SECTION - C

DECISION MAKING TOOLS

Marginal Costing 3

This Module includes:

3.1 Concept

3.2 Cost-Volume-Profit Analysis

3.3 Break-Even Charts and Profit Charts

3.4 Multiple Product Break Even Analysis

3.5 Differential Cost Analysis

3.6 Marginal Costing Vs. Absorption Costing (advanced applications)

Marginal Costing

SLOB Mapped against the Module

To develop detail understanding of costing frameworks, tools, and techniques to facilitate managerial decision making for cost control and optimisation, and determination of prices with optimised product mix. (CMLO 2b, 3a, b)

Module Learning Objectives:

After studying this module, the students will be able to

- Grasp the fundamental difference between the absorption costing system and the marginal costing system.
- Understand the tools and techniques of marginal costing.
- Appreciate the use of the technique of differential costing in decision making.

Concept

3.1

In cost accounting, cost of production per unit of the goods produced or services provided is calculated with the help of the various methods such as Unit Costing (Job Costing, Batch Costing, Contract Costing) or Process Costing. Marginal costing is not a method of calculating the cost of production as per the mentioned methods, but it is a technique applicable to the existing methods to find out the effect on profits if changes are made either in the volume of output or in the type of output. Thus, marginal costing is a technique which helps the management in taking various routine and special or crucial decisions for running the organizational activities like:

a. To continue with a product or not,

b. To change the selling price as per the market conditions,

c. To change the method of production,

d. To make or buy decision,

e. To decide about sales mix.

Marginal Costing

Marginal Costing is the practice of charging all marginal costs to operations processes or products and deducting all fixed costs against the profits for a particular period in which they arise.

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.

In other words, Marginal costing may be defined as the technique of presenting cost data wherein variable costs and fixed costs are shown separately for managerial decision-making. It should be clearly understood that marginal costing is not a method of costing like process costing or job costing. Rather it is simply a method or technique of the analysis of cost information for the guidance of management.

Marginal Cost

The term 'marginal cost' is defined as the amount at any given volume of output by which aggregate costs are changed, if the volume of output is increased or decreased by one unit. It is a variable cost of one unit of a product or a service i.e., a cost which would be avoided if that unit was not produced or provided.

Marginal Cost = Variable Cost = Direct Labour + Direct Material + Direct Expenses + Variable Overheads

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 Costs can be presented as under:

Particulars	₹
Raw Material Cost	x
Direct Labour Cost	x
Direct Expenses	x
Variable Manufacturing Expenses	x
Variable portions of Administration Expenses	x
Variable portions of Selling and Distribution Expenses	x
Total Marginal Costs/ Variable Costs	xxxx

Marginal costing principles can be understood with help of the following example:

Illustration 1

XYZ Co. makes a product, the Goldy, which has a variable production cost of ₹6 per unit and a sales price of ₹10 per unit. At the beginning of September 2021, there were no opening inventories and production during the month was 20,000 units. Fixed costs for the month were ₹ 45,000 (production, administration, sales and distribution). There were no variable marketing costs.

Required

Calculate the contribution and profit for September 2021, using marginal costing principles, if sales were as follows:

(a) 10,000 Goldies (b) 15,000 Goldies (c) 20,000 Goldies

Solution:

The stages in the profit calculation are as follows:

1. To identify the variable cost of sales, and then the contribution

2. To deduct fixed costs from the total contribution to derive the profit

3. To value all closing inventories at marginal production cost (₹ 6 per unit)

Amount in ₹

Particulars	10,000 Goldies		15,000 Goldies		20,000 Goldies	
Sales (at ₹10)		1,00,000		1,50,000		2,00,000
Variable production cost	1,20,000		1,20,000		1,20,000	
Less:value of closing inventory (at marginal cost)	60,000		30,000			

Variable cost of sales		60,000		90,000	1,20,000
Contribution		40,000		60,000	80,000
Less: fixed costs		45,000		45,000	45,000
Profit / (loss)		(5000)		15,000	35,000
Profit (loss) per unit		(0.50)		1	1.75
Contribution per unit		4		4	4

The conclusions which may be drawn from this example are as follows:

a. The profit per unit varies at differing levels of sales, because the average fixed overhead cost per unit changes with the volume of output and sales.

b. The contribution per unit is constant at all levels of output and sales. Total contribution, which is the contribution per unit multiplied by the number of units sold, increases in direct proportion to the volume of sales.

c. Since the contribution per unit does not change, the most effective way of calculating the expected profit at any level of output and sales would be as follows.

   (i) First, to calculate the total contribution.

   (ii) Then to deduct fixed costs as a period charge in order to find the profit.

d. In our example the expected profit from the sale of 17,000 Goldies would be as follows:

Particulars	₹
Total contribution (17,000 × ₹4)	68,000
Less: fixed costs	45,000
Profit	**23,000**

   (i) If total contribution exceeds fixed costs, a profit is made.

   (ii) If total contribution exactly equals fixed costs, no profit or loss is made.

   (iii) If total contribution is less than fixed costs, there will be a loss.

Marginal costing, as one of the tools of management accounting helps management in making certain decisions. It provides management with information regarding the behavior of costs and the incident of such costs on the profitability of an undertaking. Marginal costing is defined as "the ascertainment of marginal costs and of the effect on profit of changes in volume or type of output by differentiating between fixed costs and variable costs". Marginal costing is not a separate costing. It is only a technique used by accountants to aid management decision. It is also called as "Direct costing". This technique of costing is also known as "Variable Costing", "Differential costing" or "Out-of- pocket" costing. The following points are noteworthy:

a. Only variable costs are considered for product costing and inventory valuation.

b. Fixed costs are regarded as period costs. The Profitability of different products is judged by their P/V ratio.

c. Cost data presented highlight the total contribution of each product.

d. The difference in the magnitude of opening stock and closing stock does not affect the unit cost of production.

e. In case of marginal costing the cost per unit remains the same, irrespective of the production as it is valued at variable cost

Features of Marginal Costing

Features of marginal costing are as follows:

a. Marginal costing is used to know the impact of variable cost on the volume of production or output.

b. Break-even analysis is an integral and important part of marginal costing.

c. Contribution of each product or department is a foundation to know the profitability of the product or department.

d. Addition of variable cost and profit to contribution is equal to selling price.

e. Marginal costing is the base of valuation of stock of finished product and work in progress.

f. Fixed cost is recovered from contribution and variable cost is charged to production.

g. Costs are classified on the basis of fixed and variable costs only. Semi-fixed costs are also divided into fixed cost and variable cost.

Assumptions of Marginal Costing

The technique of marginal costing is based upon the following assumptions:

a. All elements of cost-production, administration and selling and distribution can be segregated into fixed and variable components.

b. Variable cost remains constant per unit of output irrespective of the level of output and thus fluctuates directly in proportion to changes in the volume of output.

c. The selling price per unit remains unchanged or constant at all levels of activity.

d. Fixed costs remain unchanged or constant for the entire volume of production.

e. The volume of production or output is the only factor which influences the costs.

Advantages of Marginal Costing

The following are the important advantages of marginal costing:

a. The Technique of marginal costing is very simple to operate and easy to understand. Since, fixed costs are kept outside the unit cost; the cost statements prepared on the basis of marginal cost are much less complicated.

b. By not charging fixed overhead to cost of production, the effect of varying charges per unit is avoided.

c. It does away with the need for allocation, apportionment and absorption of fixed overheads and hence removes the complexities of under-absorption of overheads.

d. Marginal cost remains the same per unit of output irrespective of the level of activity. It is constant in nature and helps the management in production planning.

e. Marginal costing is essentially useful to management as a technique in cost analysis and cost presentation. It enables the presentation of data in a manner useful to different levels of management for the purpose of controlling costs. Therefore, it is an important technique in cost control.

f. It prevents the carry forward of current year's fixed overheads through valuation of closing stocks. Since fixed costs are not considered in valuation of closing stocks, there is no possibility of factitious profits by over-valuing stocks.

g. It facilitates the calculation of various important factors, break – even point expectations of profits at different levels of production, sales necessary to earn a predetermined target of profit, effect on profit, effect on profit

due to changes of raw materials prices, increased wages, change in sales mixture, etc.

h. It is a valuable aid to management for decision – making and fixation of selling prices, selection of a profitable product/sales mix, make or buy decision, problem of key or limiting factor, determination of the optimum level of activity, close or shut down decisions, evaluation of performance and capital investment decisions, etc.

i. It facilitates the study of relative profitability of different product lines, departments, production facilities, sales divisions, etc.

j. It is complimentary to standard costing and budgetary control and can be used along with them to yield better results.

k. Since fixed costs are not controllable and it is only variable or marginal cost that is controllable, marginal costing, by dividing costs into controllable and non-controllable, help in cost control.

l. When there are different products, the determination of number of units of each product, called Optimum Product Mix, is made with the help of marginal costing.

m. Similarly, optimum sales mix i.e., sales of each and every product to get maximum profit can also be determined with the help of marginal costing.

n. It helps the management in profit planning by making a study of relationship between cost, volume and profits. Further, break-even charts and profit graphs make the whole problem easily understandable even to a layman.

o. It is very useful in management reporting marginal costing facilitates 'Management by exception' by focusing attention of the management towards more important areas than to waste time on problems which do not require urgent attention of the higher managements.

p. It helps in short-term profit planning by breakeven and profitability analysis, both in terms of quantity and graphs. Comparative profitability and performance between two or more products and divisions can easily be assessed and brought to the notice of management for decision making.

q. Apart from the above, numerous managerial decisions can be taken with the help of marginal costing, some of which, may be as follows:-

- Make or buy decisions,
- Exploring foreign markets,
- Accept an order or not,
- Determination of selling price in different conditions,
- Replace one product with some other product,
- Optimum utilisation of labour or machine hours,
- Evaluation of alternative choices,
- Subcontract some of the production processes or not,
- Expand the business or not,
- Diversification,
- Shutdown or continue.

Limitations of Marginal Costing

In spite of so many advantages, the technique of marginal costing suffers from the following limitations:

a. The technique of marginal costing is based upon a number of assumptions which may not hold good under all circumstances.

b. The separation of costs into fixed and variable is difficult and sometimes gives misleading results.

c. Normal costing systems also apply overhead under normal operating volume and this shows that no advantage is gained by marginal costing.

d. All costs are not divisible into fixed and variable. There are certain costs which are semi – variable in nature. It is very difficult and arbitrary to classify these costs into fixed and variable elements.

e. Variable costs do not always remain constant and do not always vary in direct proportion to volume of output because of the laws of diminishing and increasing returns.

f. Selling prices do not remain constant forever and for all levels of output due to competition, discounts for bulk orders, changes in the general price level, etc.

g. Fixed costs do not remain constant after a certain level of activity. Further, marginal costing ignores the fact that fixed costs are also controllable.

h. Application of fixed overhead depends on estimates and not on the actuals and as such there may be under or over absorption of the same.

i. Under marginal costing, stocks and work in progress are understated. The exclusion of fixed costs from inventories affect profit and true and fair view of financial affairs of an organisation may not be clearly transparent.

j. The exclusion of fixed costs from the stocks of finished goods and work-in-progress is illogical since fixed costs are also incurred on the manufacture of products. Stocks valued on marginal costing are undervalued and the profit and loss account cannot reveal true profits. Similarly, as the stocks are undervalued, the balance sheet does not give a true picture.

k. Although the technique of marginal costing overcomes the problem of under or over absorption of fixed overheads, the problem still exists in regard to under or over absorption of variable overheads.

l. Marginal costing completely ignores the 'time factor'. Thus, if two jobs give equal contribution but one takes longer time to complete, the one which takes longer time should be regarded as costlier than the other. But this fact is ignored altogether under marginal costing.

m. The technique of marginal costing cannot be applied in contract or ship building industry because in such cases, normally the value of work-in-progress is very high and the exclusion of fixed overheads may result into losses every year and huge profit in the year of completion of the job.

n. Cost control be better being achieved with the help of other techniques, viz., standard costing and budgetary control than by marginal costing technique.

o. Fixation of selling price in the long run cannot be done without considering fixed costs. Thus, pricing decisions cannot be based on marginal cost alone.

p. In the present days of automation, the proportion of fixed costs in relation to variable costs is very high and hence managerial decisions based upon only the marginal cost ignoring equally important element of fixed cost may not be correct.

q. Volume variance in standard costing also discloses the effect of fluctuating output on fixed overhead. Marginal cost data becomes unrealistic in case of highly fluctuating levels of production, e.g., in case of seasonal factories.

r. Control affected by means of budgetary control is also accepted by many. In order to know the net profit, we should not be satisfied with contribution and hence, fixed overhead is also a valuable item. A system which ignores fixed costs is less effective since a major portion of fixed cost is not taken care of under marginal costing.

s. In practice, sales price, fixed cost and variable cost per unit may vary. Thus, the assumptions underlying the theory of marginal costing sometimes becomes unrealistic. For long term profit planning, absorption costing is the only answer.

Tools and Techniques of Marginal Costing

1. Contribution

In common parlance, contribution is the reward for the efforts of the entrepreneur or owner of a business concern. From this, one can get in his mind that contribution means profit. But it is not so. Technically or in Costing terminology, contribution means not only profit but also fixed cost. That is why; it is defined as the amount recovered towards fixed cost and profit.

Contribution can be computed by subtracting variable cost from sales or by adding fixed costs and profit.

Symbolically, $C = S - V \rightarrow (1)$

Where C = Contribution*

S = Selling Price*

V = Variable Cost*

Also $C = F + P \rightarrow (2)$

Where F = Fixed Cost#

P = Profit

* These can be found out both product wise and total

Fixed cost can be found out only for total

From (1) and (2) above, we may deduce the following equation called Fundamental Equation of Marginal Costing i.e.

$S-V = F + P \rightarrow (3)$ (can be found out only for total)

Contribution is helpful in determination of profitability of the products and/or priorities for profitabilities of the products. When there are two or more products, the product having more contribution is more profitable.

For example: The following are the three products with selling price and cost details:

Amount (₹)

Particulars	A	B	C
Selling Price (₹)	100	150	200
Variable Cost (₹)	50	70	100
Contribution (₹)	50	80	100

In the above example, one can say that the product 'C' is more profitable because, it has more contribution. This proposition of product having more contribution is more profitable is valid, as long as, there are no limitations on any factor of production. In this context, factors of production means, the factors that are responsible for producing the products such as material, labour, machine hours, demand for sales etc.

