales Value to Total Cost Method.
- (c) Crediting to Sales Value Less Selling and Distribution Expenses Method.
- (d) Expenses Cost Method.

**(2) Cost Methods:**

- (a) Replacement Cost Method or Opportunity Cost Method
- (b) Standard Cost Method
- (c) Apportionment on Suitable Basis

**(1) Non-Cost Method**

This method is also known as "Sales Value Method." While in valuation of the by-products only sales value of by-products is taken in to account in accounting treatment of by-products they use anyone of the following non-cost methods:

- (a) *Other Income Method:* Under this method, when the sales value of the by-products is very low or negligible, it is treated as other income and same is credited to the profit and loss account.
- (b) *Adding Sales Value to Total Cost Method:* Under this method all the cost of joint products deducted from the combined sales proceeds of both joint products and main products.
- (c) *Crediting to Sales Value Loss Selling and Distribution Expenses:* Under this method, costs incurred relating to selling and distribution expenses of by-products are deducted from the sales value of by-product and the net sales value credited to the process account.

(d) *Reverse Cost Method*: In this method, cost of by-product is determined by sales of the by-product deducted from the estimated profit and all costs incurred on by-products after split off point. This method also known as "crediting sales value less profit."

## **(2) Cost Methods**

Cost methods are useful to determine the cost of by-products when the apportionment of the portion of joint costs incurred to by-products. The following are the important methods included under this categories.

(a) *Replacement Cost Method*: This method is also called as "Opportunity Cost Method." In this method, by-products are determined where by-products are used as raw material in some other process. Here the by-products are value at the opportunity lost of purchasing or replacing them. The opportunity cost of by-product refers to the cost which could have been incurred had the by-product being used as material could have been purchased from the market. The process account is credited with the value of byproduct so ascertained.

(b) *Standard Cost Method*: In this method, a standard cost is fixed for each by-product and the process account is credited with this standard cost.

(c) *Apportionment on Suitable Basis*: Under this method, if the value of by products is considerably significant, the actual cost of by-product is ascertained by apportioning the joint costs up to the point of physical separation by way of suitable basis used for costing of joint products.

## **Inter-Process Profits**

In usual practice of certain firms, the output of one process is transferred to the subsequent process at current market price or cost plus agreed percentage of profit. The object is to show a margin of profit or loss on each process to performing the relative efficiency of each process. The difference between the cost and the transfer price is known as Inter-Process Profit. One accounting complication of this technique is the fact that work in progress and stock figures at the end of the period will include a profit element. For balance sheet purposes, inter process profits cannot be included in stocks because a firm cannot make a profit by trading with itself. Financial accounting requires stock to be valued at the lower cost or realizable value. The unrealized profit, therefore, must be calculated and written back.

The cost of closing stock and realized profit can be ascertained by applying the following formula:

$$\text{Cost of Closing Stock} = \frac{\text{Cost of Process}}{\text{Total Cost of Process}} \times \text{Closing Stock}$$

$$\text{Realized Profit} = \text{Profits shown in process and finished stock A/c} + \text{Unrealized profit in opening stock} - \text{unrealized profit in closing stock}$$

### Equivalent Units

When opening and closing stocks of WIP exist, unit costs cannot be computed by simply dividing the total cost by total number of units still in process. We must convert the work in progress in to finished elements called "equivalent unit" so that the unit cost can be obtained. For example, 300 units 60% complete are equal to 180 equivalent units. It consists of balance of work done on opening work in progress, current production done fully and part of work done on closing work in progress. Once credit side entries are valued the equivalent units are ignored.

### Steps Involved for Calculation of Equivalent Units

The following procedure to be followed for calculation of equivalent units :

- (1) Calculate the number of equivalent units after taking the percentage of degree of completion in respect of opening stock of work in progress.
- (2) To step (1) add the units introduced deducting the closing work in progress.
- (3) Convert the equivalent units of closing work in progress and add to the above.
- (4) Find out net process costs element wise ie materials, labour and overheads.
- (5) Calculate the cost per unit of equivalent production of each element of cost separately.
- (6) Find out the cost of finished goods transferred to the next process and stock of work in progress,

The above procedures are to be considered for preparation of the following three statements:

- (i) Statement of Equivalent Production.
- (ii) Statement of Cost.
- (iii) Statement of Evaluation (i.e., Apportionment of Process Costs).

**Problem**

From the following informations, find the profit made by each product, apportioning joint costs on a sales value basis :

	A Rs.	B Rs.
Sales	7,60,000	8,40,000
Selling Expenses	1,00,000	4,00,000
Joint Costs :		
Materials		Rs. 6,24,000
Process Costs		Rs. 2,76,000

**Solution:**

Joint cost to be apportioned

$$\text{Rs. } 6,24,000 + \text{Rs. } 2,76,000 = \text{Rs. } 9,00,000$$

	Product A	Product B
Sales	7,60,000	8,40,000
Selling Expenses	1,00,000	4,00,000
Effective sales value	<u>6,60,000</u>	<u>4,40,000</u>
Joint cost apportioned : (ratio of 3 : 2)	5,40,000	3,60,000
Profit	<u>1,20,000</u>	<u>80,000</u>

**Problem**

A canning merchant supplies you the following production data during the year 2002 :

Grades	Units Produced
A	5,000
B	8,000
C	10,000

The Pre-separation cost incurred was Rs. 2,07,000. The joint cost is apportioned on technical evaluation based on the proportion of 5 : 3 : 2 to three grades respectively. Apportion the joint cost.

**Solution:****Apportion of Joint Cost On Survey Method**

Items (1)	Units (2)	Points Attached (3)	Equivalent Units $2 \times 3 = 4$	Cost Per Equivalent $4 / 2 = 5$	Apportioned Cost $4 \times 5 = 6$	Cost Per Unit $6 / 2 = 7$
Grade A	5,000	5	25,000	3	75,000	15
Grade B	8,000	3	24,000	3	72,000	9
Grade C	10,000	2	20,000	3	60,000	6
	<u>23,000</u>		<u>69,000</u>		<u>2,07,000</u>	

**Problem**

A Pharmaceutical company purchases a raw material, which is then processed to yield three chemicals Anarol, Estyl and Betyl. In October, 2003 the Pharmaceutical Company purchased 10,000 gallons of the raw materials at a cost of Rs.12,50,000 and company incurred additional joint conversion costs of Rs.7,50,000. October, 2003 sales and production information are as follows :

	<i>Gallons Produced</i>	<i>Price at Split off (Per Gallon)</i>	<i>Further Processing cost Per Gallon</i>	<i>Eventual Sales Price</i>
Anarol	2,000	Rs. 350	-	-
Estyl	3,000	Rs. 240	-	-
Betyl	5,000	Rs. 200	Rs. 30	Rs. 360

Anarol and Estyl are sold to other pharmaceutical companies at the split off point. Betyl can be sold at the split-off point or processed further and packaged for sale as an asthma medication.

Required :

- (i) Allocate the joint cost to three products using the Physical Units Method, the Sales Value at Split-off Method and the Net Realizable Value Method.
- (ii) Suppose that half of October, 2003 production of Estyl could be purified and mixed with all off the Anarol to produce a veterinary grade anesthetic. All further processing costs amount to Rs.2,25,000. The selling price of the veterinary grade anarol is Rs.650 per gallon. Should the pharmaceutical company further process the anarol into anesthetic? Assume, the resultant quantity of veterinary grade anarol produced is Rs.2000 gallons only.

**Solution:**

$$(i) \text{ Total Joint Cost to be allocated} = \text{Rs. } 12,50,000 + \text{Rs. } 7,50,000 \\ = \text{Rs. } 20,00,000$$

**Physical Unit Method**

<i>Product</i>	<i>Gallons Produced</i>	<i>Proportion X Joint Cost</i>	<i>= Joint Cost Allocation</i>
Anarol	2000	$\frac{2000}{10000} = 0.20 \times \text{Rs. } 20,00,000$	= Rs. 4,00,000
Estyl	3000	$\frac{3000}{10000} = 0.30 \times \text{Rs. } 20,00,000$	= Rs. 6,00,000
Betyl	5000	$\frac{5000}{10000} = 0.50 \times \text{Rs. } 20,00,000$	= Rs. 10,00,000
	10000		Rs. 20,00,000

**Sales Value at Split-off Method**

Product	Gallons Produced	Price at Split off	Revenue at Split off	% of Revenue	Joint Cost	Joint cost = Allocation Rs.
Anarol	2,000	Rs. 350	7,00,000	0.2893	$0.2893 \times 20,00,000 = 5,78,600$	
Estyl	3,000	Rs. 240	7,20,000	0.2975	$0.2975 \times 20,00,000 = 5,95,000$	
Betryl	5,000	Rs. 200	10,00,000	0.4132	$0.4132 \times 20,00,000 = 8,26,400$	
	10,000		24,20,000			20,00,000

**Net Realizable Value Method (Sales less further processing)**

Product	Qty	NRV	% of Revenue	Joint cost =	Joint cost allocation
Anarol	2,000	7,00,000	0.228	$0.228 \times 20,00,000 =$	Rs. 4,56,026
Estyl	3,000	7,20,000	0.2345	$0.2345 \times 20,00,000 =$	Rs. 4,69,055
Betryl	5,000	16,50,000	0.5375	$0.5375 \times 20,00,000 =$	Rs. 10,74,919
		30,70,000			Rs. 20,00,000

(ii) *Joint costs are irrelevant to this decision*

Instead, further processing costs and the opportunity cost of the lost contribution margin on the Estyl diverted to Anarol purification must be considered.

Added Revenues

(Rs.650 – Rs.350) x 2000 Gallons = Rs. 6,00,000

Less : Further processing of Anarol Mixture = (Rs. 2,25,000)

Less : Lost contribution margin on Estyl  
(1500 Gallons & Rs. 240) } = (Rs. 3,60,000)

Increased Net Income Rs. 15,000

**Alternatively****Existing Income**

		Rs.	Rs.
Estyl = 1500 gallon x Rs.240	=	3,60,000	
Anarol = 2000 gallon x Rs.350	=	7,00,000	10,60,000

**Proposed Income**

Veterinary Grade = 2000 gallon x Rs.650	=	13,00,000	
Less : Processing Cost	=	2,25,000	10,75,000
Increased Income	=		<u>15,000</u>

**Alternative**

Joint cost of 2,000 gallons of Anarol and 1,500 gallons of Estyl at the point of split off comes out to be :  
= (Rs. 5,78,600 + Rs. 2,97,500) = Rs. 8,76,100.

After adding Rs. 2,25,000 of further processing cost we get 2,000 gallons of output of veterinary grade Anarol.

Total revenue earned on 2,000 gallons of veterinary grade Anarol is Rs. 13,00,000. Hence the profit come to Rs. 1,98,900.

Total profit earned if 2,000 gallons of Anarol and 1,500 gallons of Estyl were sold at the point of split off (Rs. 10,60,000 – Rs. 8,76,100) = Rs. 1,83,900. Since the profit on making veterinary grade of Anarol increases by Rs.15,000, therefore this proposition should be accepted.

**Problem**

In manufacturing the main product A company processes the incidental waste into two by products A and B. From the following data relating to the product you are required to prepare a comparative profit and loss statement showing the individual cost and other details. The total cost up to separation period was Rs. 3,10,400.