Measure of profitability when there is a Limiting Factor (or) Key Factor:

In the above example, we find that product having more contribution is more profitable. However, when there is a limitation on any input factor, the profitability of the product cannot simply be determined by finding out the contribution of the unit, but it can be found out by ascertaining the contribution per unit of that factor of production which is limited in the given situation. Such factor of production which is limited in the question is called key factor or limiting factor.

Continuing the above example, it may be explained as follows:

The three products take same raw material. A takes 1 kg, B requires 2 kgs, C requires 5 kgs and the raw material is not abundant.

Then profitability of the above products is determined as follows:

$$\text{Profitability} = \left(\frac{\text{Contribution per unit}}{\text{Key Factor}}\right)$$

A	B	C
50 / 1 = ₹ 50	80 / 2 = ₹ 40	100 / 5 = ₹ 20

Now, product A is more profitable because it has more contribution per kg of material.

The key factor can also be called as scarce factor or Governing factor or Limiting factor or Constraining factor etc., whatever may be the name, it indicates the limitation on the particular factor of production.

From the above, it is essentially understandable that contribution is helpful in determination of profitability of the products, priorities for profitability of the products and in particular, profitabilities when there are limitation on any factor.

2. Profit Volume Ratio (P/V Ratio) or Contribution Ratio

A ratio is a statistical or mathematical tool with the help of which a relationship can be established between the variables of the same kind. Further, it may be expressed in different forms such as fractional form, quotient, percentage, decimal form, and proportional form.

For example:

Gross profit ratio: It may be expressed as follows:

- Gross profit is ¼th of sales
- Sales is 4 times that of gross profit
- Gross profit ratio is 25%
- Gross profit is 0.25 of sales and lastly
- Gross profit and sales are in the ratio of 1:4

So, P/V ratio or contribution ratio is association of two variables. From this, one may assume that it is the ratio of profit and sales. But it is not so. It is the ratio of Contribution to Sales.

$$\text{Symbolicaly, P/V ratio} = \left(\frac{\text{Contribution per unit}}{\text{Key Factor}}\right) \times 100 \rightarrow (1)$$

$$\Rightarrow \quad \text{P/V ratio} = \left(\frac{\text{Contribution}}{\text{Sales*}} \times 100\right)$$

$$\Rightarrow \quad \text{Contribution} = \text{Sales} \times \text{P/V ratio} \rightarrow (2)$$

$$\Rightarrow \quad \text{Sales} = \left(\frac{\text{Contribution}}{\text{P/V Ratio}}\right) \rightarrow (3)$$

When cost accounting data is given for two periods, then:

$$\text{P/V ratio} = \left(\frac{\text{Change in Contribution}}{\text{Change in Sales}} \times 100\right)$$

$$\text{or, P/V ratio} = \left(\frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100\right)$$

* When the limiting factor or key factor is not specifically mentioned, Sales is considered as the limiting factor.

It is to be noted that the above two formulas are valid as long as there are no changes in prices, means input prices and selling prices.

Usually, Sales = Cost + Profit

i.e. it can also be written as Sales = Variable Cost + Fixed Cost + Profit and this is called general sales equation.

Since Sales consists of variable costs and contribution, given the variable cost ratio, P/V ratio can be found out. Similarly, given the P/V ratio, variable cost ratio can be found out.

For example, P/V ratio is 40%, then variable cost ratio is 60%, given variable cost ratio is 70%, then P/V ratio is 30%. Such a relationship is called complementary relationship. Thus, P/V ratio and variable cost ratios are said to be complements of each other.

P/V ratio is also useful like contribution for determination of profitabilities of the products as well as the priorities for profitabilities of the products. In particular, it is useful in determination of profitabilities of the products in the following two situations:

(i) When sales potential in value is limited.

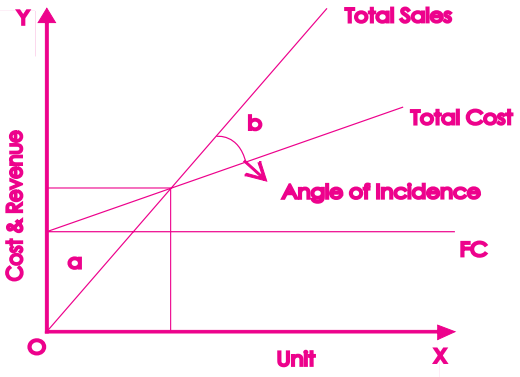
(ii) When there is a greater demand for the products.

3. Break Even Point

When someone asks a layman about his business he may reply that it is alright, but a technical man may reply that it is break even. So, Break Even means the volume of production or sales where there is no profit or loss. In other words, Break Even Point is the volume of production or sales where total costs are equal to revenue. It helps in finding out the relationship of costs and revenues to output. In understanding the breakeven point, cost, volume and profit are always used. The break even analysis is used to answer many questions of the management in day to day business.

Break-even Chart is a graphical representation of the Break- Even Analysis, i.e. Cost-Volume- Profit relationship. It indicates the point of production at which there is neither profit nor loss. It also indicates the estimated profit or loss at different levels of production.

The formal break even chart is as follows:



Area represented by a = Loss Area Area represented by b = Profit Area

Figure 3.1 Graphical representation of the Break-Even Analysis

When no. of units are expressed on X-axis and costs and revenues are expressed on Y-axis, three lines are drawn i.e., fixed cost line, total cost line and total sales line. In the above graph we find there is an intersection point of the

total sales line and total cost line and from that intersection point if a perpendicular is drawn to X-axis, we find break even units. Similarly, from the same intersection point a parallel line is drawn to X-axis so that it cuts Y-axis, where we find Break Even point in terms of value. This is how, the formal pictorial representation of the Break Even chart.

At the intersection point of the total cost line and total sales line, an angle is formed called Angle of Incidence.

Break Even Analysis (or) Cost-Volume-Profit Analysis (CVP analysis):

From the breakeven charts breakeven point and profits at a glance can be found out. Besides, management makes profit planning with the help of breakeven charts. It can clearly be understood by way of charts to know the changes in profit due to changes in costs and output. Such profit planning is made with the variables mainly cost, profit and volume, such an analysis is called breakeven analysis. Throughout the charts relationship is established among the cost, volume and profit, it is also called Cost-Volume-Profit Analysis (CVP analysis). The analysis is further explained in Module 3.3.

COMPUTATION OF BREAK EVEN POINT

Break Even Point in value $= \frac{F \times S}{S - V}$ ..... (1)

$= \frac{F \times S}{C}$ ..... (2)

$= \frac{F \times S}{F + P}$ ..... (3)

$= \frac{F}{P.V.\ Ratio}$ ..... (4)

or $= \frac{F}{C/S}$

or $= \frac{F}{\frac{S - V}{S}}$

or $= \frac{F}{1 - \frac{V}{S}}$ ..... (5)

Break Even Point (in units) = Fixed Cost / Contribution per unit

Proof for basic breakeven:

Let, V be the variable cost per unit

U be the volume of output i.e., No. of units

P be the Profit

F be the Fixed Cost

S be the Selling Price

Where,

F = Fixed Cost

V = Variable Cost per unit

S = Sales

P = Profit

C = Contribution

By substituting the notations in general sales equation:

Sales = Fixed cost + Variable cost + Profit

SU = F + VU + P

At Break Even, SU = F +VU (Since P = 0)

or, SU – VU = F

or, U(S – V) = F

or, $U = \frac{F}{S - V}$

or, No. of Units = $\frac{\text{Fixed Cost}}{\text{Contribution per Unit}}$

Break even sales:

SU (Sales) = $\frac{F \times S}{S - V}$

4. Margin of Safety

It is the sales point beyond the breakeven point. Margin of safety can be obtained by subtracting break even sales from actual sales. It is useful to determine financial soundness of business enterprise. If margin of safety is high, then the financial position of the enterprise is sound.

Margin of Safety = Total Sales – Break Even Sales → (1)

Total Sales = Break Even Sales + Margin of Safety Sales → (2)

- Margin of safety can also be computed as follows:

  Margin of Safety = Profit / P/V ratio → (3)

A relative measure to the margin of safety is its ratio to total sales.

- Margin of safety ratio is the ratio of Margin of safety sales to Total sales.

  Margin of safety ratio = [Margin of safety / Total sales] × 100 → (4)

- Margin of safety ratio and Break even sales ratios are complements of each other.
- If the sales amount, P/V ratio and M/S ratio are given, then profit can be computed as follows:

  Profit = Total sales x P/V ratio x M/S ratio → (5)

  Apart from the above formulae, various formulae that are used in the chapter to find out different results are as follows:

  Profit = (Sales x P/V ratio) – Fixed Cost

  Sales value to earn desired profit = $\frac{\text{Fixed Cost + desired Profit}}{\text{P/V Ratio}}$ and

  Required units to earn desired profit = $\frac{\text{Fixed Cost + desired Profit}}{\text{Contribution per unit}}$

  Fixed cost = (Sales x P/V ratio) – Profit

  Total sales = Break even sales + Margin of safety sales

  or, Break even sales = Total sales – Margin of safety sales

  or, Margin of safety sales = Total sales – Break even sales

Fixed cost = Break even sales × P/V ratio

$$\text{Shut down sales} = \frac{\text{Fixed Cost - Shut Down Costs}}{\text{P/V Ratio}}$$

$$\text{Shut down Units} = \frac{\text{Fixed Cost - Shut Down Costs}}{\text{Contribution per unit}}$$

The level at which profits are same or the level at which costs are same for two methods or two alternatives

$$\text{i.e., Indifference Point} = \frac{\text{Difference in Fixed Cost}}{\text{Difference in variable costs per unit}}$$

Cost-Volume-Profit Analysis

3.2

Cost-Volume-Profit (CVP) Analysis

Cost-volume-profit (CVP)/break-even analysis is the study of the interrelationships between costs, volume and profit at various levels of activity.

The management of an organisation usually wishes to know the profit likely to be made if the target for production and sales for the year are achieved. Management may also be interested to know the following:

a. The break-even point, at which is the activity level at which there is neither profit nor loss.

b. The amount by which actual sales can fall below anticipated sales, without a loss being incurred.

A company's net income is a measure of management's success in attaining its goals. In planning, management must anticipate how selling prices, costs, expenses, and profits will react to changes in activity when the activity is measured in terms of capacity or volume. When the degree of variability in costs is known, the effect of volume changes can be predicted.

Cost-volume-profit (CVP) analysis is a technique that uses the degrees of cost variability to measure the effect of changes in volume on resulting profits. Such analysis assumes that the fixed costs of the firm will remain the same in total within a wide range of production volume within which the firm expects to operate, known as the relevant range.

Cost-volume-profit analysis considers the relationship between costs (fixed and variable), sales volume and levels of profit. The techniques of CVP analysis are used in breakeven calculations, contribution/ sales ratio analysis and can be applied to indicate the level of sales necessary to make a desired profit (target profit) or the amount by which sales can fall before the product is loss making (margin of safety).

Break-even Analysis

Break-even analysis can be used to help management select an action when several alternatives exist. This analysis is based on the conditions that variable costs will vary in constant proportion to the sales volume and that fixed costs will be fixed over a prescribed or relevant range of activity.

Therefore, if management wishes to test new proposals that will change the percentage of variable costs to sales volume, or the total amount of fixed costs, or a combination of these changes, then it can use the basic breakeven equation to calculate the results.

Break-even point represents the minimum level of sales (revenue or volume) needed to cover total costs (fixed and variable). At breakeven point, profit is equal to zero because our total sales income is equal to total expenditure.

The formula is for breakeven volume is below:

Contribution per unit = unit selling price – unit variable costs

- Profit = (sales volume × contribution per unit) – fixed costs

- Break-even point = activity level at which there is neither profit nor loss = Total Fixed Costs÷ Contribution per unit = Contribution required to break-even÷ Contribution per unit
- Contribution÷ sales (C÷ S) ratio = profit/volume (P/V) ratio = (contribution÷ sales) × 100%
- Sales revenue at break-even point = fixed costs ÷ C/S ratio
- Margin of safety (in units) = Budgeted sales units – Break-even sales units
- Margin of safety (as %) = [(Budgeted sales - Break-even sales) ÷ Budgeted sales] × 100%
- Sales volume to achieve a target profit = (Fixed cost + Target profit) ÷ Contribution per unit

It is an analysis of three variables, viz. cost, volume and profit, which gives the relationship amongst costs, revenue (sales), activity levels (quantity) and the resulting profit. Cost-Volume-Profit (CVP) Analysis is also known as Break–Even Analysis. Every business organisation works to maximize its profits. With the help of CVP analysis, the management studies the co-relation of profit and the level of production.

CVP analysis is concerned with the level of activity where total sales equal the total cost and it is called as the break-even point. In other words, we study the sales value, cost and profit at different levels of production. CVP analysis highlights the relationship between the cost, the sales value, and the profit.

If only we could look into a crystal ball and find out exactly how many customers were going to buy our product, we would be able to make perfect business decisions and maximize profits. While management accounting information can't really help much with the crystal ball, it can be of use in providing the answers to questions about the consequences of different courses of action. One of the most important decisions that need to be made before any business even starts is 'how much do we need to sell in order to break-even?' By 'break-even' we mean simply covering all our costs without making a profit. This type of analysis is known as 'cost-volume-profit analysis' (CVP analysis) Cost-volume profit analysis is an essential tool used to guide managerial, financial and investment decisions.

As quantity increases, variable cost increases but fixed costs remains same, so total cost also increases. Since quantity increases value of sale also increases. Initially when company sells small quantity of units total cost is greater than sales, then it incurs loss. As it sells more & more quantity, sales exceeds total cost, it makes profit. Level at which there is no profit no loss is called as B.E.P. (Break Even Point). Such analysis between quantity (volume), cost, sales & profit is called as CVP analysis. The cost-volume-profit analysis is an extension of marginal costing. It makes use of the principles of marginal costing. It is an important tool of short term planning and is more relevant where the proposed changes in the level of activity are relatively small. It is useful in making short-run decisions.

CVP analysis looks at the effect of sales volume variations on costs and operating profit. The analysis is based on the classification of expenses as variable (expenses that vary in direct proportion to sales volume) or fixed (expenses that remain unchanged over the long term, irrespective of the sales volume). Accordingly, operating income is defined as follows:

Operating Income = Sales – Variable Costs – Fixed Costs

CVP analysis looks primarily at the effects of differing levels of activity on the financial results of a business. The reason for the particular focus on sales volume is because, in the short-run, sales price, and the cost of materials and labour, are usually known with a degree of accuracy. Sales volume, however, is not usually so predictable and therefore, in the short-run, profitability often hinges upon it. For example, Company A may know that the sales price for product X in a particular year is going to be in the region of ₹500 and its variable costs are approximately ₹300. It can, therefore, say with some degree of certainty that the contribution per unit (sales price less variable costs) is ₹200. Company A may also have fixed costs of ₹2,00,000 per annum, which again, are fairly easy to predict. However, when we ask the question, 'Will the company make a profit in that year?' the answer is 'We don't know'. We don't know because we don't know the sales volume for the year. However, we can work out how many sales

the business needs to achieve in order to make a profit and this is where CVP analysis begins.

Assumptions of Break-Even Analysis

(i) All elements of cost, i.e., production, administration and selling and distribution can be segregated into fixed and variable components.

(ii) Variable cost remains constant per unit of output irrespective of the level of output and thus fluctuates directly in proportion to changes in the volume of output.

(iii) Fixed cost remains constant at all volumes of output.

(iv) Selling price per unit remains unchanged or constant at all levels of output.

(v) Volume of production is the only factor that influences cost.

(vi) There will be no change in the general price-level.

(vii) There is only one product or in case of multi-products, the sales mix remains unchanged.

(viii) There is synchronization between production and sales.

Assumptions of CVP Analysis are highlighted as under:

a. All other variables remain constant

It has been assumed that all variables other than the particular one under consideration have remained constant throughout the analysis. In other words, it is assumed that volume is the only factor that will cause costs and revenues to change. However, changes in other variables such as production efficiency, sales mix and price levels can have an important influence on sales revenue and costs. If significant changes in these other variables occur the CVP analysis presentation will be incorrect.

b. Single product or constant sales mix

CVP analysis assumes that either a single product is sold or, if a range of products is sold, that sales will be in accordance with a predetermined sales mix. When a predetermined sales mix is used, it can be depicted in the CVP analysis by measuring sales volume using standard batch sizes based on a planned sales mix. As we have discussed, any CVP analysis must be interpreted carefully if the initial product mix assumptions do not hold.

c. Total costs and total revenue are linear functions of output

The analysis assumes that unit variable cost and selling price are constant. This assumption is only likely to be valid within the relevant range of production.

d. Profits are calculated on a variable costing basis

The analysis assumes that the fixed costs incurred during the period are charged as an expense for that period. Therefore, variable-costing profit calculations are assumed. If absorption-costing profit calculations are used, it is necessary to assume that production is equal to sales for the analysis to predict absorption costing profits.

e. Costs can be accurately divided into their fixed and variable elements

CVP analysis assumes that costs can be accurately analyzed into their fixed and variable elements. In practice, the separation of semi-variable costs into their fixed and variable elements is extremely difficult. Nevertheless, a reasonably accurate analysis is necessary if CVP analysis is to provide relevant information for decision-making.

f. Analysis applies only to the relevant range

CVP analysis is appropriate only for decisions taken within the relevant production range, and that it is incorrect to project cost and revenue figures beyond the relevant range.

g. Analysis applies only to a short-term time horizon

CVP analysis is based on the relationship between volume and sales revenue, costs and profit in the short run, typically a period of one year, in which the output of a firm is likely to be restricted to that available from the current operating capacity. During this period significant changes cannot be made to selling prices and fixed and variable costs. CVP analysis thus examines the effects of changes in sales volume on the level of profits in the short run. It is inappropriate to extend the analysis to long-term decision-making.

Limitations of CVP Analysis

a. It is assumed that fixed costs are the same in total and variable costs are the same per unit at all levels of output. This assumption is a great simplification. The following are two inevitable cases-

(i) Fixed costs will change if output falls or increases substantially (most fixed costs are step costs).

(ii) The variable cost per unit will decrease where economies of scale are made at higher output volumes, but the variable cost per unit will also eventually rise when diseconomies of scale begin to appear at even higher volumes of output (for example the extra cost of labour in overtime working).

The assumption is only correct within a normal range or relevant range of output. It is generally assumed that both the budgeted output and the breakeven point lie within this relevant range.

b. It is assumed that sales prices will be constant at all levels of activity. This may not be true, especially at higher volumes of output, where the price may have to be reduced to win the extra sales.

c. Production and sales are assumed to be the same, so that the consequences of any increase in inventory levels or of 'de-stocking' are ignored.

d. Uncertainty in the estimates of fixed costs and unit variable costs is often ignored.

Break-Even Charts and Profit Charts 3.3

Break-Even Chart: Meaning and Concept

Break-Even means the volume of production or sales where there is no profit or loss. In other words, Break-Even Point is the volume of production or sales where total costs are equal to revenue. It helps in finding out the relationship of costs and revenues to output. In understanding the breakeven point, cost, volume and profit are always used. The break even analysis is used to answer many questions of the management in day to day business.

Break-even Chart is a graphical representation of the Break- Even Analysis, i.e. Cost-Volume- Profit relationship. It indicates the point of production at which there is neither profit nor loss. It also indicates the estimated profit or loss at different levels of production.

A break-even chart is a chart which indicates approximate profit or loss at different levels of sales volume within a limited range. A very serious limitation of breakeven charts is that they can show the costs, revenues, profits and margins of safety for a single product only, or at best for a single 'sales mix' of products. Break-even charts for multiple products can be drawn if a constant product sales mix is assumed.

While constructing the chart, the following assumption is normally considered:

a. Costs are classified into fixed and variable costs.

b. Fixed costs shall remain fixed during the relevant volume range of graph.

c. Variable cost per unit will remain constant during the relevant volume range of graph.

d. Selling price per unit will remain constant.

e. Sales mix remains constant.

f. Production and sales volume are equal.

g. There exists a linear relationship between costs and revenue.

h. Linear relationship is indicated by way of straight line

For example suppose that FA sells three products, X, Y and Z which have variable unit costs of ₹3, ₹4 and ₹5 respectively. The sales price of X is ₹8, the price of Y is ₹6 and the price of Z is ₹6. Fixed costs per annum are ₹10,000. A break-even chart cannot be drawn, because we do not know the proportions of X, Y and Z in the sales mix.

The formal Break-Even Chart is as follows:

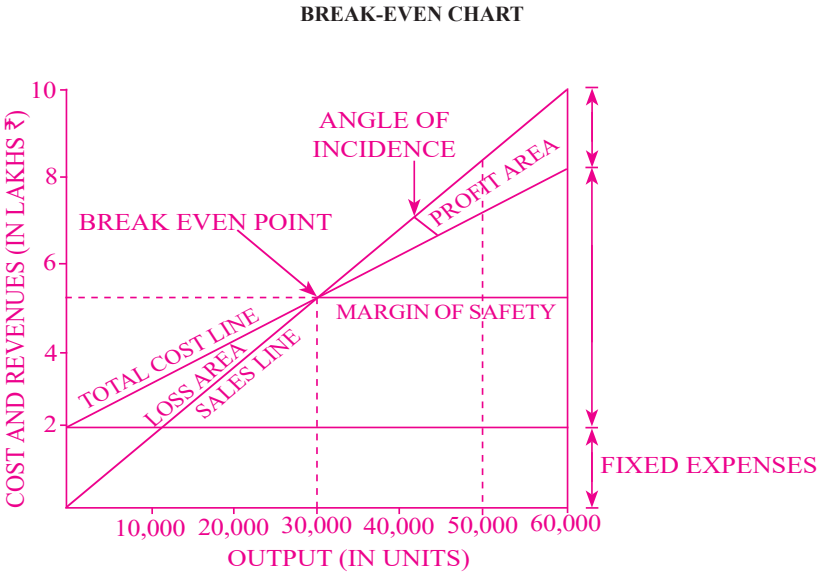


Figure 3.2 Break-Even Point, Angle of Incidence, Profit and Loss Areas.

On the X-axis of the graph is plotted the number of units produced, sold and on the Y-axis are shown costs and sales revenues. The fixed cost line is drawn parallel to X-axis. This line indicates that fixed expenses remain the same with any volume of production. The variable costs for different levels of activity are plotted over the fixed cost line. The variable cost line is joined to fixed cost line at zero volume of production. This line can also be regarded as the total cost line because it starts from the point where fixed cost has been incurred and variable cost is zero. Sales values at various levels of output are plotted joined and the resultant line is the sales line. The sales line will cut the total cost line at a point where the total costs are equal to total revenues and this point of intersection lines is known as breakeven point—the point of no profit no loss.

The number of units to be produced at the breakeven point is determined by drawing a perpendicular to the X-axis from the point of intersection and measuring the horizontal distance from the zero point to the point at which the perpendicular is drawn.

The sales value at breakeven point is determined by drawing a perpendicular to the Y-axis from the point of intersection and measuring the vertical distance from the zero point to the point at which the perpendicular is drawn.

Loss and profit are as have been shown in the charts which show that if production is less than the breakeven point, the business shall be running at a loss and if the production is more than the breakeven level, profit shall result.

Angle of Incidence

Angle of Incidence is an angle formed at the intersection point of total sales line and total cost line in a formal break even chart. If the angle is larger, the rate of growth of profit is higher and if the angle is lower, the rate of growth of profit is lower. So, growth of profit or profitability rate is depicted by Angle of Incidence.

Break Even Analysis (or) Cost-Volume-Profit Analysis (CVP analysis):

From the breakeven charts breakeven point and profits at a glance can be found out. Besides, management makes profit planning with the help of breakeven charts. It can clearly be understood by way of charts to know the changes

in profit due to changes in costs and output. Such profit planning is made with the variables mainly cost, profit and volume, such an analysis is called breakeven analysis. Throughout the charts relationship is established among the cost, volume and profit, it is also called Cost-Volume-Profit Analysis (CVP analysis). That is why it is popularly said by S.C. Kuchal in his book "Financial Management - An Analytical and Conceptual Approach", that Cost-volume-profit analysis, break even analysis and profit graphs are interchangeable words. The analysis is further explained as follows:

The change in profit can be studied through Break even charts under different conditions in the following manner:

(i) Increase in No. of Units:

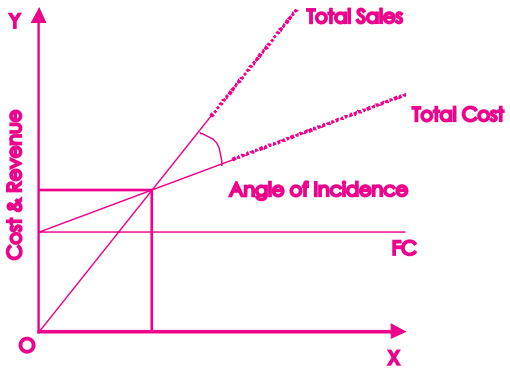


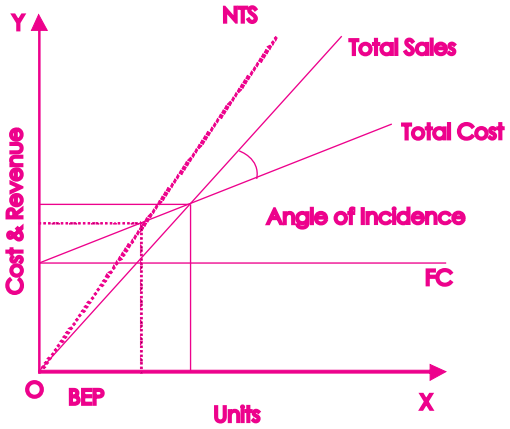
Figure 3.3 Increase in No. of Units but BEP in units remaining same.

'……' line indicates increase in total cost and total sales.

In the above chart, if we clearly observe we find that there is no change in BEP even if there is increase or decrease in No. of units.

(ii) Increase in Sales due to increase in selling price:

NTS = New Total Sales line



'……' line indicates changes in break even point and changes in sales.

Figure 3.4 Changes in Break-Even Point due to change in Sales.

From the above chart, we observe that profit is increased by increasing the selling price and also, if there is change

in selling price, BEP also changes. If selling price is increased then BEP decreases. If selling price is decreased then BEP increases. Thus, we say that there is an inverse relationship between selling price and BEP.

(iii) Decrease in variable cost:

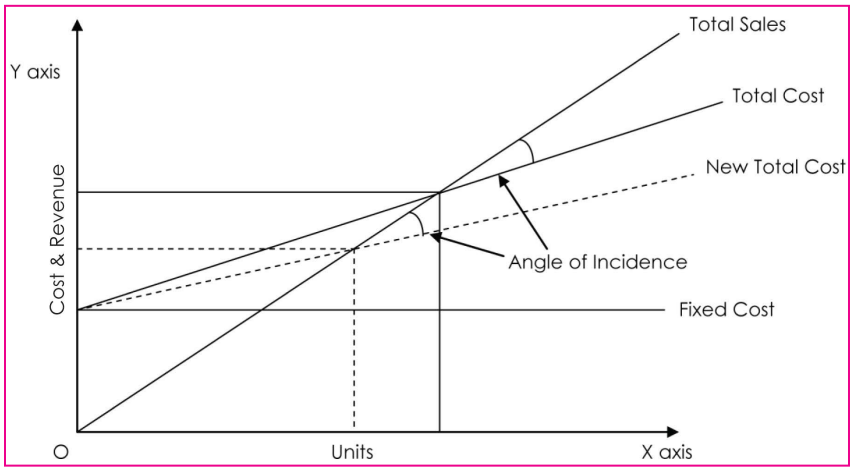


Figure 3.5 Decrease in Total Cost and Decrease in BEP.

'……' line indicates decrease in total cost and decrease in B.E.P

From the above chart, we observe that when variable costs are decreased, no doubt, profit is increased. If there is change in variable cost then BEP also changes. If variable cost is decreased then BEP also decreases. If variable cost is increased then BEP also increases. Thus there is direct relationship between variable cost and BEP.