	Main Product	By-Product	By-Product
Sales	8,00,000	64,000	96,000
Cost after separation	80,000	12,800	14,400
Estimated net profit	}	20%	20%
Percentage to sales value			
Estimated selling expenses as percentage to sales value			
	20%	10%	15%

Reverse Cost Method to be followed for separation of joint costs.

**Solution:****Comparative Profit and Loss Account**

Particulars	Main Product Rs.	By-Product Rs.	By-Product Rs.
Joint cost upto separation point	3,10,400	-	-
Less : Cost allocated to by-products	80,000	32,000	48,000
	2,30,400		
Cost after separation	80,000	12,800	14,400
Selling Expenses	1,60,000	6,400	14,400
	4,70,400	51,200	76,800
Net Profit	3,29,600	12,800	19,200
Sales	8,00,000	64,000	96,000

**Cost allocated to by-product is calculated as under**

Particulars	By-Product A	By-Product B	Total Rs.
Sales (Rs.)	64,000	96,000	
Less : Estimated Net Profit	12,800	19,200	
Estimated Selling Expenses	6,400	14,400	
Cost After Separation	12,800	48,000	
	32,000	48,000	80,000

**Problem**

Input 7,600 units, output 6,000 units ; Closing work in progress 1,600 units

	<i>Degree of Completion</i>	<i>Process costs</i>
Materials	80%	14,560
Labour	70%	21,360
Overhead	70%	14,240

Find out equivalent production assuming that there is opening work in progress and process loss.

**Solution:****Statement of Equivalent Production**

<i>Particulars</i>	<i>Total Units</i>	<i>Equivalent Units</i>		
		<i>Materials</i>	<i>Labour</i>	<i>Overhead</i>
Completed	6,000	6,000	6,000	6,000
Work in progress	1,600	1,280	1,120	1,120
	7,600	7,280	7,120	7,120



**UNIT – III**  
**COST CONTROL ACCOUNTS**

**Integral and Non-Integral System**

Integral or Integrated system is a system of accounting under which only one set of account books is maintained to record both the Cost and Financial transactions. The system implies the merger of both cost and financial accounts in one set of books.

The two sets of account books merge into a composite system. CIMA, London defines *Integral system as a system in which the financial and cost accounts are interlocked to ensure that all relevant expenditure is absorbed into the cost accounts.*

**The system of accounting has the following advantages:**

- There is no need for reconciliation because there will be only one figure of profit or loss as there is only one set of books.
- This system is economical because it avoids duplication of recording the transactions in two separate set of books.
- Accounting information is readily available and the correctness of the data is automatically checked.
- It enables the introduction of mechanised accounting.
- A better understanding exists among the staff.

**Basic Features of Integral System:**

- (a) There is no need for cost ledger because all control accounts are maintained in the financial ledger.
- (b) There is no need to open a Cost Ledger Control Account because both the aspects (i.e., debit and credit) of all transactions are recorded in respective accounts.
- (c) Subsidiary ledgers i.e., Stores Ledger, Work-in-Progress Ledger and Finished goods ledger are maintained as is done in non-integrated accounting. In addition, a Sales Ledger (containing personal accounts for each customer) and a Purchase Ledger (containing personal accounts for each supplier) are also maintained.

Overhead ledger is maintained to contain separate accounts for factory, administration and selling and distribution overhead.

- (d) **A control account for each subsidiary ledger is maintained in the general ledger.**

**The important control accounts are as follows:**

- Stores Ledger Control Account;
- Work-in-Progress Ledger Control Account;

- Finished Goods Ledger Control Account;
  - Wages Control Account;
  - Factory Overhead Control Account;
  - Administrative Overhead Control Account;
  - Selling and Distribution Overhead Control Account;
  - Sales Ledger Control Account;
  - Purchase Ledger Control Account.
- (e) The balances of overheads Control Accounts represent under or over absorption of overheads which are transferred to Profit and Loss Account.
- (f) The profit or loss as per Profit and Loss Account is transferred to Profit and Loss Appropriation Account.
- (g) The degree of integration must be determined in advance. Some business firms may integrate the cost and financial accounts up to the stage of prime cost or factory cost while other firms integrate the two completely.
- (h) A suitable coding system is generally developed to serve the purposes of both cost accounts as well as financial accounts.
- (i) There should be an agreed accounting procedure in respect of treatment of provision for accruals, prepaid expenses and other adjustments necessary for preparing interim accounts.

**Essential Prerequisites for Integrated Accounting System:**

**The essential prerequisites for integrated system include the following:**

**(a) Degree of Integration:**

The degree of integration of the two sets of accounts should be determined. It is the management which has to decide on full or partial integration. Full integration changes the entire accounting records.

**(b) Suitable Coding System:**

A suitable coding system must be developed to serve the accounting purposes of both financial and cost accounts.

**(c) Accounting Policy:**

An agreed routine with regard to the treatment of provision for accruals, pre-paid expenses, other adjustments necessary for the preparation of interim accounts.

**(d) Co-ordination:**

Perfect co-ordination should exist between the staff responsible for the financial and cost aspects of the accounts and an efficient processing of various accounting documents should be ensured.

**Non-integral system**

Non-integral system is a system of accounting under which two separate sets of account books are maintained—one for cost accounts and the other for financial accounts. In other words, cost accounts are maintained separately from financial accounts.

Since separate ledgers are maintained for cost and financial accounts in this system, the cost accountant is responsible for recording of the cost accounting transactions and the financial accountant is responsible for financial transactions.

Non-integral system of accounting is also known as non-integrated system or Inter-locking system or Cost Ledger Accounting system. CIMA, London defines *Non-integral system as a system in which the cost accounts are distinct from financial accounts, the two sets of accounts being kept continuously in agreement by the use of control accounts or made readily reconcilable by other means.*

**Basic Features of Non-Integral System:**

1. Separate ledgers are maintained for cost and financial accounts.
2. Like financial accounting, it is also based on double entry system.
3. There are no personal accounts because cost accounts do not show relationship with outsiders.
4. Cost accounts are concerned with impersonal accounts i.e., real and nominal accounts.
5. In real accounts, only stocks are shown in cost accounts.
6. Transactions affecting the nominal accounts are recorded separately in detail. Thus cost accounting department is concerned mainly with the ascertainment of income and expenditure of business,
7. Under this system one main ledger (i.e., Cost Ledger) and various subsidiary ledgers are maintained,
8. Since the system is not properly integrated, some items may appear in financial ledgers only, while some other items appear only in cost ledger,
9. The profit or loss disclosed by the two sets of accounts for a particular period will never be the same and as such a reconciliation of costing profit or loss with that of financial accounts is essential.

### Reconciliation of Cost and Financial Accounts

In business concern where Non-integrated Accounting System is followed, cost and financial accounts are maintained separately, the difference between the end result of these two are required to be reconciled. Reconciliation of cost and financial accounts mean tallying the profit or loss revealed by both set of accounts. The chief aim is to find out the reasons for the difference between the results shown by Cost Accounts and Financial Accounts.

### Reasons for the Difference

The various reasons which create difference between cost and financial profit or loss shown by the two set of books may be listed under the following heads:

1. Items shown only in Financial Accounts
2. Items shown only in Cost Accounts
3. Absorption of Overheads
4. Methods of Stock Valuation
5. Abnormal Loss and Gains

***Items shown only in Financial Accounts:*** Some items of income and expenses which are included only in financial accounts but are not shown in cost accounts and vice versa. The following items are shown in financial accounts but not in cost accounts:

*(A) Income:*

- Profit on sale of fixed assets
- Interest received on investment
- Dividend received on investment
- Rent, brokerage and commission received
- Premium on issue of shares
- Transfer fees received.

*(B). Expenditure:*

- Loss on sale of fixed assets, e.g., Plant, Machinery, Building etc.
- Interest paid
- Discount paid
- Dividend paid
- Losses due to scrapping of plant and machinery
- Penalties and, fines
- Expenses of shares' transfer fees
- Preliminary expenses written off
- Damages payable at law.

**Items shown only in Cost Accounts:** There are some items which are recorded only in Cost Accounts but are not included in financial accounts, notional interest on capital, notional rent of premises owned, salary to proprietor etc. are not recorded in financial account because the amount is not actually spent or paid. These expenses reduced the profit in cost account while in financial account it may be the reverse effect.

**Absorption of Overheads:** In financial accounts actual amount of expenses paid are recorded while in cost accounts overheads are charged at predetermined rates. If overhead charged are not equal to the amount of overhead incurred the under or over absorption of overhead leads to difference in profits of two accounts.

**Methods of Stock Valuation:** The term stock refers to opening or closing stock of raw materials, work in progress and finished goods. In financial accounts stocks are valued at cost price or market price whichever is lower. In Cost Account; stock of raw materials can be valued on the basis of FIFO, LIFO and Simple Average Method etc., and work in progress may be valued at Prime Cost or Work Cost. Finished stocks are generally valued on the basis of cost of production. Thus, the adaptation of different method of valuation of stock leads to difference in profits of two sets of accounts.

**Abnormal Losses and Gains:** Different items of abnormal wastages, losses or gains which are included in financial accounts but are not recorded in cost accounts. Thus, the figures of abnormal losses and gains may affect the results in financial accounts alone.

### **Importance of Reconciliation**

Reconciliation of cost and financial account is necessary for the following reasons:

- 1) To ensure arithmetical accuracy of both set of accounts for effective cost ascertainment and cost control.
- 2) To identify the reasons for different results in two sets of accounts.
- 3) To evaluate the reasons for variations for effective internal control.
- 4) To enable the smooth co-operation and co-ordination between the activities of cost and financial accounting departments.
- 5) To ensure the standardization of policies relating to stock valuation, depreciation and absorption of overheads.

### **Methods of Reconciliation**

For reconciling the profit or loss as disclosed by the financial accounting with that shown by the cost accounting, a Reconciliation Statement or Memorandum of Reconciliation Account is prepared.

The following steps have to be taken for preparation of Reconciliation Statement:

- 1) Ascertain the extent of difference between the profit or loss disclosed by two set of book of accounts.
- 2) Take the base profit or loss as per any set of books (either cost or financial) of accounts as the starting point.
- 3) Prepare a statement by making suitable adjustment of items either added or subtracted included in one set of accounts but not in the other set.
- 4) In other words, balances as per cost account has been taken as the starting point, and then balance as per financial account is to be adjusted according to the transaction recorded in the financial accounts and vice versa.