(iv) Change in fixed cost:

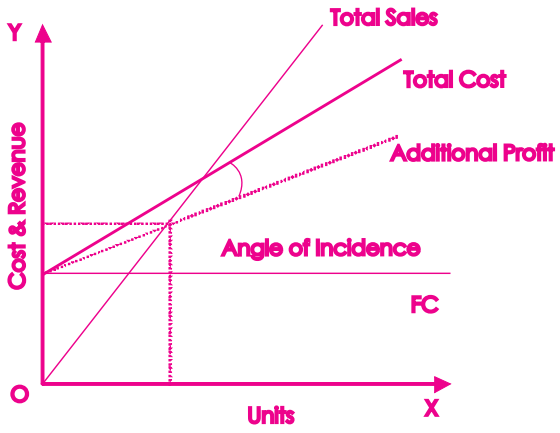


Figure 3.6 Decrease in Fixed Cost and Total Cost and also Decrease in BEP.

'……' line indicates decrease in fixed cost and total cost and also decrease in BEP.

NTC = New Total Cost Line

NFC = New Fixed Cost Line

From the above chart also we find that there is increase in profit due to decrease in fixed cost. If fixed cost is increased then BEP also increases. If fixed cost is decreased then BEP also decreases. Thus, there is a direct relationship between fixed cost and BEP.

Non linear Break-Even Chart:

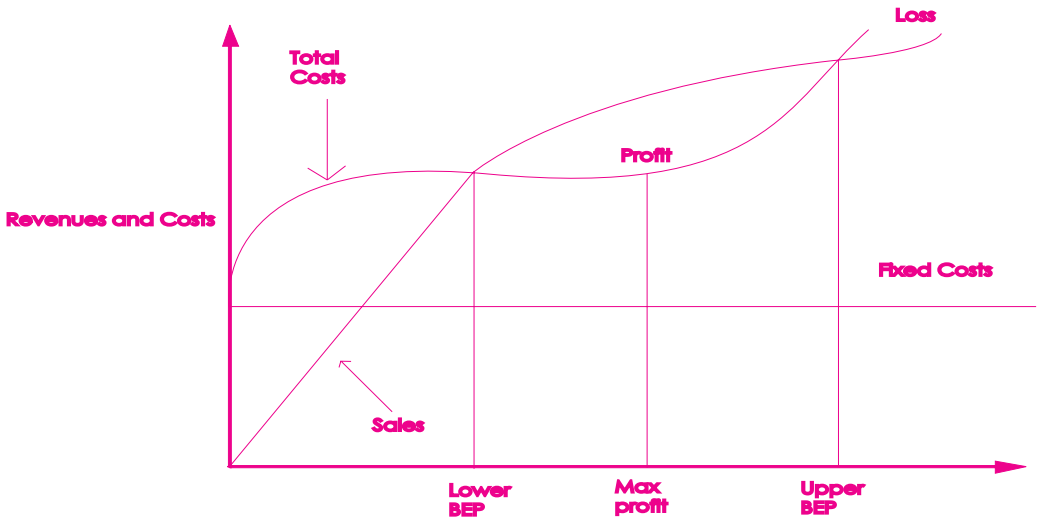


Figure 3.7 Non-linear Break-Even Chart

In some cases on account of non-linear behaviour of cost and sales there may be two or more break even points. In such a case the optimum profit is earned where the difference between the sales and the total costs is the largest. It is obvious that the business should produce only upto this level. This is being illustrated in the above chart.

Cash Break-Even Point:

When break-even point is calculated only with those fixed costs which are payable in cash, such a break-even point is known as cash break-even point. This means that depreciation and other non-cash fixed costs are excluded from the fixed costs in computing cash break-even point. Its formula is-

Cash break-even point = Cash fixed costs / Contribution per unit.

Advantages of Break-Even Chart

a. Graphical representation of cost and revenue data (break-even charts) can be more easily understood by non-financial managers.

b. A breakeven model enables profit or loss at any level of activity within the range for which the model is valid to be determined, and the C/S ratio can indicate the relative profitability of different products.

Conventional/Basic Breakeven Chart

Advantages

- Shows clearly the constant nature of the fixed costs.
- The angle of the profit 'wedge' gives a visual representation of the profitability of the product: the wider the angle, the more rapidly profits will grow once the break-even point has been reached. Conversely, the wider the angle the more rapidly losses will be incurred when sales volume falls below break-even.

Disadvantages

- Although profit can be read from the chart, readings at two separate points are required in order to do so.
- It can be difficult to adapt the chart to show the effect of changes in any of the variables, for example, an increase in the selling price or a decrease in the unit variable cost.
- Contribution cannot be read directly from the chart.

Contribution Breakeven Chart

Advantages

- Contribution can be read directly from the chart.
- As with the conventional chart, the angle of the profit 'wedge' gives a visual representation of the profitability of the product.

Disadvantages

- Although profit can be read from the chart, readings at two separate points are required in order to do so.
- It can be difficult to adapt the chart to show the effect of changes in any of the variables, for example, an increase in the selling price or a decrease in the unit variable cost.

Profit–Volume Chart

Profit-volume chart prominently exhibits the relationship between profit and sales volume. The normal break-even charts suffer from one limitation. Profit cannot be read directly from the chart. It is essential to deduct total cost from sale to know the profit figure. The profit graph overcomes the difficulty by plotting profit directly against an activity. These charts are easy to understand and their preparation involves drawing sales curve and profit curve. The point at which profit line cuts the sales line is called break-even point. Taking the methods and objects under consideration, the profit-volume chat can be further divided into following categories i.e.:

a. Simple Profit-Volume Chart:

Its preparation involves the following steps:

(i) Finding out profit at any two levels of activity.

(ii) Drawing sales line.

(iii) Drawing profit line.

Simple Profit-Volume chart is shown below:

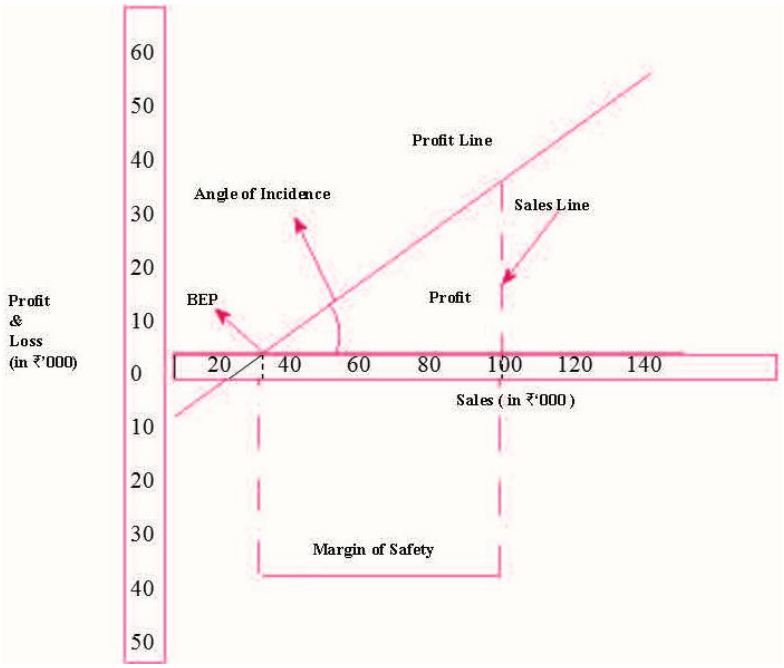


Figure 3.8 Profit-Volume Chart

Profit volume chart showing different breakeven point at different price levels is shown below:

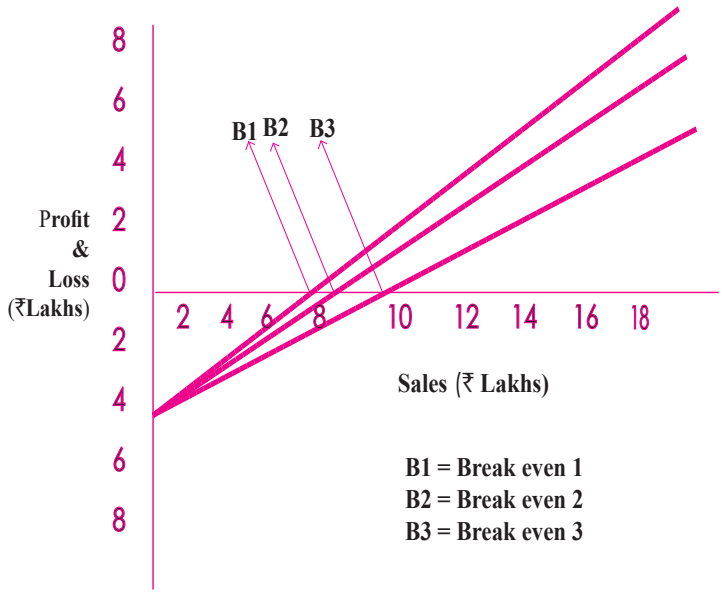


Figure 3.9 Profit-Volume Chart showing different breakeven point at different price levels.

b. Sequential Profit Graph:

Sometimes, a company manufactures more than one product of varying profitability. A change in the profitability of one product will lead to a change in the profitability as a whole. Profit-volume chart can be prepared for a group also. This chart shows relative profitability of different products. It is also called profit-volume graph for a group of products, sequential profit graph or profit path chart. Its main advantage is that it exhibits the relative profitability of different products at a glance. This graph is also useful to show average slope and marginal slope.

Methods of drawing 'Profit Path':

In sequential profit graph or profit graph for a group of products, a line "profit plan" is drawn in order to draw total profit line. For drawing profit path, a statement is prepared showing cumulative sale and cumulative profit. The line 'Profit path' is drawn with the aid of columns for cumulative same and cumulative profit.

Steps in drawing Profit volume graph (or) sequential profit graph:

- First prepare a marginal cost statement to know the P/V ratios.
- Prepare a statement to find out cumulative sale and cumulative profit.
- Draw a profit path with the help of columns, cumulative sale and cumulative profit.
- Draw total profit line for group of products.

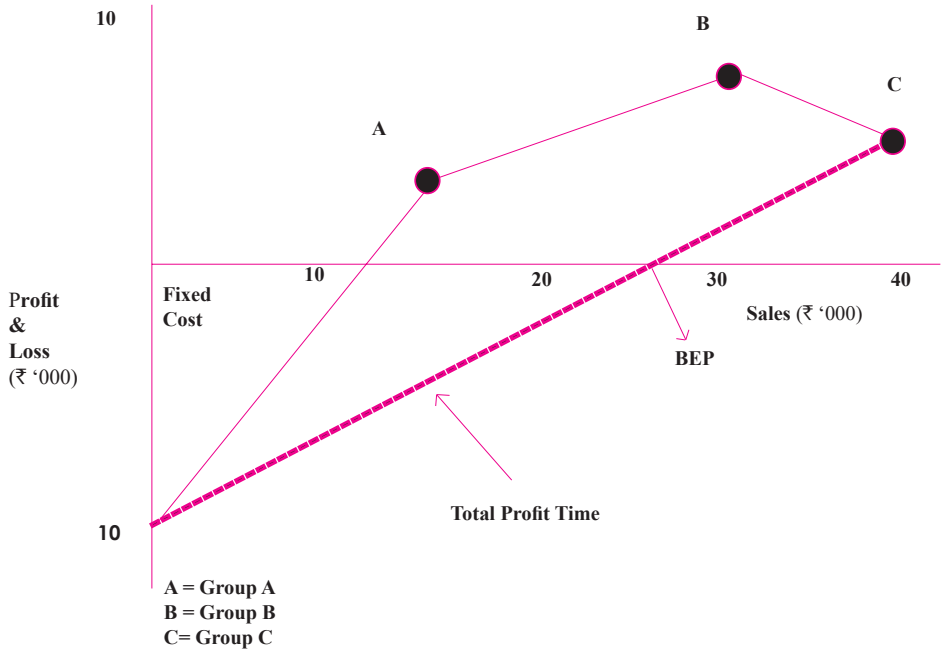


Figure 3.10 Profit-Volume graph (or) sequential profit graph

Advantages of Profit Volume Chart:

- Profit or loss for any level of activity can be read directly from the chart.
- The angle of the profit line gives a visual representation of the profitability of the product.
- The loss below breakeven point is very clearly highlighted.
- Several charts can be drawn on a common set of axes to show clearly the effect of changes in any of the variables, for example, an increase in the selling price or a decrease in the unit variable cost.

Disadvantages of Profit Volume Chart:

- The cost behaviour patterns are not depicted, for example, the constant nature of the fixed costs.

Profit–volume graph

Neither the break-even nor the contribution graphs highlight the profit or loss at different volume levels. To ascertain the profit or loss figures from a break-even graph, it is necessary to determine the difference between the total cost and total revenue lines. The profit–volume graph is a more convenient method of showing the impact of changes in volume on profit.

Example of construction of P/V Graph

Prepare a P/V graph from the following data:

Units produced 60,000; Selling price per unit ₹15; Variable cost per unit ₹10; Fixed costs ₹1,50,000. Show the expected sales on the graph when the profit to be earned is ₹87,500.

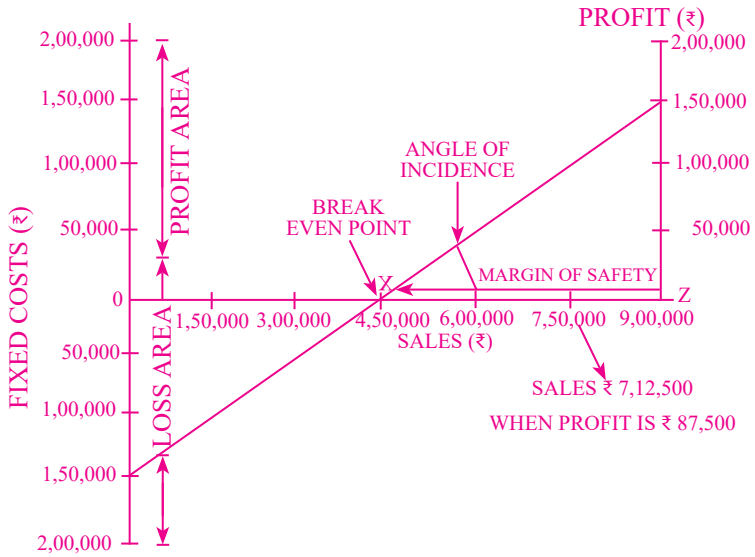


Figure 3.11 Chart showing construction of P/V Graph

Multiple Product Break Even Analysis 3.4

Organisations typically produce and sell a variety of products and services. To perform breakeven analysis in a multi-product organization, however, a constant product sales mix must be assumed. In other words, it is to be assumed that whenever x units of product A are sold, y units of product B and z units of product C are also sold. Such an assumption allows us to calculate a weighted average contribution per mix, the weighting being on the basis of the quantities of each product in the constant mix. This means that the unit contribution of the product that makes up the largest proportion of the mix has the greatest impact on the average contribution per mix.

The only situation when the mix of products does not affect the analysis is when all of the products have the same ratio of contribution to sales (C/S ratio).

Most firms produce and sell many products or services. Here, we shall consider how we can adapt CVP analysis to a multi-product setting. It can be explained with the help of the following example:

Illustration 2

The ABC Company sells two types of products – A and B. The CMA has prepared the following information based on the sales forecast for the period:

Amount in ₹

Product Sales Units (Volume)	A 1200	B 600	Total
Unit selling price	300	200	
Unit variable cost	150	110	
Unit contribution	150	90	
Total sales revenues	3,60,000	1,20,000	4,80,000
Less: Total variable cost	1,80,000	66,000	2,46,000
Contribution to direct and common fixed costs	1,80,000	54,000	2,34,000
Less: Direct Avoidable fixed costs	90,000	27,000	1,17,000
Contribution to common fixed costs	90,000	27,000	1,17,000
Less: Common fixed costs			39,000
Profit			**78,000**

Solution

In the present case the company sells two products so that there are two-unit contribution margins. If all of the fixed costs are directly attributable to products (i.e. there are no common fixed costs), we can apply the same approach as that used for a single product. We simply apply the analysis separately to each product as follows:

Product A, Break-even point = Direct fixed costs ÷ Unit contribution = ₹90,000÷₹ 150 = 600 units

Product B, Break-even point = Direct fixed costs ÷Unit contribution = ₹27,000÷₹ 90 = 300 units

There are some common fixed costs that must be taken into account. Selling 600 units of Product A and 300 units of Product B, will generate a contribution that only covers direct fixed costs; the common fixed costs will not be covered. A loss equal to the common fixed costs will be reported. The break-even point for the firm as a whole has not been ascertained. The common fixed costs cannot be specifically identified with either of the products since they can only be avoided if both products are not sold. The solution to the problem is to convert the sales volume measure of the individual products into standard batches of products based on the planned sales mix. The ABC Company plans to sell 1200 units of Product A and 600 units of Product B and a sales mix of 1200:600, i.e. 2:1.

In other words, for the sale of every two units Product A and one unit of Product B is expected to be sold and we can therefore define our standard batch of products as comprising two units of A and one unit of B, giving a contribution of ₹390 per batch (two units of Product A, at a contribution of ₹150 per unit sold plus one unit of Product B, at a contribution of ₹90).

The break-even point in standard batches can be calculated by using the same break-even equation that we used for a single product, so that:

Break-even number of batches = Total Fixed Costs ÷ Contribution margin per batch

= ₹1,56,000 (1,17,000 + 39,000) ÷ ₹390 = 400 batches

The sales mix used to define a standard batch (2:1) can now be used to convert the break-even point (measured in standard batches) into a break-even point expressed in terms of the required combination of individual products sold. Thus, 800 units of A (2 × 400) and 400 (1 × 400) units of B must be sold to break-even. The following profit statement verifies this outcome:

Amount in ₹

Product Units sold	A 800	B 400	Total
Unit contribution margin	150	90	
Contribution to direct and common fixed costs	1,20,000	36,000	1,56,000
Less: Direct fixed costs	90,000	27,000	1,17,000
Contribution to common fixed costs	30,000	9,000	39,000
Less: Common fixed costs			39,000
Profit			**NIL**

Let us now assume that the actual sales volume for the period was 1200 units, the same total volume as the break-even volume, but consisting of a sales mix of 600 units of each product. Thus, the actual sales mix is 1:1 compared with a planned sales mix of 2:1. The total contribution to direct and common fixed costs will be ₹1,44,000 [(₹150× 600 for A)]+[(₹90×600 for B)] and a loss of ₹12,000 (₹1,44,000 contribution – ₹1,56,000 total fixed costs) will occur. It should now be apparent that the break-even point (or the sales volumes required to achieve a target profit) is not a unique number, it varies depending upon the composition of the sales mix, because the actual sales mix differs from the planned sales mix, the sales mix used to define a standard batch has changed from 2:1 to 1:1 and the contribution per batch changes from ₹390 to ₹240 [(1×₹150)]+[(1×₹90)]. This means that the revised break-even point will be 650 batches (₹1,56,000 total fixed costs/₹240 contribution per batch), which converts to a sales volume of 650 units of each product based on a 1:1 sales mix. Generally, an increase in the proportion of sales of higher contribution margin products will decrease the break-even point whereas increases in sales of the lower margin products will increase the break-even point.

Differential Cost Analysis

3.5

Differential Cost: Meaning & Concept

Differential Cost is the change in the costs which results from the adoption of an alternative course of action. The alternative actions may arise due to change in sales volume, price, product mix (by increasing, reducing or stopping the production of certain items), or methods of production, sales, or sales promotion, or they may be due to 'make or buy' or 'take or refuse' decisions. When the change in costs occurs due to change in the activity from one level to another, differential cost is referred to as incremental cost or decremental cost, if a decrease in output is being considered, i.e. total increase in cost divided by the total increase in output. However, accountants generally do not distinguish between differential cost and incremental cost and the two terms are used to mean one and the same thing.

The computation of differential cost provides an useful method of analysis for the management for anticipating the results of any contemplated changes in the level or nature of activity. When policy decisions have to be taken, differential costs worked out on the basis of alternative proposals are of great assistance.

The determination of differential cost is simple. Differential cost represents the algebraic difference between the relevant costs for the alternatives being considered. Thus, when two levels of activities are being considered, the differential cost is obtained by subtracting the cost at one level from the cost of another level.

For example, difference in costs may arise because of replacement of labour by machinery and difference in costs of two alternative courses of action will be the differential cost.

It is important to note that differential cost may be an increase or a decrease in costs. Suppose, present cost is ₹2,50,000, when the work is done by labour and the expected cost ₹2,25,000 when the work is done by machinery.

In this case, differential cost will be decrease in costs ₹25,000 (i.e., ₹2,50,000 - ₹2,25,000) and the decision of replacement of labour by machinery should be implemented by the firm because differential cost of ₹25,000 (decrease in cost) will increase the profits of the firm by ₹25,000.

If change in cost occurs due to change in level of activity, differential cost is referred to as incremental cost in case of increase in output and decremental cost in case of decrease in output. However, in practice, no distinction is made between differential cost and incremental or decremental cost and two terms are used to mean the same thing.

However, if the alternate course of action does not involve any additional fixed costs change in variable costs will become differential costs and there will be no difference between marginal costs and differential costs.

A management of any type of business organisation is confronted with the problem of making appropriate decisions. "Behaviour of cost" plays a vital and crucial role in decision-making areas. Although the historical costs serve as an effective tool for predicting future costs, they are not suitable to decision-making process. We are of the view that variable costs are affected by a decision and fixed costs are not affected, but in reality, it is not so; particularly in the long run, no type of cost is fixed. Costs tend to vary due to variations in volume of production, method of production, product mix and the like. Such increase or decrease in the total costs at a particular level of activity has

to be analyzed. At this juncture, the concept of differential cost arises.

Characteristics of Differential Costing

a. In order to ascertain the differential costs, only total cost is needed and not cost per unit.

b. Existing level is taken to be the base for comparison with some future or forecasted level.

c. Differential cost is the economist's concept of marginal cost.

d. It may be referred to as incremental cost when the difference in cost is due to increase in the level of production and decremental costs when difference in cost is due to decrease in the level of production.

e. It does not form part of the accounting records, but may be incorporated in budgets.

f. It is not necessary to adopt marginal cost technique for differential cost analysis because it can be worked out on the method of absorption costing or standing costing.

g. What is said of the differential cost above, applies to differential revenue also.

h. Variable costs are the differential costs when the additional output does not involve the additional fixed costs. It is used for planning and decision-making only and not incorporated in the accounting records. It is intended for the comparison of the expected changes in costs and revenues. It is applied only to the existing business and not suitable for new business set-up. Differential costs are future costs.

i. Differential cost analysis is carried on using only relevant costs.

Differential Costing is used for various policy decisions, some of which are stated below:

a. The introduction of a new plant.

b. Make or buy decisions.

c. Lease or buy decisions.

d. Discontinuing a product, suspending or closing down a segment of the business.

e. The profitability of a change in product mix.

f. Acceptance of an offer at a lower selling price.

g. Change in the methods of production.

h. The determination of the most profitable levels of production and price.

i. Submitting tenders.

j. The determination of price at which raw materials can be purchased.

k. Equipment replacement decisions.

l. The profitability or otherwise of further processing.

m. The opening of a new sales area or territory.

n. Determination of most profitable levels of production and price.

o. Acceptance of offer at a lower price or offering a quotation at lower selling price in order to increase capacity.

p. It is used to decide whether it will be more profitable to sell a product as it is or to process it further into a different product to be sold at an increased price.

q. Determining the suitable price at which raw material may be purchased.

r. Decision of adding a new product or business segment.

s. Discontinuing a product or business segment in order to avoid or reduce the present loss or increase profit.

Incremental and Decremental Cost:

Differential costs are also known as incremental costs, although technically an incremental cost should refer only to an increase in cost from one alternative to another; decrease in cost should be referred to as decremental cost. Differential cost is a broader term, encompassing both cost increases (incremental costs) and cost decreases (decremental costs) between alternatives.

The concept of differential costing is vital in planning and decision-making. It is an important tool in evaluating the profitability of alternative choice decisions and helping management in choosing the best alternative. The differential cost analysis can assist management in knowing the additional profit that would be earned if idle or unused capacity is used for extra production or if some additional investments are made by the firm.

"Marginal Cost" and "Differential Cost"

Marginal cost represents the increase or decrease in total cost which occurs with a small change in output say, a unit of output. In Cost Accounting variable costs represent marginal cost.

Differential cost is the change (increase or decrease) in the total cost (variable as well as fixed) due to change in the level of activity, technology or production process or method of production. In other words, it can be defined as the cost of one unit of product or service which would be avoided if that unit was not produced or provided.

Similarity:

(a) Both the techniques of cost analysis and cost presentation.

(b) Both are made use of by the management in decision making and in formulating policies.

(c) The concepts of differential costs and marginal costs mainly arise out of the difference in the behaviour of fixed and variable costs.

(d) Differential costs compare favourably with the economist's definition of marginal cost, viz. that marginal cost is the amount which at any given volume of output is changed if output is increased or decreased by one unit.

Difference:

(a) Differential cost analysis can be made in the case of both absorption costing as well as marginal costing.

(b) While marginal costing excludes the entire fixed costs, some of the fixed costs may be taken into account as being relevant for the purpose of differential cost analysis.

(c) Marginal costs may be embodied in the accounting system whereas differential costs are worked out separately as analysis statements.

(d) In marginal costing, margin of contribution and contribution ratio are the main yardsticks for performance evaluation and for decision making. In differential cost analysis, differential costs are compared with the incremental or decremental revenues, as the case may be.

The main point which distinguishes marginal cost and differential cost is that change in fixed cost when volume of production increases or decreases by a unit of production. In the case of differential cost variable as well as fixed cost i.e. both costs change due to change in the level of activity, whereas under marginal costing only variable cost

changes due to change in the level of activity.

Illustration 3

A company is at present working at 90 per cent of its capacity and producing 13,500 units per annum. It operates a flexible budgetary control system. The following figures are obtained from its budget.

Particulars	90%	100%
Sales (₹)	15,00,000	16,00,000
Fixed expenses (₹)	3,00,500	3,00,600
Semi-fixed expenses (₹)	97,500	1,00,500
Variable expenses (₹)	1,45,000	1,49,500
Units made	13,500	15,000

Labour and material costs per unit are constant under present conditions. Profit margin is 10 per cent.

a. You are required to determine the differential cost of producing 1,500 units by increasing capacity to 100%

b. What would you recommend for an export price for these 1,500 units taking into account that overseas prices are much lower than indigenous prices?

Solution

Computation of material and labour cost

Particulars	₹	₹
Sales at present		15,00,000
(-) Profit @ 10%		1,50,000
Total cost		13,50,000
(-) All costs other than material & labour		
Fixed expenses	3,00,500	
Semi fixed expenses	97,500	
Variable expenses	1,45,000	5,43,000
Material & Labour cost		8,07,000

a. Statement showing differential cost of 1500 units:

Particulars	₹
Material & Labour (₹ 8,07,600 × 1500 ÷ 13,500)	89,667
Fixed expenses (₹ 3,00,600 – ₹ 3,00,500)	100
Semi fixed expenses (₹ 1,00,500 – ₹ 97,500)	3,000
Variable expenses (₹1,49,500 – ₹ 1,45,000)	4,500
Differential cost	**97,267**

b. Differential cost per unit = ₹97,267 ÷1,500 = ₹64.84

The minimum price for these 1,500 units should not be less than ₹64.84.

Marginal Costing vs. Absorption Costing (Advanced Applications)

3.6

Absorption Costing and Marginal Costing

The cost of a product or process can be ascertained using different elements of cost using any of the following two techniques viz.,

1. Absorption Costing
2. Marginal Costing

Absorption Costing

Under this method, the cost of the product is determined after considering the total cost i.e., both fixed and variable costs. Thus this technique is also called traditional or total costing. The variable costs are directly charged to the products where as the fixed costs are apportioned over different products on a suitable basis, manufactured during a period. Thus under absorption costing, all costs are identified with the manufactured products.

Marginal Costing

Marginal costing is "the ascertainment of marginal costs and of the effect on profit of changes in volume or type of output by differentiating between fixed costs and variable costs." Several other terms in use like direct costing, contributory costing, variable costing, comparative costing, differential costing and incremental costing are used more or less synonymously with marginal costing.

It is a process whereby costs are classified into fixed and variable and with such a division so many managerial decisions are taken. The essential feature of marginal costing is division of total costs into fixed and variable, without which this could not have existed. Variable costs vary with volume of production or output, whereas fixed costs remains unchanged irrespective of changes in the volume of output. It is to be understood that unit variable cost remains same at different levels of output and total variable cost changes in direct proportion with the number of units. On the other hand, total fixed cost remains same disregard of changes in units, while there is inverse relationship between the fixed cost per unit and the number of units.