The following table will help to prepare the reconciliation of cost and financial accounts:

Treatment of Causes for Differences

Sl. No.	Reasons for Differences	Suitable Adjustments	
		Base is Costing Profit or Financial Loss (+) or (-)	Base is Financial Profit or Costing Loss (+) or (-)
1	Over absorption of overhead in Cost Account	Add (+)	Less (-)
2	Over valuation of closing stock in Financial Account	Add (+)	Less (-)
3	Over valuation of opening stock in Cost Account	Add (+)	Less (-)
4	Excess provision for depreciation of building plant & machinery etc., charged in Cost Account	Add (+)	Less (-)
5	Items of expenses charged in Cost Account but not in Financial Accounts (Example Notional interest on Capital, Notional rent on Premises)	Add (+)	Less (-)
6	Items of income recorded in Financial Account but not in Cost Account	Add (+)	Less (-)
7	Under absorption of overhead in Financial Account	Less (-)	Add (+)
8	Over valuation of opening stock in Financial Account	Less (-)	Add (+)
9	Over valuation of closing stock in Cost Account	Less (-)	Add (+)
10	Item of income tax, dividend paid, preliminary expenses written off, goodwill written off, under writing commission and debenture discount written off and any appropriation of profit included in Financial Account only.	Less (-)	Add (+)

### Types of Problems

You are required to prepare a reconciliation of cost and financial account from the following situations:

- (1) When profit or loss of financial and cost account are given
- (2) When profit or loss of financial account is given
- (3) When profit or loss of cost account is given
- (4) When profit and loss account and additional information are given.

### Problem

The financial books of a company show a net profit of Rs.1,27,560 for the year ending 31st Dec. 2003. The Cost Account shows a net profit of Rs.1,33,520 for the same corresponding period. The following facts are brought to light:

	Rs.
Factory overhead under recovered in costing A/c	11,400
Administration overhead over recovered in costing A/c	8,500
Depreciation charged in financial accounts	7,320
Depreciation recovered in cost A/c	7,900
Interest received but not included in cost A/c	900
Income Tax debited in financial A/c	1,200
Bank interest credited financial A/c	460
Stores adjustment credited in financial A/c	840
Rent charged in financial A/c	1,720
Dividend paid recorded in financial A/c	2,400
Loss of obsolescence charged in financial A/c	520

### Solution:

#### Reconciliation Statement

<i>Particulars</i>	<i>Rs.</i>	<i>Rs.</i>
Profits as per Cost Accounts		1,33,520
<b>Add :</b>		
Administration overhead over recovered in Cost Account	8,500	
Depreciation over recovered in Cost Account (7900 – 7320)	580	
Interest received but not included in Cost A/c	900	
Bank interest credited in Financial A/c	460	
Stores adjustments credited in Financial A/c	840	11,280
		1,44,800
<b>Less :</b>		
Factory overhead under recovered in Cost A/c	11,400	
Income Tax received but not included in Cost A/c	1,200	
Rent charged in Financial A/c	1,720	
Dividend paid charged in Financial A/c	2,400	
Loss of obsolescence charged in Financial A/c	520	17,240
Profit as per Financial Accounts		1,27,560

**Problem**

AVS Ltd., made a Net Profit of Rs. 5,71,000 during the year 2003 as per the their financial system. Whereas their cost accounts disclosed a profit of Rs. 7,77,200. On reconciliation, the following differences were noticed :

- (1) Directors fees charged in financial account, but not in cost account Rs. 13,000.
- (2) Bank interest credited in financial account, but not in cost account Rs. 600.
- (3) Income Tax charged in financial account, but not in cost account Rs. 1,66,000.
- (4) Bad and doubtful debts written off Rs. 11,400 in financial accounts.
- (5) Overheads charged in costing books Rs. 1,70,000 but actual were Rs. 1,66,400.
- (6) Loss on sale of old machinery Rs.20,000 charged in financial accounts.

**Solution:****Reconciliation Statement**

<i>Particulars</i>	<i>Amount Rs.</i>	<i>Amount Rs.</i>
Profits as per Financial Account		5,71,000
<i>Add :</i> Director fees charged in financial account but not in Cost account	13,000	
Income Tax charged in financial account but not in Cost Account	1,66,000	
Bad and doubtful debts written off	11,400	
Loss on sale of old machinery	20,000	2,10,400
		7,81,400
<i>Less :</i> Bank interest credited in financial account but not in Cost Account	600	
Overheads over absorbed in Cost A/c (170000 – 166400)	3,600	4,200
Profit as per Cost Accounts		7,77,200

**Problem**

Harish Ltd., has furnished you the following informations from the financial books for the year ended 30th June, 2003 :

**Profit and Loss Account (ended 30th June)**

<i>Particulars</i>	<i>Amount Rs.</i>	<i>Particulars</i>	<i>Amount Rs.</i>
To Purchases	1,26,050	By Sales (25000 units at Rs. 15)	3,75,000
Direct wages	52,500	Rent Received	1,300
Factory Overheads	60,650	Profit on sale of investment	11,700
Office & Administrative Overheads } Depreciation	26,700	Closing Stock	20,400
Selling Expenses	5,500		
Net Profit	35,500		
	1,01,500		
	4,08,400		4,08,400

The cost sheet shows the costing profit of Rs. 98,850 and closing stock of Rs. 21,400. The factory overheads are absorbed at 100% of direct wages and Office and Administrative overheads are charged at Re. 1 per unit. Selling expenses are charged at 10% of Gross of sales. Depreciation in cost account absorbed was Rs. 4,000. You are required to prepare :

- (1) A statement showing as per cost account for the year ended 30th June, 2003.
- (2) Statement showing the reconciliation of profit disclosed in cost accounts with the profit shown in the financial accounts.



**Solution:****Profit as per Cost Accounts**

<i>Particulars</i>	<i>Amount</i>
Purchases	1,26,050
Add : Direct Wages	52,500
Prime Cost	1,78,550
Add : Factory overhead at 100% on direct wages	52,500
	2,31,050
Add : Depreciation	4,000
Factory cost or Works cost	2,35,050
Add : Office & Administrative overhead at Re. 1 Per unit (25,000 units at Re. 1)	25,000
Cost of Production	2,60,050
Less : Closing stock of finished goods	21,400
Cost of goods sold	2,38,650
Add : Selling expenses at 10% of Rs. 3,75,000	37,500
Cost of Sales	2,76,150
Costing Profit	98,850
Sales	3,75,000

**Reconciliation Statement**

<i>Particulars</i>	<i>Amount Rs.</i>	<i>Amount Rs.</i>
Profits as Financial Account		1,01,500
Add : Over valuation of closing stock in Cost A/c	1,000	
Under absorption of Factory overhead in Cost A/c	8,150	
Under absorption of Office & Admi. Overhead in Cost A/c	1,700	
Depreciation under absorbed in Cost A/c	1,500	12,350
		1,13,850
Less : Over absorption of selling expenses in Cost A/c	2,000	
Rent received charged in Financial A/c	1,300	
Profit on sale of investment charged in Financial A/c	11,700	15,000
Profit as per Cost A/c		98,850

**Problem**

A manufacturing company disclosed a Net Loss of Rs. 5,72,000 as per their Cost Accounts for the year ended March 31, 2003. The Financial Accounts however disclosed a Net Loss of Rs. 8,84,000 for the same period. The following information was revealed as a result of scrutiny of the figures of both the set of Books.

	<i>Rs.</i>
(i) Factory Overheads Over-absorbed	16,000
(ii) Administration Overheads under absorbed	24,000
(iii) Depreciation charged in Financial Accounts	2,20,000
(iv) Depreciation charged in Cost Accounts	2,45,000
(v) Interest on Investments not included in Cost Accounts	64,000
(vi) Income Tax Provided	1,54,000
(vii) Interest on loan funds in Financial Accounts	2,63,000
(viii) Transfer fees (Credits in financial books)	16,000
(ix) Stores adjustment (Credit in financial books)	8,000

Prepare a Memorandum Reconciliation Method.

**Solution****Memorandum Reconciliation Account**

<i>Particulars</i>	<i>Amount Rs.</i>	<i>Amount Rs.</i>
Net Loss as per Financial Books		8,84,000
<i>Add :</i> Factory overheads over absorbed in Cost Accounts	16,000	
Interest on Investment not included in Cost Accounts	64,000	
Depreciation over charged in Cost Accounts	25,000	
Transfer fees in financial books	16,000	
Stores Adjustment in financial books	8,000	1,29,000
		10,13,000
<i>Less :</i> Administration overheads under recovered in Cost Accounts	24,000	
Income Tax not provided in Cost Accounts	1,54,000	
Interest on loan fund not included in Cost Accounts	2,63,000	4,41,000
Net Loss as per Cost Accounts		5,72,000

**BUDGET**

Budgeting has come to be accepted as an efficient method of short-term planning and control. It is employed, no doubt, in large business houses, but even the small businesses are using it at least in some informal manner. Through the budgets, a business wants to know clearly as to what it proposes to do during an accounting period or a part thereof. The technique of budgeting is an important application of Management Accounting. Probably, the greatest aid to good management that has ever been devised is the use of budgets and budgetary control. It is a versatile tool and has helped managers cope with many problems including inflation.

**Definition**

The Chartered Institute of Management Accountants, England, defines a 'budget' as under: "A financial and/or quantitative statement, prepared and approved prior to define period of time, of the policy to be pursued during that period for the purpose of attaining a given objective".

According to Brown and Howard of Management Accountant "a budget is a predetermined statement of managerial policy during the given period which provides a standard for comparison with the results actually achieved".

**Essentials of a Budget**

An analysis of the above said definitions reveal the following essentials of a budget:

- (1) It is prepared for a definite future period.
- (2) It is a statement prepared prior to a defined period of time.
- (3) The Budget is monetary and / or quantitative statement of policy.
- (4) The Budget is a predetermined statement and its purpose is to attain a given objective.

A budget, therefore, be taken as a document which is closely related to both the managerial as well as accounting functions of an organization.

### **Forecast Vs Budget**

Forecast is mainly concerned with an assessment of probable future events. Budget is a planned result that an enterprise aims to attain. Forecasting precedes preparation of a budget as it is an important part of the budgeting process. It is said that the budgetary process is more a test of forecasting skill than anything else. A budget is both a mechanism for profit planning and technique of operating cost control. In order to establish a budget it is essential to forecast various important variables like sales, selling prices, availability of materials, prices of materials, wage rates etc.

### **Types of Budgets**

As budgets serve different purposes, different types of budgets have been developed. The following are the different classification of budgets developed on the basis of time, functions, and flexibility or capacity.

#### *(A) Classification on the basis of Time:*

1. Long-Term Budgets
2. Short-Term Budgets
3. Current Budgets

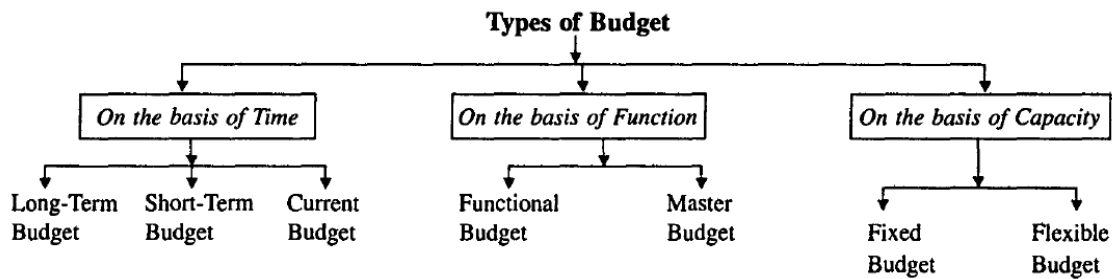
#### *(B) Classification according to Functions:*

1. Functional or Subsidiary Budgets
  - Sales Budget
  - Purchase Budget
  - Production Budget
  - Selling and Distribution Cost Budget
  - Labour Cost Budget
  - **Cash Budget**
  - Capital Expenditure Budget
2. Master Budgets

#### *(C) Classification on the basis of Capacity:*

1. Fixed Budgets
2. **Flexible Budgets**

The following chart can explain this more:



### Cash Budget

This budget represent the anticipated receipts and payment of cash during the budget period. The cash budget also called as Functional Budget. Cash budget is the most important of all the functional budget because, cash is required for the purpose to meeting its current cash obligations. If at any time, a concern fails to meet its obligations, it will be technically insolvent. Therefore, this budget is prepared on the basis of detailed cash receipts and cash payments. The estimated Cash Receipts include:

- (1) Cash Sales
- (2) Credit Sales
- (3) Collection from Sundry Debtors
- (4) Bills Receivable
- (5) Interest Received
- (6) Income from Sale of Investment
- (7) Commission Received
- (8) Dividend Received
- (9) Income from Non-Trading Operations etc.

The estimated Cash Payments include the following :

- (1) Cash Purchase
- (2) Payment to Creditors
- (3) Payment of Wages
- (4) Payments relate to Production Expenses
- (5) Payments relate to Office and Administrative Expenses
- (6) Payments relate to Selling and Distribution Expenses
- (7) Any other payments relate to Revenue and Capital Expenditure
- (8) Income Tax Payable, Dividend Payable etc.

**Problem**

A company is expecting to have Rs. 25,000 cash in hand on 1st April 2003 and it requires you to prepare an estimate of cash position in respect of three months from April to June 2003, from the information given below :

	<i>Sales Rs.</i>	<i>Purchase Rs.</i>	<i>Wages Rs.</i>	<i>Expenses Rs.</i>
February	70,000	40,000	8,000	6,000
March	80,000	50,000	8,000	7,000
April	92,000	52,000	9,000	7,000
May	1,00,000	60,000	10,000	8,000
June	1,20,000	55,000	12,000	9,000

**Additional Information :**

- Period of credit allowed by suppliers — two months.
- 25 % of sale is for cash and the period of credit allowed to customer for credit sale one month.
- Delay in payment of wages and expenses one month.
- Income Tax Rs. 25,000 is to be paid in June 2003.

**Solution:****Cash Budget**

<i>Particulars</i>	<i>April Rs.</i>	<i>May Rs.</i>	<i>June Rs.</i>	<i>Total Rs.</i>
Opening balance of cash	25,000	53,000	81,000	1,59,000
<b>Cash Receipts :</b>				
Cash Sales	23,000	25,000	30,000	78,000
Debtors	60,000	69,000	75,000	2,04,000
<b>Total Cash Receipts – (1)</b>	<b>1,08,000</b>	<b>1,47,000</b>	<b>1,86,000</b>	<b>4,41,000</b>
<b>Cash Payments :</b>				
Creditors	40,000	50,000	52,000	1,42,000
Wages	8,000	9,000	10,000	27,000
Expenses	7,000	7,000	8,000	22,000
Income tax	—	—	25,000	25,000
<b>Total Payment – (2)</b>	<b>55,000</b>	<b>66,000</b>	<b>95,000</b>	<b>2,16,000</b>
<b>Closing Balance of Cash (1-2)</b>	<b>53,000</b>	<b>81,000</b>	<b>91,000</b>	<b>2,25,000</b>

**Problem**

Prasad & Co. wishes to prepare cash budget from January. Prepare a cash budget for the first six months from the following estimated revenue and expenses:

<i>Month</i>	<i>Total Sales Rs.</i>	<i>Materials Rs.</i>	<i>Wages Rs.</i>	<i>Production Overheads Rs.</i>	<i>Selling and Distribution Overheads Rs.</i>
January	10,000	10,000	2,000	1,600	400
February	11,000	7,000	2,200	1,650	450
March	14,000	7,000	2,300	1,700	450
April	18,000	11,000	2,300	1,750	500
May	15,000	10,000	2,000	1,600	450
June	20,000	12,500	2,500	1,800	600

**Additional Information**

- Cash balance on 1st January was Rs. 5,000. New machinery is to be installed at Rs.10,000 on credit, to be repaid by two equal installments in March and April.

- (2) Sales commission @ 5 % on total sales is to be paid within a month of following actual sales.
- (3) Rs. 5,000 being the amount of 2<sup>nd</sup> call may be received in March. Share Premium amounting to Rs. 1,000 is also obtainable with the 2<sup>nd</sup> call.
- (4) Period of credit allowed by suppliers - 2 months.
- (5) Period of credit allowed to customers - 1 month.
- (6) Delay in payment of overheads - 1 month.
- (7) Delay in payment of wages – ½ month.
- (8) Assume cash sales to be 50 % of total sales.

**Solution:****Cash Budget from January to June**

Particulars	January Rs.	February Rs.	March Rs.	April Rs.	May Rs.	June Rs.
Opening Balance	5,000	9,000	14,900	13,500	12,350	16,550
<b>Estimated Cash Receipts:</b>						
Cash Sales	5,000	5,500	7,000	9,000	7,500	10,000
Credit Sales	–	5,000	5,500	7,000	9,000	7,500
Second Call	–	–	5,000	–	–	–
Share Premium	–	–	1,000	–	–	–
Total Cash Receipts (A)	10,000	19,500	33,400	29,500	28,850	34,050
<b>Estimated Cash Payments:</b>						
Materials	–	–	10,000	7,000	7,000	11,000
Wages	1,000	2,100	2,250	2,300	2,150	2,250
Production Overheads	–	1,600	1,650	1,700	1,750	1,600
Selling & Distribution Overheads	–	400	450	450	500	450
Sales Commission	–	500	550	700	900	750
Purchase of Machinery	–	–	5,000	5,000	–	–
Total Cash Payments (B)	1,000	4,600	19,900	17,150	12,300	16,050
Closing Balance (A – B)	9,000	14,900	13,500	12,350	16,550	18,000

**Flexible Budget**

Flexible Budget is also called Variable or Sliding Scale budget, “takes both the fixed and manufacturing costs into account. Flexible budget is the opposite of static budget showing the expected cost at a single level of activity. According to ICMA, England defined Flexible Budget is a budget which is designed to change in accordance with the level of activity actually attained”.

According to the principles that guide the preparation of the flexible budget a series of fixed budgets are drawn for different levels of activity. A flexible budget often shows the

budgeted expenses against each item of cost corresponding to the different levels of activity. This budget has come into use for solving the problems caused by the application of the fixed budget.

### Advantages of Flexible Budget

- (1) In flexible budget, all possible volume of output or level of activity can be covered.
- (2) Overhead costs are analysed into fixed variable and semi-variable costs.
- (3) Expenditure can be forecasted at different levels of activity.
- (4) It facilitates at all times related factor can be compared, which are essential for intelligent decision making.
- (5) A flexible budget can be prepared with standard costing or without standard costing depending upon What the Company opts for.
- (6) Flexible budget facilitates ascertainment of costs at different levels of activity, price fixation, placing tenders and Quotations.
- (7) It helps in assessing the performance of all departmental heads as the same can be judged by terms of the level of activity attained by the business.

### Problem

The expenses budgeted for production of 10,000 units in a factory are furnished below :

	<i>Per unit</i>
	<i>Rs.</i>
Materials	70
Labour	25
Variable factory overheads	20
Fixed factory overhead (Rs. 1,00,000)	10
Variable expenses (Direct)	5
Selling expenses (10 % Fixed)	13
Distribution expenses (20 % Fixed)	7
Administrative expenses (Rs. 50,000)	<u>5</u>
Total cost of sale per unit	<u>155</u>

You are required to prepare a budget for the production of 8,000 units.

**Solution:****Flexible Budget**

Particulars	Output 10,000 units		Output 8,000 units	
	Per unit	Amount	Per unit	Amount
Variable Expenses :				
Material cost	70	7,00,000	70	5,60,000
Labour cost	25	2,50,000	25	2,00,000
Direct expenses (variable)	5	50,000	5	40,000
Prime cost	100	10,00,000	100	8,00,000
Add : Factory overheads :				
Variable overheads	20	2,00,000	20	1,60,000
Fixed overheads	10	1,00,000	12.50	1,00,000
Works cost	130	13,00,000	132.50	10,60,000
Add : Administrative expenses				
Fixed (Assumed)	5	50,000	6.25	50,000
Cost of production	135	13,50,000	138.75	11,10,000
Add : Selling Expenses				
Fixed – 10 % of Rs. 13	1.30	13,000	1.63	13,000
Variable – 90 % of Rs. 13	11.70	1,17,000	11.70	93,600
Add : Distribution Expenses:				
Fixed – 20 % of Rs.7	1.40	14,000	1.75	14,000
Variable – 80 % of Rs.7	5.60	56,000	5.60	44,800
Total Cost of Sales	155	15,50,000	159.43	12,75,400

**Problem**

Prepare a flexible budget for overheads on the basis of the following data. Ascertain the overhead rates at 50 %, 60 % and 70 % capacity.

	At 60 % capacity Rs.
Variable overheads :	
Indirect Material	3,000
Indirect Labour	9,000
Semi-variable overheads :	
Electricity (40 % fixed 60 % Variable)	15,000
Repairs ( 80 % fixed 20 % Variable)	1,500
Fixed Overheads :	
Depreciation	8,250
Insurance	2,250
Salaries	7,500
Total overheads	46,500
Estimated direct labour hours	93,000



**Solution:****Flexible Budget**

<i>Particulars</i>	<i>50 % Capacity</i>	<i>60 % Capacity</i>	<i>70 % Capacity</i>
<b>Variable overheads :</b>			
Indirect material	2,500	3,000	3,500
Indirect labour	7,500	9,000	10,500
<b>Semi-variable overheads :</b>			
Electricity	13,500	15,000	16,500
Repairs and Maintenance	1,450	1,500	1,550
<b>Fixed overheads :</b>			
Depreciation	8,250	8,250	8,250
Insurance	2,250	2,250	2,250
Sales	7,500	7,500	7,500
<b>Total Overheads</b>	<b>42,950</b>	<b>46,500</b>	<b>50,050</b>
Estimated direct labour hours	77,500	93,000	1,08,500
Overhead Rate	Re. 0.55	Re. 0.50	Re. 0.46

**Working Notes :**

(1) **Electricity:** Rs. 15,000 is the cost of electricity at 60 % capacity, of which 40% are fixed overheads, i.e., Rs. 6,000 and variable is Rs. 9,000 :

$$\begin{aligned} \text{For 60 \% capacity variable overheads} &= \text{Rs. 9,000} \\ \text{For 50 \% capacity variable overheads} &= \frac{9,000}{60} \times 50 = \text{Rs. 7,500} \\ \text{Therefore electricity cost at 50 \% capacity} &= 6,000 + 7,500 = \text{Rs. 13,500} \\ \text{For 70 \% capacity, variable overheads} &= \frac{9,000}{60} \times 70 = \text{Rs. 10,500} \\ \text{Therefore electricity cost at 70 \%} &= \text{Rs. 10,500} + \text{Rs. 6,000} = \text{Rs. 16,500} \end{aligned}$$

(2) **Repairs and Maintenance:** Rs. 1,500 is the cost of repairs and maintenance at 60 % capacity, of which 80% is fixed overhead, i.e., Rs. 1,200 and variable is Rs. 300 :

$$\begin{aligned} \text{For 60 \% capacity variable overhead} &= \text{Rs. 300} \\ \text{For 50 \% capacity variable overhead} &= \frac{300}{60} \times 50 = \text{Rs. 250} \\ \text{Therefore the total cost of repairs and maintenance at 50 \%} &= \text{Rs. 1,200} + \text{Rs. 250} = \text{Rs. 1,450} \\ \text{For 70 \% capacity, the variable overhead} &= \frac{300}{60} \times 70 = \text{Rs. 350} \\ \text{Therefore the total cost of repairs and maintenance} &= \text{Rs. 1,200} + \text{Rs. 350} = \text{Rs. 1,550} \end{aligned}$$

**Zero Base Budgeting (ZBB)**

Zero Base Budgeting is a new technique of budgeting. It is designed to meet the needs of the management in order to ensure the operational efficiency and effective utilization of the allocated resources of a concern. This technique was originally developed by Peter A. Phyhrr, Manager of Texas Instrument during 1969. This concept is widely used in USA for controlling their state expenditure when Mr. Jimmy Carter was the president of the USA. At present the technique has for its global recognition for many countries have implemented in real terms.