Marginal Costing vs. Absorption Costing

Marginal Costing and Absorption Costing will report different profit figures if there is any change in the volume of inventory during the period. If closing inventory is greater than opening inventory, absorption costing will report a higher profit than marginal costing. If opening inventory is greater than closing inventory (i.e. inventory levels decrease), then absorption costing will report a lower profit than marginal costing.

There are two differences between the way that variances are calculated in a marginal costing system and in an absorption costing system:

- In marginal costing, fixed costs are not absorbed into product costs and so there are no fixed cost variances to explain any under or over absorption of overheads. There will, therefore, be no fixed overhead volume variance. There will, however, be a fixed overhead expenditure variance which is calculated in exactly the same way as for absorption costing systems.

- In marginal costing the sales volume variance in units will be valued at standard contribution margin and called the sales volume contribution variance. In standard absorption costing standard profit is used instead of standard contribution.

Marginal Costing :

Here only variable costs are charged to product, processes or operations. Fixed costs are charged as period costs to the profit statement of the same period in which they are incurred. The cost of production under this method does not include fixed factory overheads and therefore, the value of closing stock comprises of only variable costs. No part of the fixed expenses in included in the value of closing stock and carried over to the next period. Since fixed overheads are not included in the cost of production, therefore the question of their under/ over recovery does not arise. Here decisions are made on the basis of contribution i.e. excess of sales price over variable costs. This basis of decision making results in optimum profitability.

Absorption Costing:

Fixed production overheads are charged to the product to be subsequently released as a part of goods sold i.e., it is included in cost per unit.

Profit is the difference between sales and cost of goods sold.

Costs are seldom classified into variable and fixed. Although such a classification is possible, it fails to establish a cost-volume profit relationship.

If inventories increase during a period, this method will reveal more profit than marginal costing. When inventories decrease, fewer profits are reported because under this method closing stock is valued at higher figures. Since inventories are valued at total cost, a portion of fixed overheads are also included in inventories.

Arbitrary apportionment of fixed costs may result in under or over recovery of overheads.

Differences between Absorption Costing and Marginal Costing:

	Absorption Costing	Marginal Costing
1.	Both fixed and variable costs are considered for product costing and inventory valuation.	Only variable costs are considered for product costing and inventory valuation.
2.	Fixed costs are charged to the cost of production. Each product bears a reasonable share of fixed cost and thus the profitability of a product is influenced by the apportionment of fixed costs.	Fixed costs are regarded as period costs. The profitability of different products is judged by their P/V ratio.
3.	Cost data are presented in conventional pattern. Net profit of each product is determined after subtracting fixed cost along with their variable cost.	Cost data are presented to highlight the total contribution of each product.
4.	The difference in the magnitude of opening stock and closing stock affects the unit cost of production due to the impact of related fixed cost.	The difference in the magnitude of opening stock and closing stock does not affect the unit cost of production.
5.	In case of absorption costing the cost per unit reduces, as the production increases as it is fixed cost which reduces, whereas, the variable cost remains the same per unit.	In case of marginal costing the cost per unit remains the same, irrespective of the production as it is valued at variable cost.

Difference in profit under Marginal and Absorption Costing:

(i) No opening and closing stock: In this case, profit/loss under absorption and marginal costing will be equal.

(ii) When opening stock is equal to closing stock: In this case, profit/loss under two approaches will be equal provided the fixed cost element in both the stocks is same amount.

(iii) When closing stock is more than opening stock: In other words, when production during a period is more than sales, then profit as per absorption approach will be more than that by marginal approach. The reason behind this difference is that a part of fixed overhead included in closing stock value is carried forward to next accounting period.

(iv) When opening stock is more than the closing stock: In other words when production is less than the sales, profit shown by marginal costing will be more than that shown by absorption costing. This is because a part of fixed cost from the preceding period is added to the current year's cost of goods sold in the form of opening stock.

Marginal Costing

XYZ Ltd.
Operating Income Statement under Marginal Costing
For the year ended……

Particulars	₹	₹
Sales		xxxxx
Total variable cost:		
Direct material consumed	xxxx	
Direct labour cost	xxxx	
Variable manufacturing overhead	xxxx	
Variable cost of goods produced	xxxx	
Add: Op. stock of finished goods (valued at Total Var. Cost of previous year)	xxxx	
Less: Cl. stock of finished goods (valued at Total Var. Cost of current year)	xxxx	
Variable Cost of Goods Sold		
Add: Variable administration, selling and distribution overhead	xxxx	
Total variable cost	xxxx	
Contribution Margin (Sales - Total variable cost)		xxxx
Less: Fixed operating costs (Production, administration, selling and distribution)		xxxx
Operating Income		**xxxx**

Absorption Costing

XYZ Ltd.
Operating Income Statement under Absorption Costing
For the year ended…….

Particulars	₹	₹
Sales		xxxx
Cost of Goods Sold:		
Direct material consumed	xxxx	
Direct labour cost	xxxx	
Variable manufacturing overhead	xxxx	
Fixed manufacturing overhead	xxxx	
Manufacturing Cost incurred during the year (Gross Factory Cost)	xxxx	
Add: Opening Work-in-Progress	xxxx	
Less: Closing Work-in-Progress	xxxx	

Particulars	₹	₹
Total cost of goods manufactured	xxxx	
Add: Op. stock of finished goods (valued at total cost of previous year)	xxxx	
Less: Cl. stock of finished goods (valued at total cost of current year)	xxxx	
Gross profit/Margin (i.e. Sales - Cost of goods sold)		xxxx
Less: Operating Costs:		
Administration costs, etc. (Both Fixed & Variable)		xxxx
Selling and distribution costs (Both Fixed & Variable)		xxxx
Operating Income		**xxxx**

Illustration 4

ABC Limited has production capacity of 5,00,000 units per annum at its full capacity.

Company's Cost structure is as under:	
Variable production cost per unit	₹32.00
Variable selling expenses per unit	₹ 9.60
Fixed production cost per annum	₹30,00,000
Fixed selling expenses per annum	₹20,00,000

During the year ended 31st March, 2022, the company worked at 80 percent of its capacity.

The operating data for the year are as follows:

Production	4,00,000 Units
Sales	₹ 64 per Unit; 3,87,500 Units
Opening stock of finished goods	50,000 Units

Fixed production expenses are absorbed on the basis of capacity and fixed selling expenses are recovered on the basis of period.

You are required to prepare statements of Cost and Profit for the year ending 31st March, 2022:

a. On the basis of marginal costing

b. On the basis of absorption costing.

Solution:

a. Statement of Cost and Profit under Marginal Costing for the year ending 31st March, 2022 Output = 4,00,000 units

Particulars	Amount (₹)	Amount (₹)
Sales: (3,87,500 units @ ₹ 64 per unit)		2,48,00,000
Less: Marginal costs:		
Variable cost of production (400000 × ₹32)	1,28,00,000	
Add: Opening stock (50000 units @ ₹32)	16,00,000	
Less: Closing Stock [(4,00,000 + 50,000 – 3,87,500) = 62,500 units @ ₹32]	(20,00,000)	
Variable cost of production of 3,87,500 units	1,24,00,000	

Particulars	Amount (₹)	Amount (₹)
Add: Variable selling expenses @ ₹ 9.60 per unit	37,20,000	1,61,20,000
Contribution (sales – variable cost)		86,80,000
Less: Fixed Cost of Production	30,00,000	
Fixed selling expenses	20,00,000	50,00,000
Profit under marginal costing		**3,68,0000**

b. Statement of Cost and Profit under Absorption Costing for the year ending 31st March, 2022 Output = 4,00,000 units

Particulars	Amount (₹)	Amount (₹)
Sales: 3,87,500 units @ ₹64		2,48,00,000
Less : Cost of sales:		
Variable cost of production (4,00,000 @ ₹ 32)	1,28,00,000	
Add: Fixed cost of production absorbed 4,00,000 units @ ₹6 (As per W.N. 1)	24,00,000	
Add: Opening Stock	19,00,000	
Less : Closing Stock	23,75,000	
Production cost of 3,87,500 units	14,72,5000	
Selling expenses: Variable: ₹9.60 × 3,87,500 units	37,20,000	
Fixed	20,00,000	2,04,45,000
Profit		43,55,000
Less : Overheads under absorbed: (As per W.N. 2)		6,00,000
Profit under absorption costing		**37,55,000**

Working Notes:

a. Absorption rate for fixed cost of production = ₹30,00,000÷5,00,000 units = ₹ 6 per unit

b. Fixed production overhead under absorbed = ₹(30,00,000–24,00,000) = ₹ 6,00,000

Observations from the Solution:

Marginal Costing rewards sales and Absorption Costing rewards production.

Solved Illustrations & Cases

Illustration 5

You are given the following information for the coming year of a factory:

Particulars	Amount
Fixed expenses	₹4,00,000
Selling price per unit	₹20
Variable expenses per unit	₹10
Budgeted output	80,000 units

Calculate Break-even Point in Rupees and Margin of Safety in Rupees.

Solution:

For calculating Break-even Point, arranging information in the following format would be appropriate and in the

format, it would be useful to show sales and variable cost per unit and fixed cost in total.

(Budgeted Output – 80,000 Units)

Particulars	Per Unit (₹)	Total (₹)
Sales	20	16,00,000
Less: Variable Cost	10	8,00,000
Contribution	10	8,00,000
Less: Fixed Cost		4,00,000
Profits		4,00,000

Calculation of Break-Even Point (in ₹)

Break-Even Point (in ₹) = (Fixed Costs × Sales) ÷ Contribution

= 4,00,000 × 16,00,000 ÷ 8,00,000

= ₹8,00,000.

Calculation of Margin of Safety (in ₹)

Margin of Safety (in ₹) = Actual (or Budgeted) Sales – Break-Even Sales

= ₹16,00,000 – ₹8,00,000

= ₹8,00,000

Illustration 6

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

Fixed cost ₹3,00,000

Variable cost per unit ₹5

Selling price per unit ₹10

Output level 1,00,000 units

Solution:

Contribution = Selling Price - Marginal Cost

= (1,00,000 × 10) - (1,00,000 × 5)

= 10,00,000 - 5,00,000

= ₹ 5,00,000.

Contribution = Fixed Cost + Profit

₹ 5,00,000 = ₹ 3,00,000 + Profit

Profit = ₹ 2,00,000

Illustration 7

From the following particulars find out break-even point:

Fixed Expenses ₹1,00,000

Selling price Per unit ₹20

Variable cost per unit ₹15

Solution:

Break-Even Point in Units = Fixed Cost ÷ Contribution per unit

Contribution per unit = Selling Price per unit - Variable Cost per unit

= ₹ 20 - ₹ 15

= ₹ 5

BEP (in units) = ₹1,00,000 ÷ ₹ 5

= 20,000 units

BEP in Sales = 20,000 × ₹ 20

= ₹4,00,000

Illustration 8

From the following information calculate:

(1) P/V Ratio

(2) Break-Even Point

(3) If the selling price is reduced to ₹ 80, calculate New Break-Even Point:

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

Solution:

(1) P/V Ratio = Contribution ÷ Sales × 100

Contribution = Sales - Variable Cost

Total Sales = ₹ 5,00,000

Selling price per unit = ₹ 100

Sales in units = 5,000 units

Contribution = ₹ 2,00,000

P/V Ratio = 40%

(2) Break-Even Point in sales = Fixed Cost ÷ P/V Ratio = ₹ 3,00,000

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

Sales =₹ 4,00,000

P/V Ratio = (80 - 60) ÷ 80 = 25% , Contribution per unit = 80 - 60 = ₹ 20

Break-Even Point (in units) = 1,20,000 ÷ 20 = 6,000 units

Break-Even Point in Sales = 1,20,000 ÷ 25% = ₹4,80,000

Illustration 9

Sales ₹ 2,00,000

Profit ₹ 20,000

Variable Cost 60%

You are required to calculate:

(1) P/V Ratio

(2) Fixed Cost

(3) Sales volume to earn a profit of ₹ 50,000

Solution:

Sales = ₹ 2,00,000

Variable Cost = 60% = ₹ 1,20,000

(1) P/V Ratio = 40%

(2) Contribution = ₹ 80,000

Contribution = Fixed Cost + Profit

or, Fixed Cost = ₹ 60,000

(3) Sales volume to earn a profit of ₹ 50,000 = Fixed Cost + Desired Profit ÷ P / V Ratio = ₹ 2,75,000

Illustration 10

From the following particulars, calculate:

(a) P/V Ratio

(b) Profit when sales are ₹ 40,000, and

(c) New break-even point if selling price is reduced by 10%

Fixed cost = ₹ 8,000

Break-even point = ₹ 20,000

Variable cost = ₹ 60 per unit

Solution:

(a) Break-Even Point = Fixed Cost ÷ P/V Ratio

P/V Ratio = Fixed Cost ÷ Break-Even Point = 8,000 ÷20,000 × 100 = 40%

(b) Profit when sales are ₹ 40,000

Profit = Sales × P/V Ratio - Fixed Cost

= ₹40,000 × 40% - ₹ 8,000

= ₹ 16,000 – ₹ 8,000

= ₹ 8,000

(c) New break-even point if the selling price is reduced by 10%. If the selling price is ₹ 100, now it is reduced by 10%, i.e., it will be ₹ 90 (100 - 10)

Variable Cost = ₹ 60 Per unit

New P/V Ratio = 33.33%

New Break-Even Point = ₹ 24,002.40

Illustration 11

From the following particulars, calculate Margin of safety:

Fixed cost ₹ 1,00,000

Variable cost ₹ 1,50,000

Total Sales ₹ 3,00,000

Solution:

Contribution = Sales - Variable Cost = ₹ 1,50,000

Profit = Contribution – Fixed Cost = ₹ 50,000

Margin of Safety = Profit ÷ P/ V Ratio = ₹ 1,00,000

P / V Ratio = 50%

Margin of Safety expressed in percentage of sales= 33.33%

Illustration 12

From the following information calculate the Cash Break-Even Point:

Particulars	₹
Selling price per unit	60
Variable cost per unit	40
Fixed cost	2,00,000
Depreciation included in fixed cost	50,000

Solution:

Cash Fixed Cost = ₹ 2,00,000 – ₹ 50,000
= ₹ 1,50,000

Contribution per unit = ₹ 60 – ₹ 40
= ₹20

Cash Break-Even point in units = Cash Fixed Cost ÷ Contribution per unit
= 7,500 units.