According to Peter A. Phyhrr ZBB is defined as an “*Operative Planning and Budgeting Process* which requires each Manager to justify his entire budget in detail from Scratch (hence zero base) and shifts the burden of proof to each Manager to justify why we should spend any money at all”.

In zero-base budgeting, a manager at all levels has to justify the importance of activity and to allocate the resources on priority basis.

**Important Aspects of ZBB**

Zero Base Budgeting involves the following important aspects:

- (1) It emphasizes on all requisites of budgets.
- (2) Evaluation on the basis of decision packages and systematic analysis, i.e., in view of cost benefit analysis.
- (3) Planning the activities promotes operational efficiency and monitors the performance to achieve the objectives.

**Steps Involved in ZBB**

The following are the steps involved in Zero Base Budgeting:

- (1) No Previous year performance of inefficiencies are to be taken as adjustments in subsequent year.
- (2) Identification of activities in decision packages.
- (3) Determination of budgeting objectives to be attained.
- (4) Extent to which Zero Base Budgeting is to be applied.
- (5) Evaluation of current and proposed expenditure and placing them in order of priority.
- (6) Assignment of task and allotment of sources on the basis of cost benefit comparison.
- (7) Review process of each activity examined afresh.
- (8) Weightage should be given for alternative course of actions.

**Advantages of ZBB**

- (1) Utilization of resources at a maximum level.
- (2) It serves as a tool of management in formulating production planning.
- (3) It facilitates effective cost control.
- (4) It helps to identify the uneconomical activities.
- (5) It ensures the proper allocation of scarce resources on priority basis.
- (6) It helps to measure the operational inefficiencies and to take the corrective actions.
- (7) It ensures the principles of Management by Objectives.
- (8) It facilitates Co-operation and Co-ordination among all levels of management.
- (9) It ensures each activity is thoroughly examined on the basis of cost benefit analysis.

## UNIT – IV

**STANDARD COSTING AND VARIANCE ANALYSIS**

The success of a business enterprise depends to a greater extent upon how efficiently and effectively it has controlled its cost. In a broader sense the cost figure may be ascertained and recorded in the form of Historical costing and Predetermined costing. The term Historical costing refers to ascertainment and recording of actual costs incurred after completion of production.

One of the important objectives of cost accounting is effective cost ascertainment and cost control. Historical Costing is not an effective method of exercising cost control because it is not applied according to a planned course of action. And also it does not provide any yardstick that can be used for evaluating actual performance. Based on the limitations of historical costing it is essential to know before production begins what the cost should be so that exact reasons for failure to achieve the target can be identified and the responsibility are fixed. For such an approach to the identification of reasons to evaluate the performance, suitable measures may be suggested and taken to correct the deficiencies.

**Standard Cost**

The word "Standard" means a "Yardstick" or "Bench Mark." The term "Standard Costs" refers to Pre-determined costs. Brown and Howard define Standard Cost as a Pre-determined Cost which determines what each product or service should cost under given circumstances. This definition states that standard costs represent planned cost of a product.

Standard Cost as defined by the Institute of Cost and Management Accountant, London "is the Predetermined Cost based on technical estimate for materials, labour and overhead for a selected period of time and for , a prescribed set of working conditions."

**Standard Costing**

Standard Costing is a concept of accounting for determination of standard for each element of costs. These predetermined costs are compared with actual costs to find out the deviations known as "Variances." Identification and analysis of causes for such variances and remedial measures should be taken in order to overcome the reasons for Variances.

Chartered Institute of Management Accountants England defines Standard Costing as "the Preparation and use of standard costs, their comparison with actual costs and the analysis of variances to their causes and points of incidence."

From the above definition, the technique of Standard Costing may be summarized as follows :

- (1) Determination of appropriate standards for each element of cost.

- (2) Ascertainment of information about actual and use of Standard Costs.
- (3) Comparison of actual costs with Standard Costs, the differences known as Variances.
- (4) Analysis of Variances to find out the causes of Variances.
- (5) Reporting to the responsible authority for taking remedial measures.

### **Advantages of Standard Costing**

The following are the important advantages of standard costing :

- (1) It guides the management to evaluate the production performance.
- (2) It helps the management in fixing standards.
- (3) Standard costing is useful in formulating production planning and price policies.
- (4) It guides as a measuring rod for determination of variances.
- (5) It facilitates eliminating inefficiencies by taking corrective measures.
- (6) It acts as an effective tool of cost control.
- (7) It helps the management in taking important decisions.
- (8) It facilitates the principle of "Management by Exception."
- (9) Effective cost reporting system is possible.

### **Limitations of Standard Costing**

Besides all the benefits derived from this system, it has a number of limitations which are given below:

- (1) Standard costing is expensive and a small concern may not meet the cost.
- (2) Due to lack of technical aspects, it is difficult to establish standards.
- (3) Standard costing cannot be applied in the case of a- concern where non-standardized products are produced.
- (4) Fixing of responsibility is difficult. Responsibility cannot be fixed in the case of uncontrollable variances.
- (5) Frequent revision is required while insufficient staff is incapable of operating this system.
- (6) Adverse psychological effects and frequent technological changes will not be suitable for standard costing system.

### **VARIANCE ANALYSIS**

Standard Costing guides as a measuring rod to the management for determination of "Variances" in order to evaluate the production performance. The term "Variances" may be defined as the difference between Standard Cost and actual cost for each element of cost incurred during a particular period. The term "Variance Analysis" may be defined as the

process of analyzing variance by subdividing the total variance in such a way that management can assign responsibility for off-Standard Performance.

The variance may be favourable variance or unfavourable variance. When the actual performance is better than the Standard, it presents "Favourable Variance". Similarly, where actual performance is below the standard it is called as "Unfavourable Variance".

Variance analysis helps to fix the responsibility so that management can ascertain -

- a) The amount of the variance
- b) The reasons for the difference between the actual performance and budgeted performance
- c) The person responsible for poor performance
- d) Remedial actions to be taken

### **Types of Variances:**

Variances may be broadly classified into two categories (A) Cost Variance and (B) Sales Variance.

#### *(A) Cost Variance*

Total Cost Variance is the difference between Standards Cost for the Actual Output and the Actual Total Cost incurred for manufacturing actual output. The Total Cost Variance Comprises the following:

- 1) Direct Material Cost Variance (DMCV)
- 2) Direct Labour Cost Variance (DLCV)
- 3) Overhead Cost Variance (OCV)

### **Problem**

**Calculate Material Cost Variance from the following information :**

**Standard Price of material per kg = Rs. 4**

**Standard Usage of materials = 800 kgs**

**Actual Usage of materials = 920 kgs**

**Actual Price of materials per kg = Rs. 3**

**Actual Cost of materials Rs. 2,760**

**Standard cost of material for actual production Rs. 3,200**

**Solution:**

$$\begin{aligned}
 (1) \text{ Material Cost Variance} &= \left\{ \begin{array}{l} \text{Standard} \\ \text{Price} \end{array} \times \begin{array}{l} \text{Standard} \\ \text{Quantity} \end{array} \right\} - \left\{ \begin{array}{l} \text{Actual} \\ \text{Price} \end{array} \times \begin{array}{l} \text{Actual} \\ \text{Quantity} \end{array} \right\} \\
 &= (4 \times 800) - (3 \times 920) \\
 &= \text{Rs. } 3,200 - \text{Rs. } 2,760 = \text{Rs. } 440 \text{ (F)} \\
 \\
 (2) \text{ Material Price Variance} &= \text{Actual} \times \left\{ \begin{array}{l} \text{Standard} \\ \text{Price} \end{array} - \begin{array}{l} \text{Actual} \\ \text{Price} \end{array} \right\} \\
 &= 920 (4 - 3) \\
 &= 920 \times \text{Rs. } 1 = \text{Rs. } 920 \text{ (F)} \\
 \\
 (3) \text{ Material Usage Variance} &= \begin{array}{l} \text{Standard} \\ \text{Price} \end{array} \times \left\{ \begin{array}{l} \text{Standard} \\ \text{Quantity} \end{array} - \begin{array}{l} \text{Actual} \\ \text{Quantity} \end{array} \right\} \\
 &= 4 (800 - 920) \\
 &= 4 \times 120 = \text{Rs. } 480 \text{ (A)}
 \end{aligned}$$

**Problem**

From the following particulars calculate:

- (a) Material Cost Variance
- (b) Material Price Variance
- (c) Material Usage Variance
- (d) Material Mix Variance

**The Standard Mix of Product is :**

- X 300 Units at Rs. 7.50 per unit
- Y 400 Units at Rs. 10 per unit
- Z 500 Units at Rs. 12.50 per unit

**The Actual Consumption was :**

- X 320 Units at Rs. 10 per unit
- Y 480 Units at Rs. 7.50 per unit
- Z 420 Units at Rs. 15 per unit

**Solution:****Standard Cost of Standard Materials :**

X	300	x 7.50	=	Rs. 2,250
Y	400	x 10	=	Rs. 4,000
Z	500	x 12.50	=	Rs. 6,250
	<u>1,200</u>			<u>Rs. 12,500</u>

**Actual Cost of Actual Materials :**

X	320	x 10	=	Rs. 3,200
Y	480	x 7.50	=	Rs. 3,600
Z	420	x 15	=	Rs. 6,300
	<u>1,220</u>			<u>Rs. 13,100</u>

**Revised Quantity :**

X	=	$\frac{1,220}{1,200}$	x 300	= 305 units
Y	=	$\frac{1,220}{1,200}$	x 400	= 406.66 units
Z	=	$\frac{1,220}{1,200}$	x 500	= 508.33 units



**Calculation of Variance :**

(a) <i>Material Cost Variance</i>	=	Standard Cost – Actual Cost
	=	Rs. 12500 – Rs. 13100 = Rs. 600 (A)
(b) <i>Material Price Variance</i>	=	Actual Quantity x $\left\{ \begin{array}{l} \text{Standard} \\ \text{Price} \end{array} - \begin{array}{l} \text{Actual} \\ \text{Price} \end{array} \right\}$
	=	(or) AQ (SP – AP)
X = 320 (7.50 – 10)	=	Rs. 800 (A)
Y = 480 (10 – 7.50)	=	Rs. 1200 (F)
Z = 420 (12.50 – 15)	=	Rs. 1050 (A)
Material Price Variance	=	<u>Rs. 650 (A)</u>
(c) <i>Material Usage Variance</i>	=	Standard Price x $\left\{ \begin{array}{l} \text{Standard} \\ \text{Quantity} \end{array} - \begin{array}{l} \text{Actual} \\ \text{Quantity} \end{array} \right\}$
	=	SP (SQ – AQ)
X = 7.50 (300 – 320)	=	Rs. 150 (A)
Y = 10 (400 – 480)	=	Rs. 800 (A)
Z = 12.50 (500 – 420)	=	Rs. 1000 (F)
Material Mix Variance	=	<u>Rs. 50 (F)</u>
(d) <i>Material Mix Variance</i>	=	Standard Price x $\left\{ \begin{array}{l} \text{Revised Standard} \\ \text{Quantity} \end{array} - \begin{array}{l} \text{Actual} \\ \text{Quantity} \end{array} \right\}$
	=	SP (RSQ – AQ)
X = 7.50 (305 – 320)	=	Rs. 112.50 (A)
Y = 10 (407 – 480)	=	Rs. 730 (A)
Z = 12.50 (508 – 420)	=	Rs. 1100 (F)
Material Mix Variance	=	<u>Rs. 257.50 (F)</u>

**Problem**

From the following particulars, calculate Labour Variance:

Standard hours = 200

Standard rate for actual production = Re. 1 per hour

Actual hour = 190

Actual Rate = Rs. 1.25 per hour

**Solution:**

$$\begin{aligned}
 (1) \text{ Labour Cost Variance} &= \left\{ \begin{array}{l} \text{Standard} \\ \text{Hours} \end{array} \times \begin{array}{l} \text{Standard} \\ \text{Rate} \end{array} \right\} - (\text{Actual hours} \times \text{Actual Rate}) \\
 \text{(or)} &= (\text{SH} \times \text{SR}) - (\text{AH} \times \text{AR}) \\
 &= (200 \times \text{Re.1}) - (190 \times \text{Rs. 1.25}) \\
 &= \text{Rs. 200} - \text{Rs. 237.50} = \text{Rs. 37.50 (A)} \\
 \\
 (2) \text{ Labour Rate Variance} &= \left\{ \begin{array}{l} \text{Standard} \\ \text{Rate} \end{array} - \begin{array}{l} \text{Actual} \\ \text{Rate} \end{array} \right\} \times \text{Actual hours} \\
 &= (\text{Re. 1} - \text{Rs. 1.25}) \times 190 \\
 &= \text{Rs. 0.25} \times 190 = \text{Rs. 47.50 (A)} \\
 \\
 (3) \text{ Labour Efficiency Variance} &= \left\{ \begin{array}{l} \text{Standard} \\ \text{Hours} \end{array} - \begin{array}{l} \text{Actual} \\ \text{Hours} \end{array} \right\} \times \text{Standard Rate} \\
 &= (200 - 190) \times \text{Re. 1} \\
 &= 10 \times \text{Re. 1} = \text{Rs. 10 (F)}
 \end{aligned}$$

**Verification:**

$$\begin{aligned}
 \text{Labour Cost Variance} &= \text{Labour Rate Variance} + \text{Labour Efficiency Variance} \\
 \text{Rs. 37.50 (A)} &= \text{Rs. 47.50 (A)} + \text{Rs. 10 (F)} \\
 \text{Rs. 37.50 (A)} &= \text{Rs. 37.50 (A)}
 \end{aligned}$$

**Problem**

The details regarding the composition and the weekly wage rates of labour force engaged on a job scheduled to be completed in 30 weeks are as follows :

Category of Workers	Standard		Actual	
	No. of workers	Weekly wage Rate per worker	No. of workers	Weekly wage Rate per worker
Skilled	75	60	70	70
Semi-Skilled	45	40	30	50
Unskilled	60	30	80	20

The work was actually completed in 32 weeks. Calculate the various labour variances.

**Solution:**

(1) Labour Cost Variance = Standard Labour Cost – Actual Labour Cost

**Calculation of Standard Labour Cost :****Category of Standard Workers :**

			<i>Week</i>		<i>Rate</i>		<i>Amount</i>			
					<i>Rs.</i>		<i>Rs.</i>			
Skilled	=	75	x	30	=	2,250	x	60	=	1,35,000
Semi Skilled	=	45	x	30	=	1,350	x	40	=	54,000
Unskilled	=	60	x	30	=	1,800	x	30	=	54,000
						<u>5,400</u>				<u>2,43,000</u>

**Calculation of Actual Labour Cost :**

			<i>Actual Week</i>		<i>Rate</i>		<i>Amount</i>			
					<i>Rs.</i>		<i>Rs.</i>			
Skilled	=	75	x	32	=	2,240	x	70	=	1,56,800
Semi Skilled	=	30	x	32	=	960	x	50	=	48,000
Unskilled	=	80	x	32	=	2,560	x	20	=	51,200
						<u>5,760</u>				<u>2,56,000</u>

(1) *Labour Cost Variance* = Standard Labour - Actual Labour Cost  
 = 2,43,000 – 2,56,000 = Rs. 13,000 (A)

(2) *Labour Rate Variance* = (Standard Rate – Actual Rate) x Actual Time  
 Skilled = (Rs. 60 – Rs. 70) x 2,240 = Rs. 22,400 (A)  
 Semi Skilled = (Rs. 40 – Rs. 50) x 960 = Rs. 9,600 (A)  
 Unskilled = (Rs. 30 – Rs. 20) x 2,560 = Rs. 25,600 (F)  
 Labour Rate Variance = Rs. 6,400 (A)

(3) *Labour Efficiency Variance* =  $\left\{ \begin{array}{l} \text{Standard} \\ \text{Time} \end{array} - \begin{array}{l} \text{Actual} \\ \text{Time} \end{array} \right\} \times \text{Standard Rate}$

Skilled = (2,250 – 2,240) x 60 = Rs. 600 (F)  
 Semi Skilled = (1,350 – 960) x 40 = Rs. 15,600 (F)  
 Unskilled = (1,800 – 2,560) x 30 = Rs. 22,800 (A)  
 Labour Efficiency Variance = Rs. 6,600 (A)

(4) *Labour Mix Variance* =  $\left\{ \begin{array}{l} \text{Revised Standard} \\ \text{Time} \end{array} - \begin{array}{l} \text{Actual} \\ \text{Time} \end{array} \right\} \times \text{Standard Rate}$

Where :

Revised Standard Time =  $\frac{\text{Standard Time}}{\text{Total Standard Time}} \times \text{Actual Time}$

Skilled =  $\frac{2,250}{5,400} \times 5,760 = 2,400$  hours

Semi Skilled =  $\frac{1,350}{5,400} \times 5,760 = 1,440$  hours

Unskilled =  $\frac{1,800}{5,400} \times 5,760 = 1,920$  hours

**Labour Mix Variance**

Skilled	=	(2,400 - 2,240)	x	60	=	Rs. 9,600 (F)
Semi Skilled	=	(1,440 - 960)	x	40	=	Rs. 19,200 (F)
Unskilled	=	(1,920 - 2,560)	x	30	=	Rs. 19,200 (A)
Labour Mix Variance					=	Rs. 9,600 (F)

(5) Labour Revised Efficiency Variance	=	$\left\{ \begin{array}{l} \text{Standard} \\ \text{Time} \end{array} - \begin{array}{l} \text{Revised Standard} \\ \text{Time} \end{array} \right\} \times \text{Standard Rate}$
Skilled	=	(2,250 - 2,400) x Rs. 60 = Rs. 9,000 (A)
Semi Skilled	=	(2,350 - 1,440) x Rs. 40 = Rs. 3,600 (A)
Unskilled	=	(1,800 - 1,920) x Rs. 30 = Rs. 300 (A)
Labour Revised Efficiency Variance		= Rs. 16,200 (A)

**Verification :**

(1) Labour Cost Variance	=	Labour Rate Variance	+	Labour Efficiency Variance
Rs. 13,000 (A)	=	Rs. 6,400 (A)	+	Rs. 6,600 (A)
Rs. 13,000 (A)	=	Rs. 13,000 (A)		
(2) Labour Efficiency Variance	=	Labour Mix Variance	+	Labour Revised Variance
Rs. 6,600 (A)	=	Rs. 9,600 (F)	+	Rs. 16,200 (A)
Rs. 6,600 (A)	=	Rs. 6,600 (A)		

**Problem**

From the following particulars, compute the Variable Overhead Variances :

	<i>Standard</i>	<i>Actual</i>
Output in Units	2,500 units	2,000 units
Labour Hours	5,000	6,000
Variable Overheads	Rs. 1,000	Rs. 1,500

**Solution:**

$$\left. \begin{array}{l} \text{Standard Variable} \\ \text{Overhead rate per hour} \end{array} \right\} = \frac{\text{Budgeted Variable Overhead}}{\text{Budgeted Hours}}$$

$$= \frac{1,000}{5,000} = 0.20 \text{ per hour}$$

$$\left. \begin{array}{l} \text{Standard Variable} \\ \text{Overhead rate per} \\ \text{Unit of output} \end{array} \right\} = \frac{\text{Budgeted Variable Overheads}}{\text{Budgeted Output}}$$

$$= \frac{1,000}{2,500} = \text{Rs. } 0.40 \text{ per hour}$$

**Calculation of Variances:**

$$\begin{aligned}
 \text{(1) Variable Overhead Cost Variance} & \left. \vphantom{\text{(1) Variable Overhead Cost Variance}} \right\} = \left\{ \begin{array}{c} \text{Actual Variable} \\ \text{Overheads} \end{array} \right\} - \left\{ \begin{array}{c} \text{Standard Variable} \\ \text{Overhead for Actual} \\ \text{Production} \end{array} \right\} \\
 & = 1,500 - (2,000 \times 0.40) \\
 & = \text{Rs. } 1,500 - \text{Rs. } 800 = \text{Rs. } 700 \text{ (A)}
 \end{aligned}$$

$$\begin{aligned}
 \text{(2) Variable Overhead Expenditure Variance} & \left. \vphantom{\text{(2) Variable Overhead Expenditure Variance}} \right\} = \left\{ \begin{array}{c} \text{Actual Variable} \\ \text{Overheads} \end{array} \right\} - \left\{ \begin{array}{c} \text{Standard Variable} \\ \text{Overhead for Actual} \\ \text{Hours Worked} \end{array} \right\} \\
 & = 1,500 - (6,000 \times 0.20) \\
 & = \text{Rs. } 1,500 - \text{Rs. } 1,200 = \text{Rs. } 300 \text{ (A)}
 \end{aligned}$$

$$\begin{aligned}
 \text{(3) Variable Overhead Efficiency Variance} & \left. \vphantom{\text{(3) Variable Overhead Efficiency Variance}} \right\} = \left\{ \begin{array}{c} \text{Standard Variable} \\ \text{Overhead for Actual} \\ \text{Hours} \end{array} \right\} - \left\{ \begin{array}{c} \text{Standard Variable} \\ \text{Overhead for Actual} \\ \text{Output} \end{array} \right\} \\
 & = (\text{Rs. } 6,000 \times 0.20) - (2,000 \times 0.40) \\
 & = \text{Rs. } 1,200 - \text{Rs. } 800 = \text{Rs. } 400 \text{ (A)}
 \end{aligned}$$

**Verification:**

$$\begin{aligned}
 \left. \begin{array}{c} \text{Variable Overhead} \\ \text{Cost Variance} \end{array} \right\} & = \begin{array}{c} \text{Variable Overhead} \\ \text{Expenditure Variance} \end{array} + \begin{array}{c} \text{Variable Overhead} \\ \text{Efficiency Variance} \end{array} \\
 \text{Rs. } 700 \text{ (A)} & = \text{Rs. } 300 \text{ (A)} + \text{Rs. } 400 \text{ (A)} \\
 \text{Rs. } 700 \text{ (A)} & = \text{Rs. } 700 \text{ (A)}
 \end{aligned}$$

**Sales Variances**

The Variances so far analysed are related to the cost of goods sold. Quantum of profit is derived from the difference between the cost and sales revenue. Cost Variances influence the amount of profit favourably or adversely depending upon the cost from materials, labour and overheads. In addition, it is essential to analyse the difference between actual sales and the targeted sales because this difference will have a direct impact on the profit and sales. Therefore the analysis of sales variances is important to study profit variances.