Illustration 13

For the coming year, a manufacturing company has budgeted as under:

Contribution/Sales (C/S) Ratio = 45%

Margin of Safety Ratio = $33\frac{1}{2}$ %

Fixed Costs = ₹ 5,85,000

Required: Determine Total Sales-volume for the coming year and Profit thereon.

Solution:

Break-even sales (Volume) = Fixed cost ÷ P/V Ratio

Break-even sales = ₹ 5,85,000 ÷ 45%

Break-even sales = ₹ 5,85,000 × 100/45 = ₹13,00,000

% Profit = P/V Ratio × Margin of sales Ratio × 100

% Profit = 45/100 × 100/300 × 100

% Profit = 15%

Sales Volume (s) = (Fixed cost + Profit % on Sales or S) ÷ P/V Ratio

or, S = (₹ 5,85,000 + 15% S) ÷ 45%

or, 45% S = ₹ 5,85,000 + 15% S

or, 30% S = ₹ 5,85,000

or, S = ₹ 5,85,000 × 100/30 = ₹ 19,50,000

Sales = ₹ 19,50,000, Profit = 15% of ₹ 19,50,000 = ₹ 2,92,500.

Illustration 14

When sales of a company declines from ₹ 9,00,000 to ₹ 7,00,000, its profit of ₹ 50,000 is converted into a loss of ₹ 50,000.

Determine contribution margin ratio.

Solution:

Sales	Profit
₹	₹
9,00,000	50,000
7,00,000	(-) (Loss) 50,000
2,00,000	1,00,000

P/V Ratio or Contribution Margin Ratio = 1,00,000 ÷ 2,00,000 × 100 = 50%

Illustration 15

An exporter of garments is earning a profit of ₹ 1,00,000 on a sale of ₹ 12,00,000. Selling price is ₹ 40 per garment and variable cost is ₹30 per garment. The exporter incurs an additional fixed cost of ₹3,00,000 on product improvement which also enables him to economise ₹5 in per garment variable cost.

As per trade agreements, the sale of his garments is restricted to the old value of ₹ 12,00,000. What should be the selling price per garment so that the exporter earns the same profit at the same sales value?

Solution:

Units sold = Sales ÷ Selling Price per unit = ₹ 12,00,000 ÷ ₹ 40 = 30,000 units

Sales	40	12,00,000
Less: Variable cost	30	9,00,000
Contribution	10	3,00,000
Less: Profits		1,00,000
Fixed Cost		2,00,000

Hence, total fixed cost in the new case = ₹ 2,00,000 + ₹ 3,00,000 = ₹ 5,00,000

Contribution in the New Case = New Fixed Cost + Profits = 5,00,000 + 1,00,000 = ₹ 6,00,000

Since as per agreement the sale value is restricted to the old value that is ₹ 12,00,000. Hence P/V Ratio will be:

₹ 6,00,000 ÷ ₹12,00,000 × 100 = 50%

The variable cost in the new case = ₹ 30 - ₹ 5 = ₹ 25

Variable Cost Ratio = 100 - P/V Ratio = 100 - 50 = 50%

Computation of New Selling Price:

If VC is 50, then SP = ₹ 100

If VC is 1, then SP = 100 ÷ 50

If VC is 25, then SP = 100 ÷ 50 × 25 = ₹ 50 per unit

Illustration 16

On investigation it was found that variable cost in XYZ Ltd is 80 per cent of the selling price. If the fixed expenses are ₹ 10,000, calculate the break-even sales of the company.

Another firm, MN Company Ltd, having the same amount of fixed expenses, has its break-even point at a lower figure than that of XYZ Ltd. Comment on the causes.

Solution:

BEP (amount) = ₹ 10,000/ P/V ratio (100 percent -Variable cost to volume ratio = 0.80)

= ₹ 10,000/0.20

= ₹ 50,000 (XYZ Ltd)

The lower break-even point of MN Ltd vis-à-vis XYZ Ltd is due to its lower variable expenses to volume ratio, which in turn may be either due to its lower VC per unit or higher SP per unit, eventually yielding higher contribution margin and, hence, higher P/V ratio and lower BEP.

Illustration 17

ABC Ltd manufactures and sells four types of products under the brand names of A, B, C and D. The sales-mix in value comprises 33.33, 41.67, 16.67 and 8.33 per cents for products A, B, C and D respectively. The total budgeted sales (100 per cent) are ₹ 60,000 per month. Operating costs are:

Variable costs as per cent of selling price: Product A 60, B 68, C 80, and D 40. Fixed costs, ₹ 14,700 per month.

Calculate the break-even point for the products on an over-all basis.

Solution:

Determination of Weighted PV Ratio:

Product	Sales Revenue (₹)	(%)	Variable Costs (₹)	(%)	Contribution (₹)	P/V Ratio (%)
A	20,000	33.33	12,000	60	8,000	40
B	25,000	41.67	17,000	68	8,000	32
C	10,000	16.67	8,000	80	2,000	20
D	5,000	8.33	2,000	40	3,000	60
Total	60,000	100	39,000	65	21,000	35

BEP = Fixed Costs/Weighted P/V Ratio = ₹14,700 / 0.35 = ₹42,000.

Confirmation

Particulars	₹
Variable Costs (0.65 × ₹ 42,000)	27,300
Fixed Costs	14,700
Total Costs	42,000
Total Sales Revenue	42,000

Illustration 18

From the cost records of a company for a specific period, for product X, the information given in the first column can be ignored since it is only one of the several projections of an assistant accountant, but it may be useful to you.

Particular	This Period Actual (₹)	One of The Future Projections (₹)
Sales (Units)	10,000	20,000
Profit (Loss)	(10,000)	10,000
Fixed Costs	30,000	30,000
Variable Cost Per Unit	8	8

On the basis of the first column, determine

1. What increased sales volume is required to cover an additional attractive packaging cost of ₹ 0.50 per unit, to increase the sales, at the existing sales price, to yield zero profit?
2. What increased sales volume in required at the present sale price, to cover an additional publicity expense of ₹5,000 for that period, while yielding a profit of ₹5,000.
3. What increased sale volume is required to reach a profit of ₹4,000 while reducing the selling price by 3 per cent per unit?

Solution:

(1) Sales volume required to yield zero profit: = Fixed costs/ CM per unit = ₹ 30,000/₹ 1.50 = 20,000 units. Sales volume required = 20,000 units (₹ 2,00,000). Existing sales volume = 10,000 units (₹ 1,00,000). Difference represents increase in sales volume required to make zero profit = 10,000 units (₹ 1,00,000).

(2) Assuming situation (2) independent of (1): Sales volume required to earn a profit of ₹ 5,000 = [₹ 30,000 + ₹5,000 (publicity expenses) + ₹ 5,000 (profit)]/₹ 2 = 20,000 units (₹ 2,00,000); 10,000 units (₹ 1,00,000) is the increased sales volume required.

(3) Assuming (3) to be independent of situations (1) and (2): Desired sales volume to earn a profit of ₹ 4,000= (₹30,000 + ₹ 4,000)/(₹ 9.70 – 8) = 20,000 units (or ₹ 1,94,000). Increased sales volume required is 10,000 units.

Working Note:

Determination of total sales revenue and selling price per unit:

Total sales revenue = Total costs – Loss

Total costs = FC + (VC per unit × Sales in units)

₹ 80,000 = ₹ 30,000 + (₹ 8 × 10,000)

Total sales revenue = ₹ 1,10,000 – ₹ 10,000 = ₹ 1,00,000

SP per unit = ₹ 1,00,000/10,000 = ₹10.

EXERCISE

Theoretical Questions

⊙ Multiple Choice Question (MCQ)

1. To obtain the break-even point in rupee sales value, total fixed costs are divided by:
   A. Variable cost per unit;
   B. Contribution margin per unit;
   C. Fixed cost per unit;
   D. Profit/volume ratio.
2. The break-even point is the point at which:
   A. There is no profit, no loss;
   B. Contribution margin is equal to total fixed cost;
   C. Total revenue is equal to total cost;
   D. All of the above.
3. The primary difference between a fixed budget and a variable (flexible) budget is that a fixed budget:
   A. includes only fixed costs, while a variable budget includes only variable costs.
   B. is concerned with only further acquisitions of fixed costs, while a variable budget is concerned with expenses which vary with sales.
   C. cannot be changed after the period begins, while a variable budget can be changed after the period begins.
   D. is a plan for a single level of sales (or other measure of activity), while a variable budget consists of several plans, one for each of several levels of sales (or other measures of activity).
4. Margin of safety is referred to as:
   A. Excess of actual sales over fixed expenses;
   B. Excess of actual sales over variable expenses;
   C. Excess of actual sales over break-even sales;
   D. Excess of budgeted sales over fixed costs.
5. Contribution margin is known as
   A. Marginal income
   B. Gross profit
   C. Net income
   D. Net profit
6. Fixed cost per unit decrease when
   A. Production volume increases
   B. Production volume decreases
   C. Variable costs per unit decreases
   D. Prime costs per unit decreases

7. Within a relevant range, the amount of variable costs per unit
   A. Differs at each production level
   B. Remains constant at each production level
   C. Increases as production increases
   D. Decreases as production increases
8. Margin of safety is referred to as
   A. Excess of budgeted or actual sales over the variable expenses and fixed expense, at break-even.
   B. Excess of budgeted or actual sales revenue over the fixed expenses.
   C. Excess of actual sales over budgeted sales.
   D. Excess of sales revenue over the variable expenses.
9. Under marginal costing system, the contribution margin discloses the excess of
   A. Revenue over fixed costs
   B. Projected revenues over the break-even point
   C. Revenues over variable costs
   D. Variable costs over fixed costs
10. A decrease in sales price
   A. does not affect the break-even point
   B. lowers the fixed cost
   C. Increases the break-even point
   D. lowers the break-even point

Answer:

1-D, 2-A, 3-D, 4-C, 5-A, 6-A, 7- B, 8- C, 9-C, 10-C.

State True or False

1. Marginal costing and absorption costing will report different profit figures if there is any change in the volume of inventory during the period.
2. Another term for marginal costing is variable costing.
3. For the marginal cost, the stock will be calculated on total cost.
4. The P/V ratio will be equal to the profits by the sale ratio
5. BEP in marginal costing is Break entity profit
6. The kind of cost which will not differ due to the volume of the production is called Fixed cost
7. Under High and Low Point method, the output at two different levels is compared with the amount of total costs incurred at these two points.
8. In Analytical method of calculating marginal costing, it is determined on the basis of past records.
9. Margin of safety will be ₹ 37,500 if Profit is ₹ 15,000 and P/V ratio is 40%.
10. Differential cost is the economist's concept of marginal cost.

11. Marginal Costing is the practice of charging all marginal costs to operations processes or products and deducting all fixed costs against the profits for a particular period in which they arise.
12. Marginal cost may also be defined as the "cost of producing one additional unit of product."
13. Addition of variable cost and profit to contribution is equal to selling price.
14. Fixed costs remain unchanged or constant for the entire volume of production.
15. Marginal cost remains the same per unit of output irrespective of the level of activity.
16. Marginal cost per unit is not constant in nature and helps the management in production planning.
17. Selling prices do not remain constant forever and for all levels of output due to competition, discounts for bulk orders, changes in the general price level, etc.
18. Fixation of selling price in the long run can be done without considering fixed costs.
19. Break-even analysis can be used to help management select an action when several alternatives exist.
20. CVP analysis looks at the effect of sales volume variations on costs and operating profit.

Answer:

1- True, 2- True, 3- False, 4- False, 5- False, 6- True, 7-True, 8-False, 9- True, 10-True. 11. True, 12. True, 13. True, 14. True, 15. True, 16. False, 17. True, 18. False, 19. True, 20. True.

Fill in the Blanks

1. If the total cost of 1000 units is ₹ 60,000 and that of 1001 units is ₹ 60,400, then the increase of ₹ 400 in the total cost is _____.
2. The costing method where fixed factory overheads are added to inventory is called _____
3. The marginal cost of change in the total cost when the quantity of product is —?
4. Contribution margin in marginal costing is also known as _____.
5. Fixed cost is also referred to as _____ in the marginal costing technique.
6. An increase in the variable cost _____.
7. Under marginal costing, the stock is valued at _____
8. Marginal cost is equal to _____.
9. While computing contribution in marginal costing, _____.
10. The marginal cost will be equal to _____.
11. Break-even Chart is a graphical representation of the …….
12. …… of cost and revenue data (breakeven charts) can be more easily understood by non-financial managers.
13. …….. is the result of an alternative course of action.
14. A management of any type of business organization is confronted with the problem of making appropriate ……
15. Differential cost analysis is carried on using only…….
16. The main point which distinguishes …….. and differential as that change in fixed cost when volume of production increases or decreases by a unit of production.

17. Fixed production overheads under……. are charged to the product to be subsequently released as a part of goods sold.
18. The …….to be charged for a product or service is often one of the most important decisions made by managers.
19. When the conditions prevailed both internally and externally are ……..to the companies, they usually plan to earn some planned profit
20. The decision about whether to produce parts and components in-house, or to sub-contract work to external suppliers, is referred to as the…….

Answer:

1- Marginal cost, 2- Absorption costing, 3- increased by one unit., 4- Marginal income, 5- Period cost, 6- Improves margin of safety, 7- Variable Cost, 8- Prime cost plus variable overheads, 9- The total marginal cost gets deducted from total sales revenue, 10- Prime cost plus all the variables overhead, 11. Break- Even Analysis, 12. Graphical representation, 13. Differential cost, 14. Decisions, 15. Relevant costs, 16. Marginal cost, 17. Absorption costing, 18. Price, 19. Favourable, 20. 'Make-or-buy decision'.

⊙ Short Essay Type Questions

1. What do you mean by marginal costing? Discuss its usefulness and limitations.
2. Distinguish between absorption costing and variable costing.
3. Discuss the role of contribution in marginal costing in decisions relating to fixation of selling price.
4. What are the limitations of break-even analysis?
5. Define break-even point. How can the break-even point be computed?