**Problem**

From the following information is given about standard and actual sales. You are required to calculate Sales Variances.

	<i>Standard Qty. Units</i>	<i>Sales Price</i>	<i>Actual Qty. Units</i>	<i>Sales Price</i>
X	250	2.50	250	2.50
Y	200	3	300	3.25
Z	150	3.50	200	3.75
	<u>600</u>		<u>750</u>	

**Solution:****(1) Sales Value Variance :**

	=	Actual Value of Sales – Standard Value of Sales
X	=	(250 x 2.50) – (250 x 2.50)
	=	Rs. 625 – Rs. 625 = Nil
Y	=	(300 x 3.25) – (200 x 3)
	=	Rs. 975 – Rs. 600 = Rs. 375 (F)
Z	=	(200 x 3.75) – (150 x 3.50)
	=	Rs. 750 – Rs. 525 = Rs. 225 (F)
Total Sales Value Variance	=	Rs. 375 (F) + Rs. 225 (F) = Rs. 600 (F)

**(2) Sales Price Variance :**

	=	Actual Quantity Sold x (Actual Price – Standard Quantity)
X	=	250 (2.50 – 2.50) = Nil
Y	=	300 (3.25 – 3) = Rs. 75 (F)
Z	=	200 (3.75 – 3.50) = Rs. 50 (F)
Total Sales Price Variance	=	Rs. 75 (F) + Rs. 50 (F) = Rs. 125 (F)

**(3) Sales Value Variance :**

	=	Standard Price x (Actual Quantity – Standard Quantity)
X	=	2.50 (250 – 250) = Nil
Y	=	3 (300 – 200) = Rs. 300 (F)
Z	=	3.50 (200 – 150) = Rs. 175 (F)
Total Sales Value Variance	=	R. 300 (F) + Rs. 175 (F) = Rs. 475 (F)

**(4) Sales Mix Variance :**

There is a difference between standard quantity and actual quantity so the standard will be revised in proportion to actual quantity of sales.

$$X = \frac{250}{600} \times 750 = 312.50$$

$$Y = \frac{200}{600} \times 750 = 250$$

$$Z = \frac{150}{600} \times 750 = 187.50$$

Sales Mix Variance = Standard Value of Actual Mix – Standard Value of Revised Standard Mix

**Standard Value of Actual Mix**

X	=	250 x 2.50 = 625
Y	=	200 x 3 = 600
Z	=	150 x 3.50 = 525
		<u>Rs. 1750</u>

**Standard Value of Revised Standard Mix**

X	=	312.50 x 2.50 = 781.25
Y	=	250 x 3 = 750.00
Z	=	187.50 x 3.50 = 656.25
		<u>Rs. 2187.50</u>

Sales Mix Variance = Rs. 1750 – Rs. 2187.50 = Rs. 437.50 (A)

**VARIANCE ANALYSIS**  
*Summary of Formulas*

<i>Variances</i>	<i>Formulas</i>
<b>I. Material Variances</b>	
(1) Material Cost Variance (MCV)	= (Standard Quantity x Standard Price) - (Actual Quantity x Actual Price) (or) = (SQ x SP) - (AQ x AP)
(2) Material Price Variance (MPV)	= Actual Quantity x (Standard Price - Actual Price) (or) = AQ (SP - AP)
(3) Material Usage Variance (MUV)	= Standard Price (Standard Quantity - Actual Quantity) (or) = SP (SQ - AQ)
(4) Material Mix Variance (MMV)	= Standard Price (Standard Quantity - Actual Quantity) (or) = SP (SQ - AQ)
(a) Revised Standard Quantity (RSQ)	= Standard Unit Cost (Revised Standard Quantity - Actual Quantity) (or) = SP (RSQ - AQ)
(b) Revised Material Usage Variance	= $\left\{ \frac{\text{Total Weight of Actual Mix}}{\text{Total Weight of Standard Mix}} \times \text{Standard Cost of Standard Mix} \right\} - [\text{Standard Cost of Actual Mix}]$
(5) Materials Yield Variance (MYV)	= Standard Rate (Actual Yield - Standard Yield)
Standard Rate	= $\frac{\text{Standard Cost of Standard Mix}}{\text{Net Standard Output}}$
<b>Verification</b>	
(1) Material Cost Variance	= Material Price Variance + Material Usage Variance
(2) Material Usage Variance	= Material Mix Variance + Material Yield Variance
(3) Material Cost Variance	= Material Mix Variance + Material Price Variance + Material Yield Variance
<b>II. Labour Variances</b>	
(1) Labour Cost Variance (LCV)	= (Standard Cost of Labour - Actual Cost of Labour)* (or) (Standard Rate x Standard Time for Actual Output) - (Actual Rate x Actual Time)
(2) Labour Rate Variance (LRV)	= Actual Time Standard Rate - Actual Rate
(3) Labour Efficiency Variance	= Standard Rate Standard Time - Actual Time
(4) Labour Idle Time Variance	= Idle Hours x Standard Rate
(5) Labour Mix Variance (LMV)	
(a) When Standard & Actual Time of the Labour Mix are same	} = Standard Cost of Standard Labour Mix - Standard Cost of Actual Labour Mix
(b) When Standard & Actual Time of Labour Mix are different	
	= Standard Rate Revised Standard Time - Actual Time

<i>Variances</i>	<i>Formulas</i>
Revised Standard Time	$= \frac{\text{Total Actual Time}}{\text{Total Standard Time}} \times \text{Actual Time}$
<b>Verification</b>	
Total Labour Cost Variance	= Labour Rate Variance + Labour Efficiency Variance
Total Labour Efficiency Variance	= Labour Efficiency Variance + Labour Idle Time Variance
<b>III. Overhead Variances</b>	
<i>Essentials of Certain Terms :</i>	
(1) Standard Overhead Rate per unit	$= \frac{\text{Budgeted Overheads}}{\text{Budgeted Output}}$
(2) Standard Overhead Rate per hour	$= \frac{\text{Budgeted Overheads}}{\text{Budgeted Hours}}$
(3) Standard Output for Actual Time	$= \frac{\text{Budgeted Output}}{\text{Budgeted Hours}} \times \text{Actual Hours}$
(4) When Output is measured in Standard Hours:	
Recorded Overheads	= Standard Rate Per Hour x Standard Hours for Actual Output
When Output is measured in units :	
Absorbed Overhead	= Standard Rate Per Unit x Actual Output in Units
(5) Budgeted Overhead	= Standard Rate Per Unit x Budgeted Output in Units (or) = Standard Rate Per Hour x Budgeted Hours
(6) Actual Overhead	= Actual Rate Per Unit x Actual Output in Units (or) = Actual Rate Per Hour x Actual Hours
(7) Standard Overhead	= Standard Rate Per Unit x Standard Output for Actual Time (or) = Standard Rate Per Hour x Actual Hours
<b>Overhead Variances</b>	
Overhead Cost Variance	= (Actual Output x Standard Overhead Rate per Unit)-Actual Overhead Cost (or) = Standard hours for Actual Output x [Standard Overhead Rate Per Hour-Actual Overhead Cost]
<b>(A) Variable Overhead Variances :</b>	
(1) Variable Overhead Cost Variance	= Standard Variable Overhead for Actual Output-Actual Variable Overhead



<i>Variances</i>	<i>Formulas</i>
(2) Variable Overhead Expenditure Variance	= Actual Time (Standard Variable Overhead Rate per Hour - Actual Variable Overhead Rate per Hour) (or) = Standard Variable Overheads - Actual Variable Overheads
(3) Variable Overhead Efficiency Variance	
	= Standard Rate per Hour x (Standard Hours for Actual Production - Actual Hours)
<b>(B) Fixed Overhead Variances</b>	
(1) Fixed Overhead Cost Variance :	= Actual Fixed Overhead - Standard Fixed Overhead for Actual Production (or) = Actual Output Standard Fixed Overhead Rate per Hour - Actual Fixed Overheads
(2) Fixed Overhead Expenditure Variance (or) Budget Variance	= (Budgeted Fixed Overheads) - (Actual Fixed Overheads)
(3) Fixed Overhead Volume Variance	
(4) Fixed Overhead Capacity Variance	= Budgeted Fixed Overheads - Standard Fixed Overheads on Actual Production (or) = Standard Fixed Overhead Rate per Hour x (Actual Hours Worked - Budgeted Hours)
(5) Fixed Overhead Efficiency Variance	= Standard Fixed Overhead Rate per Hour x (Standard Quantity - Actual Quantity)
(6) Fixed Overhead Calendar Variance	
	= Standard Rate per Hour / per Day x Excess or Deficit Hours or Days Worked
<b>IV. Sales Variances</b>	
<b>(A) Sales Value Method Variances</b>	
(1) Sales Value Variance	= Actual Value of Sales - Budgeted Value of Sales
(2) Sales Price Variance	= Actual Quantity x (Standard Price - Actual Price)
(3) Sales Volume Variance	= Standard Price Actual Quantity of Sales - Budgeted Quantity of Sales
(4) Sales Mix Variance	= (Standard Value of Actual Mix) - (Standard Value of Revised Standard Mix)
(5) Sales Quantity Variance	= Standard Selling Price Revised Standard Sales Quantity - Budgeted Sales Quantity
<b>(B) Sales Margin or profit Method of Variances :</b>	
(1) Sales Margin Value Variance	= Budgeted Profit - Actual Profit (or) (Budgeted Sales Quantity x Budgeted Profit Per Unit) - (Actual Quantity Sold x Actual Profit per Unit)
(2) Sales Margin Volume Variance	= Standard Profit x (Standard Quantity - Actual Quantity)
(3) Sales Margin Price Variance	= Standard Profit - Actual Profit (Or) Actual Quantity Sold Budgeted per Unit - Actual Profit per Unit
(4) Sales Margin Mix Variance	= Standard Profit per Unit Revised standard Quantity - Actual Quantity)

**UNIT – V****ABSORPTION AND MARGINAL COSTING**

**Marginal Cost:** The term Marginal Cost refers to the amount at any given volume of output by which the aggregate costs are charged if the volume of output is changed by one unit. Accordingly, it means that the added or additional cost of an extra unit of output.

Marginal cost may also be defined as the "cost of producing one additional unit of product." Thus, the concept marginal cost indicates wherever there is a change in the volume of output, certainly there will be some change in the total cost. It is concerned with the changes in variable costs. Fixed cost is treated as a period cost and is transferred to Profit and Loss Account.

**Marginal Costing:** Marginal Costing may be defined as "the ascertainment by differentiating between fixed cost and variable cost, of marginal cost and of the effect on profit of changes in volume or type of output." With marginal costing procedure costs are separated into fixed and variable cost.

According to J. Batty, Marginal costing is "a technique of cost accounting pays special attention to the behaviour of costs with changes in the volume of output." This definition lays emphasis on the ascertainment of marginal costs and also the effect of changes in volume or type of output on the company's profit.

**FEATURES OF MARGINAL COSTING**

- (1) All elements of costs are classified into fixed and variable costs.
- (2) Marginal costing is a technique of cost control and decision making.
- (3) Variable costs are charged as the cost of production.
- (4) Valuation of stock of work in progress and finished goods is done on the basis of variable costs.
- (5) Profit is calculated by deducting the fixed cost from the contribution, i.e., excess of selling price over marginal cost of sales.
- (6) Profitability of various levels of activity is determined by cost volume profit analysis.

**Advantages of Marginal Costing (or)****Important Decision Making Areas of Marginal Costing**

The following are the important decision making areas where marginal costing technique is used :

- (1) Pricing decisions in special circumstances:
  - a. Pricing in periods of recession;

- b. Use of differential selling prices.
- (2) Acceptance of offer and submission of tenders.
- (3) Make or buy decisions.
- (4) Shutdown or continue decisions or alternative use of production facilities.
- (5) Retain or replace a machine.
- (6) Decisions as to whether to sell in the export market or in the home market.
- (7) Change Vs status quo.
- (8) Whether to expand or contract.
- (9) Product mix decisions like for example :
  - a. Selection of optimal product mix;
  - b. Product substitution;
  - c. Product discontinuance.
- (10) Break-Even Analysis.

### **Limitations of Marginal Costing**

- (1) It may be very difficult to segregation of all costs into fixed and variable costs.
- (2) Marginal Costing technique cannot be suitable for all type of industries. For example, it is difficult to apply in ship-building, contract industries etc.
- (3) The elimination of fixed overheads leads to difficulty in determination of selling price.
- (4) It assumes that the fixed costs are controllable, but in the long run all costs are variable.
- (5) Marginal Costing does not provide any standard for the evaluation of performance which is provided by standard costing and budgetary control.
- (6) With the development of advanced technology fixed expenses are proportionally increased. Therefore, the exclusion of fixed cost is less effective.
- (7) Under marginal costing elimination of fixed costs results in the under valuation of stock of work in progress and finished goods. It will reflect in true profit.
- (8) Marginal Costing focuses its attention on sales aspect. Accordingly, contribution and profits are determined on the basis of sales volume. It does not consider other functional aspects.
- (9) Under Marginal Costing semi variable and semi fixed costs cannot be segregated accurately.

## COST VOLUME PROFIT ANALYSIS

Cost Volume Profit Analysis (CVP) is a systematic method of examining the relationship between changes in the volume of output and changes in total sales revenue, expenses (costs) and net profit. In other words, it is the analysis of the relationship existing amongst costs, sales revenues, output and the resultant profit.

### Objectives of Cost Volume Profit Analysis

The following are the important objectives of cost volume profit analysis:

- (1) Cost volume is a powerful tool for decision making.
- (2) It makes use of the principles of Marginal Costing.
- (3) It enables the management to establish what will happen to the financial results if a specified level of activity or volume fluctuates.
- (4) It helps in the determination of break-even point and the level of output required to earn a desired profit.
- (5) The PN ratio serves as a measure of efficiency of each product, factory, sales area etc. and thus helps the management to choose a most profitable line of business.
- (6) It helps us to forecast the level of sales required to maintain a given amount of profit at different levels of prices.

### Problem

From the following information, calculate the amount of profit using marginal cost technique :

Fixed cost Rs. 3,00,000  
 Variable cost per unit Rs. 5  
 Selling price per unit Rs. 10  
 Output level 1,00,000 units

### Solution:

Contribution	=	Selling Price – Marginal Cost
	=	(1,00,000 x 10) – (1,00,000 x 5)
	=	10,00,000 – 5,00,000
	=	Rs.5,00,000
Contribution	=	Fixed Cost + Profit
Rs. 5,00,000	=	3,00,000 + Profit
Profit	=	Contribution – Fixed Cost
Profit	=	Rs. 5,00,000 – Rs. 3,00,000
	=	Rs. 2,00,000

**Problem**

From the following particulars find out break-even point :

Fixed Expenses Rs. 1,00,000

Selling price Per unit Rs. 20

Variable cost per unit Rs. 15

**Solution:**

$$\begin{aligned}\text{Break-Even Point in Units} &= \frac{\text{Fixed Cost}}{\text{Contribution per unit}} \\ \text{Contribution per unit} &= \text{Selling Price per unit} - \text{Variable Cost per unit} \\ &= \text{Rs. } 20 - \text{Rs. } 15 = \text{Rs. } 5 \\ \text{B E P (in units)} &= \frac{\text{Rs. } 1,00,000}{5} \\ &= 20,000 \text{ units} \\ \text{B E P in Sales} &= 20,000 \times \text{Rs. } 20 = \text{Rs. } 4,00,000\end{aligned}$$

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

Profit Volume Ratio is also called as Contribution Sales Ratio (or) Marginal Income Ratio (or) Variable Profit Ratio. It is used to measure the relationship of contribution, the relative profitability of different products, processes or departments.

The following formula for calculating the P / V ratio is given below :

$$(1) \text{ P / V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \quad (\text{or}) \quad \frac{C}{S} \times 100$$

$$(2) \text{ P / V Ratio} = \frac{\text{Sales} - \text{Variable Cost}}{\text{Sales}} \times 100 \quad (\text{or}) \quad \frac{S - V}{S} \times 100$$

$$(3) \text{ P / V Ratio} = \frac{\text{Fixed Cost} + \text{Profit}}{\text{Sales}} \times 100 \quad (\text{or}) \quad \frac{F + P}{S} \times 100$$

When we find out the P / V Ratio, Break-Even Point can be calculated by the following formula :

$$(a) \text{ B E P (Sales volume)} = \frac{\text{Fixed Cost}}{\text{P / V Ratio}}$$

$$(b) \text{ Fixed Cost} = \text{B E P} \times \text{P / V Ratio}$$

(c) Sales required in units to maintain a desired profit :

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

$$(\text{or}) = \frac{F + P}{\text{P / V Ratio}}$$

$$(\text{or}) = \frac{\text{Required Contribution}}{\text{New Contribution per unit}}$$

$$(d) \text{ Contribution} = \text{Sales} \times \text{P / V Ratio}$$

$$(e) \text{ Variable Cost} = \text{Sales} (1 - \text{P / V Ratio})$$

**Problem**

From the following information calculate :

- (1) P / V Ratio
- (2) Break-Even Point
- (3) If the selling price is reduced to Rs. 80, calculate New Break-Even Point :

Total sales	Rs. 5,00,000
Selling price per unit	Rs. 100
Variable cost per unit	Rs. 60
Fixed cost	Rs. 1,20,000

**Solution:**

$$(1) P / V \text{ Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

$$\begin{aligned} \text{Contribution} &= \text{Sales} - \text{Variable Cost} \\ \text{Total Sales} &= \text{Rs. 5,00,000} \\ \text{Selling price per unit} &= \text{Rs. 100} \end{aligned}$$

$$\text{Sales in units} = \frac{5,00,000}{100} = 5000 \text{ units}$$

$$\begin{aligned} \text{Contribution} &= \text{Rs. 5,00,000} - (5000 \times 60) \\ &= \text{Rs. 5,00,000} - \text{Rs. 3,00,000} = \text{Rs. 2,00,000} \end{aligned}$$

$$P / V \text{ Ratio} = \frac{\text{Rs. 2,00,000}}{\text{Rs. 5,00,000}} \times 100 = 40\%$$

$$\begin{aligned} (2) \text{ Break-Even Point in sales} &= \frac{\text{Fixed Cost}}{P / V \text{ Ratio}} \\ &= \frac{\text{Rs. 1,20,000}}{40\%} = \frac{1,20,000}{40} \\ &= \frac{1,20,000}{40} \times 100 \\ &= \text{Rs. 3,00,000} \end{aligned}$$

(3) If the Selling price is reduced to Rs. 80 :

$$\begin{aligned} \text{Sales} &= \frac{5,00,000}{100} \times 80 \\ &= \text{Rs. 4,00,000} \end{aligned}$$

$$\begin{aligned} \text{Break-Even Point} &= \frac{\text{Fixed Cost}}{\text{Contribution per unit}} \\ \text{(in units)} & \quad \text{(or)} \\ &= \frac{\text{Fixed Cost}}{\text{Selling Price} - \text{Variable Cost}} \\ &= \frac{\text{Rs. 1,20,000}}{80 - 60} = \frac{1,20,000}{20} = 6,000 \text{ units} \end{aligned}$$

$$\begin{aligned} \text{Break-Even Point in Sales} &= 6,000 \text{ units} \times \text{Rs. 80} \\ &= \text{Rs. 4,80,000} \end{aligned}$$

### **Application of Marginal Costing**

Everything you need to know about application of marginal costing. Marginal costing techniques assist the management in the fixation of the selling price of different products.

Marginal cost of a product is the guiding factor in the fixation of selling price. Generally, the selling price of a product is fixed at a level which not only covers the marginal cost but also contributes something towards fixed costs.

Hence, under normal circumstances for a long period, the fixation of selling price is done on the basis of the total cost of sales (i.e., by adding some margin of profit to the total cost).

Marginal costing helps management to decide whether the firm should itself manufacture a component part or buy it from an outside firm.

This is particularly so when a component part is available in the market at price below the firm's own cost. This decision can be arrived at by comparing the supplier's price with firm's own marginal cost.

The most useful contribution of marginal costing is that it helps management in vital decision making. Decision making essentially involves a choice between various alternatives and marginal costing assists in choosing the best alternative by furnishing all possible facts.

The information supplied by marginal costing technique is of special importance where information obtained from total absorption costing method is incomplete. Sometimes the information revealed by total costing method is even misleading.

Learn about the applications of marginal costing. They are:

1. Profitable Product Mix
2. Problem of Limiting Factors
3. Make or Buy Decision
4. Diversification of Production
5. Fixation of Selling Price
6. Alternative Methods of Manufacturers
7. Operate or Shut Down Decision
8. Maintaining a Desired Level of Profit
9. Alternative Courses of Action
10. Profit Planning
11. Appraisal of Performance