⊙ Essay Type Questions

1. What do you understand by the term margin of safety with reference to volume of production?
2. What do you understand by the term break-even analysis"? Enumerate its uses.
3. Discuss the uses of CVP analysis and its significance to management.
4. Mention the basic assumption made for 'Break-even Analysis' and also state how far they are valid.
5. Mention some possible courses of action to improve profit-volume ratio.

Practical Problems

⊙ Multiple Choice Question (MCQ)

1. Determine Margin of safety if Profit is ₹15,000 and P/V ratio is 40%.
   A. ₹37,500
   B. ₹33,000
   C. ₹38,000
   D. None of the above
2. What is Margin of Safety if Sales is 20,000 units and B.E.P is 15,000 units?
   A. 15000 units
   B. 5000 units
   C. 10000 units

D. 20000 units

3. Calculate margin of safety if sales is ₹3,00,000 and B.E.P is ₹ 4,50,000.

   A. ₹1,00,000

   B. ₹1,50,000

   C. Amount of sales < B.E.P, therefore no margin of safety

   D. None of the above

4. Determine sales in rupees for desired profit if fixed cost is ₹10,000, Variable cost is ₹30,000, Sales is ₹50,000 and desired profit is ₹5,000.

   A. ₹73,500

   B. ₹75,000

   C. ₹5,000

   D. ₹37,500

5. What will be sales in rupees for desired profit if fixed cost is ₹30,000, desired profit is ₹15,000 and P/V ratio is 30%?

   A. ₹1,50,000

   B. ₹1,00,000

   C. ₹2,00,000

   D. None of the above

6. Calculate sales in rupees for desired profit if fixed cost is ₹10,000, selling price is ₹20 per unit, Variable cost is ₹15 per unit and desired profit is ₹1 per unit.

   A. ₹20,000

   B. ₹50,000

   C. ₹70,000

   D. ₹10,000

7. Determine sales in units for desired profit if Fixed cost is ₹15,000, desired profit is ₹5,000 Selling price per unit is ₹20 and Variable cost per unit is ₹16.

   A. ₹5,000 units

   B. ₹5,000

   C. ₹10,000

   D. ₹10,000 units

8. What will be sales in units if fixed cost is ₹50,000 Contribution per unit is ₹60 and desired profit per unit is ₹10.

   A. ₹6,000 units

   B. ₹1,000

   C. ₹1,000 units

   D. ₹6,000

9. Determine B.E.P in units and amount if Units produced if ₹10,000, Fixed cost is ₹40,000, Selling price is ₹50 per unit and Variable cost us ₹30 per unit.
   A. ₹40 per unit, ₹2,00,000
   B. ₹50 per unit, ₹10,00,000
   C. ₹20 per unit, ₹1,00,000
   D. None of the above
10. Determine B.E.P if Sales is ₹1,00,000, Variable cost is ₹50,000 and Profit is ₹20,000.
   A. ₹60,000
   B. ₹40,000
   C. ₹80,000
   D. None of the above

Answer:

1-A, 2-B, 3-A, 4-D, 5-A, 6-B, 7- A, 8- C, 9-C, 10-A.

Comprehensive Numerical Questions

1. A company having annual sales of ₹10 crores is earning 12% profit before charging interest and depreciation. Interest and depreciation amount to ₹60 lakhs and ₹100 lakhs respectively. If the contribution/sales ratio of the company is 0.4, calculate its break-even sales.
2. In a purely competitive market 10,000 units of a product can be manufactured and sold and certain amount of profit is generated. It is estimated that 2,000 units of that product need to be manufactured and sold in a monopoly market to earn the same profit.

   Profit under both the market conditions is targeted at ₹2,00,000. The variable cost per unit is ₹100 and the total fixed cost is ₹37,000.

   You are required to determine the selling prices under both monopoly and competitive conditions.
3. A company has a fixed cost of ₹ 20,000. It sells two products A and B, in the ratio of 2 units of A and 1 unit of B. Contribution is ₹1 per unit of A and ₹2 per unit of B. How many units of A and B would be sold at break-even point?
4. ABC Ltd. manufactures three products, P, Q and R. The unit selling prices of these products are ₹100, ₹80 and ₹50 respectively. The corresponding unit variable costs are ₹ 50, ₹40 and ₹20. The proportions (quantity-wise) in which these products are manufactured and sold are 20%, 30% and 50% respectively. The total fixed costs are ₹14,80,000.

   Given the above information, you are required to work out the overall break-even quantity and the product wise break-up of such quantity.
5. A producer of Ladies purses is earning a monthly post tax profit of ₹ 60,000 when income tax rate is 40%. Selling price of a purse is ₹50 and per unit variable cost is ₹30. How many more purses he should sell to earn same monthly post tax profit, if the tax rate goes up to 50%?

6. Calculate break-even for a train journey between Delhi- Bangalore where cost of an Engine is ₹ 1,00,000 and of a bogie ₹20,000. Capacity of a bogie is 80 passengers and each ticket for the journey is ₹600. There is no variable cost per passenger.

7. W Ltd. is a single product producer with P/V ratio of 40% for the product during the current year.

   Due to increasing competition it is believed that the price will have to be reduced by 10% in the next year. By what percentage sales value and sales quantity should increase so that W Ltd. earns same profit in the next year also?

8. A company has a contribution/sales ratio of 40%. It maintains a margin of safety of 20%. If its annual fixed cost amount to ₹ 24 lakhs, calculate its

   A. Break-even sales,

   B. Margin of safety,

   C. Total sales,

   D. Total variable costs and

   E. Profit

9. A company sells its product at ₹15 per unit. In a period, if it produces and sells 8000 units, it incurs a loss of ₹5 per unit. If the volume is raised to 20000 units, it earns a profit of ₹ 4 per unit.

   Calculate break-even point in terms of rupees as well as in units.

10. A Company manufactures radios, which are sold at ₹ 1,600 per unit. The total cost is composed of 30% for direct materials, 40% for direct wages and 30% for overheads. An increase in material price by 30% and in wage rates by 10% is expected in the forthcoming year, as a result of which the profit at current selling price may decrease by 40% of the present profit per unit. You are required to prepare a statement showing current and future profit at present Selling Price.

    How much Selling Price should be increased to maintain the present rate of profit?

⊙ Unsolved Cases

1. Prepare a profit and loss statement under

   (i) Absorption costing and

   (ii) Marginal costing from the following data:

   Total units produced 5000 units

   Total units sold 4000 units

   Selling price per unit ₹10

   Total fixed overheads ₹15,000

Cost structure:

Particulars	(Per unit)
Direct material	₹ 2
Direct wages	₹2
Variable overhead	₹2
Fixed overhead	₹3

2. You are required to ascertain profit t and loss under (i) marginal-costing- and (ii) absorption-costing method from the following data:

   Basic production data:

   Normal volume of production = 20,000 units per period.

   Sales price = ₹5 per unit.

   Variable cost = ₹3 per unit.

   Fixed cost = ₹1 per unit.

   Total fixed cost = ₹20,000 (20,000 × ₹1).

   Selling and distribution costs (not available).

   The opening and closing stocks consist of both finished goods as well as equivalent units of WIP.

3. A company produces a variety of products each having a number of component parts. Product B takes 10 hours to process on a machine working to its full capacity. B has a selling price of ₹100 and a marginal cost of ₹50.

   'AA' – a component part (used for product A), could be made on the same machine in 2 hours for a marginal cost of ₹15. The suppliers' price is ₹20. Should one make or buy the component 'AA'? Assume that the machine hour is the limiting factor.

4. A company has a capacity of producing 50,000 units of a certain product in a month. The sales department reports that the following schedule of sale prices is possible:

Volume of Production	Selling Price per unit (₹)
60%	0.95
70%	0.90
80%	0.85
90%	0.75
100%	0.60

   The variable cost of manufacture between these levels is ₹0.20 per unit and the fixed cost is ₹15,000. At which volume of production will the profit be the maximum?

5. The following date relates to a manufacturing company:

   Plant capacity: 2,00,000 units per annum

   Present utilization = 50%

   Actuals for the year are:

   Selling price ₹40 per unit

   Materials cost ₹15 per unit

   Variable manufacturing costs ₹9 per unit

   Fixed costs ₹18 lakhs

   In order to improve the capacity utilization, the following proposals are being considered:

   (i) Reduce the selling price by 15%.

   (ii) Spend additionally ₹2,00,000 on sales promotion

   How many units should be made and sold in order to earn a profit t of ₹5,00,000 per year?

6. Following information is available.

Year	Sales	Profit
2013	10,00,000	1,00,000
2014	15,00,000	2,00,000

Calculate:

(a) Profit Volume Ratio.

(b) Sales required to earn profit of ₹4,00,000.

(c) Profit when sales are ₹ 20,00,000.

7.

Year	Sales	Cost
2013	16,00,000	15,76,800
2014	20,52,000	19,22,400

From the above information, calculate:(A) P/V Ratio, (B) Fixed Ratio, (C) Break-even Point and Profit/ loss when sales 12,96,000.

8. From the following particulars, you arere quired to calculate:

1. Profit Volume Ratio;
2. Break-even Point;
3. Profit when sale is ₹ 2,00,000;
4. Sales required to earn to earn a profit of ₹ 40,000;

5. Margin of safety in the 2nd year.

Year	Sales	Profit
I	2,40,000	18,000
II	2,80,000	26,000

You may assume that the cost structure and selling prices remain constant in the two years.

9. KT& Co. has prepared the following budget estimates for the year 2014-2015: Sales 15,000. You are required to find:

1. Profit Volume Ratio.
2. Break-even Point.
3. Margin of safety.

Also create revised Profit Volume Ratio, Break-even Point and Margin of Safety, if selling price per unit is reduced by 10%.

10. Z Ltd. produces and sellsasing learticleat ₹10 each. The marginal cost of productionis ₹ 6 each and fixed costis ₹ 400 perannum.

Calculate:

1. P/V Ratio
2. The break-even sales (in ₹ and numbers)
3. The sales to earn profit of ₹ 500.
4. Profit at sales of ₹3000.
5. New break-even point if sales price is reduced by 10%.
6. Margin of safety at sales of ₹ 1,500.
7. Selling price per unit if the break-even point is reduced to 80 units.

11. From the following data, compute:

1. P/V Ratio
2. BEP in rupees and unit.
3. Number of units to be sold to earn a profit of ₹ 7,50,000.

Sales Price	₹ 20 per unit
Direct Material	₹ 5 per unit
Direct Wages	₹ 6 per unit
Variable Administration Overheads	₹ 3 per unit
Fixed Factory Overheads	₹ 6,40,000 per year
Fixed Administration Overhead	₹ 1,52,000 per year

12. The following is the cost structure of a product Selling price ₹100 per unit.

Variable cost per unit:

Material	₹ 38
Labour	₹ 14
Direct Expenses	₹ 8

Fixed overheads for the year:

Factory Overheads	₹ 2,80,000
Office Overheads	₹ 2,20,000
No. of Units Produced and Sold	₹ 40,000

Calculate:

1. P/V Ratio
2. Break-even Point in units
3. Margin of Safety Amount
4. Break-even Point if fixed overheads increased by 20%.
5. Revised P/V Ratio when selling price increased by 20%.

13. From the following particulars, you are required to calculate:

(i) Profit volume ratio, (ii) Break-even point, (iii) Profit when sale is ₹2,00,000, (iv) Sales required to earn profit of ₹40,000 and (v) Margin of safety in the year 2nd year.

Year	Sales (₹)	Profit (₹)
I	2,40,000	18,000
II	2,80,000	26,000

14. E Ltd. manufactures and sells fourty piece of products A, B, C and D. The sales-mix in value comprises of $33\frac{1}{3}$%, $41\frac{2}{3}$%, $16\frac{2}{3}$% and $8\frac{1}{3}$% of products A, B, C and D respectively.

The total budgeted sales (100 per cent) are ₹ 60,000 per month. Operations costs are:

Variable costs:

Product A	60% of selling price
Product B	68% of selling price
Product C	80% of selling price
Product D	40% of selling price
Fixed cost	₹14,700 of selling price

Calculate the break-even point for the products on an over all basis. It is proposed to change the sales-mix as follows:

Product A	25%
Product B	40%
Product C	30%
Product D	5%

The total sales per month at ₹60,000. If this proposal is implemented, what will be the break-even point?

Key Terms

Marginal cost—Marginal cost is the aggregate of variable costs.

Marginal costing—Marginal costing is a technique which is concerned with the changes in costs and profits result from changes in volume of output.

Absorption Costing—Absorption costing is the total cost technique. It is the practice of charging all costs, both variable and fixed, to operations, processes or products.

Higher contribution—Higher contribution means more profit

Break-even Analysis—In CVP analysis, an attempt is made to measure variations of costs and profit with volume of production.

Break-even point- Break-even point may be as the point of sales volume at which total revenue equals total costs.

Angle of Incidence: Angle of Incidence is the angle between sales and total cost line. This angle is an indicator of profit earning capacity of the firm over the break-even point sales.

Break-even Analysis: Break-even Analysis is a method for examining the relationship between sales revenue, variable costs and fixed costs to determine the minimum value of production necessary to break-even.

Break-even Chart: Break-even Chart is the chart which shows the profitability or otherwise of a firm at various levels of activity. It indicates the point at which neither profit nor loss is made.

Contribution or Gross Margin: Contribution or Gross Margin is the difference between sales value and the variable cost. In other words, Contribution or Gross Margin is defined as the amount recovered towards fixed cost and profit.

Differential Cost: Differential Cost is the change in the costs which results from the adoption of an alternative course of action.

Margin of Safety: Margin of Safety is represented by excess sales over and above the break-even point sales.

Profit Volume Ratio (P/V Ratio) or Contribution Ratio: Profit Volume Ratio (P/V Ratio) or Contribution Ratio is the ratio of Contribution to Sales.

P/V Ratio = (Contribution/Sales) × 100 or

= [(Sales – Variable cost)/Sales] × 100 or

= (Change in Contribution/Change in Sales) × 100 or

= (Change in Profit/Change in Sales) × 100

Marginal cost plus prices are based on the marginal cost of production or the marginal cost of sales, plus a profit margin.

Desired Profit: It is a profit level desired by the fi rm to earn at the given level of sales volume.

Key Factor: Factor of influence on the component of contribution.