

**4 th. Sem. B. Com (H & G)**  
**COST ACCOUNTING – MARGINAL COSTING**

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**Learning Objectives**

- After reading this lesson, the reader should be able to: know the meaning of marginal cost.
- Understand the various elements of marginal costing technique.
- Appreciate the importance of marginal costing as a decision making tool.
- Realise the advantages and disadvantages of marginal costing.
- Apply marginal costing technique under appropriate situations.

Marginal costing is not a method of costing it is a special technique of costing where total cost is divided according to the behavior; i.e. fixed cost and variable cost accounting techniques are methods for presenting cost data to be used by the management for making decision. Marginal costing technique is one such technique which is used by the management for making short-term decision. It is a technique of ascertaining cost of goods produced or service rendered. It is an important tool used by modern management for analysis of data and presentation of information required for critical decision making. Under this technique total costs are classified into two groups, viz., fixed cost and variable cost or marginal cost. Only marginal cost is considered as product cost and the fixed cost is considered as period cost and it is charged in full against periodic consideration or written off to Costing Profit & Loss Account. Moreover, under this technique unsold finished goods and work-in-progress are valued at marginal cost. This technique is extensively by the management in C-V-P analysis.

**Marginal cost**

According to economic point of view, marginal cost means the cost incurred in a concerned for producing or reducing one additional unit of goods or service in compared to existing level of output. On the other hand according to cost accounting point of view, marginal cost means all

costs other than fixed cost. Thus, marginal cost is the summation of all variable costs obtained by adding prime cost and variable overhead.

The CIMA has defined marginal cost as "**the cost of one unit of product or service which would be avoided if that unit were not produced or provided.**" In this context one unit may be a single article, a batch of articles, an order, a process, an operation, a department or a standard measure of output of goods or service. Thus, the rate of change in total cost with respect to output is known as marginal cost.

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

### **1. Absorption Costing:**

This is the total cost technique under which total cost (variable cost and fixed cost) is charged as production cost. Under this method, the cost of the product is determined after considering the total cost i.e., both fixed and variable costs. In other words, in absorption costing, all production costs are “absorbed” in the cost of products produced. 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. Absorption costing is a traditional approach and it is also known as “total costing” or “full costing”.

### **Example**

ABC Ltd. supplies the following data:

	Rs.
Direct material cost	48,000
Direct wages	22,000
Fixed overhead:	
- Factory	20,000

- Administration and Selling	8,000
Variable overhead:	
- Factory	13,000
- Administration and Selling	2,000
Sales	1,25,000

Under absorption costing prepare an income statement.

### Solution

#### Statement of Income under Absorption Costing

	Rs.	Rs.
Direct materials		48,000
Direct wages		22,000
<b>Prime cost</b>		<b>70,000</b>
Factory overhead:		
- Variable	13,000	
- Fixed	20,000	33,000
<b>Cost of production</b>		<b>1,03,000</b>
Administration and Selling overhead:		
- Variable	2,000	
- Fixed	8,000	10,000
<b>Total cost (A)</b>		<b>1,13,000</b>
<b>Sales (B)</b>		<b>1,25,000</b>
<b>Profit (B - A)</b>		<b>12,000</b>

### 2. 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.

Marginal costing is a technique of decision making, which involves:

- (a) Ascertainment of total costs
- (b) Classification of costs into (i) Fixed and (ii) Variable
- (c) Use of such information for analysis and decision making.

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.

For example, costs of 100 units are Rs. 5000 and costs of 101 units are Rs. 5030 then marginal cost is Rs. 30.

Under marginal costing system profit calculation is done as below:

	Rs.
Sales	.....
Less: Variable cost	.....
	-----
Contribution	.....
Less: Fixed Cost	.....
	-----
Profit	.....
	=====

It can be expressed in the following equation:

$$\begin{aligned} \text{Marginal cost} &= \text{Variable Costs} = \text{Prime Cost} + \text{Variable Overhead} \\ &= \text{Direct Material Costs} + \text{Direct Labour Costs} + \text{chargeable Expenses} + \text{Variable Overheads.} \end{aligned}$$

### Example

ABC Ltd. supplies the following data:

	Rs.
Direct material cost	48,000
Direct wages	22,000
Fixed overhead:	
- Factory	20,000
- Administration and Selling	8,000
Variable overhead:	
- Factory	13,000
- Administration and Selling	2,000
Sales	1,25,000

Under absorption costing prepare an income statement.

### Solution

#### Statement of Income under Marginal Costing

	Rs.	Rs.
<b>Sales (A)</b>		<b>1,25,000</b>
Direct materials		48,000
Direct wages		22,000
Variable Overhead:		
- Factory	13,000	
- Administration and Selling	2,000	15,000
<b>Variable/Marginal cost (B)</b>		<b>85,000</b>
<b>Contribution (C) = (A - B)</b>		<b>40,000</b>
Fixed Overhead:	20,000	
- Factory	8,000	
- Administration and selling		

<b>Total Fixed Overhead (D)</b>		<b>28,000</b>
<b>Profit (C - D)</b>		<b>12,000</b>

### Distinction between Absorption Costing and Marginal Costing

The points of distinction between absorption costing and marginal costing are summarised as follows:

<b>Points</b>	<b>Absorption Costing</b>	<b>Marginal Costing</b>
Meaning	This is the total cost technique under which total cost (variable cost and fixed cost) is charged as production cost.	It is a process whereby costs are classified into fixed and variable and with such a division so many managerial decisions are taken.
Treatment of fixed and variable costs.	In absorption costing all costs both fixed and variable are charged to product. The fixed factory overhead is absorbed in units produced at actual basis or at a rate pre-determined on the basis of normal capacity utilisation.	In marginal costing, only variable costs are charged to products. Fixed costs are treated as period costs and charged to profit and loss account of the period.
Presentation of costs	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.
Focus	The emphasis is on profit (sales minus total cost).	The thrust is on contribution (sales minus variable cost). Increase in

		contribution means increase in profit.
Overheads Absorption	Since all overheads are absorbed to production, over recovery of overheads can be there.	On account of only variable overheads being absorbed to production, there' can be under recovery of overheads.
Treatment of Overheads	Over under-recovery of overheads can be transferred to Costing Profit & Loss Account.	Actual fixed overheads are wholly transferred to Costing Profit and Loss account.
Valuation of stock	In absorption costing, stocks are valued at total cost which includes both fixed and variable costs. Thus stock values in marginal costing are lower than that in absorption costing.	In marginal costing, stocks of work-in-progress and finished goods are valued at variable cost only.
Measurement of profitability	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.
Decision Making	Product Costing depends on total cost per unit.	Product costing considers only the variable costs, hence decision making is affected.

### Example

SD & Co. makes and sells a single product. At the beginning of year 2020, there is no opening stock of the product, for which the variable production cost is Rs. 4 and the sale price is Rs. 6 per unit. Fixed costs are Rs. 2,000 per period for which Rs. 1,500 are fixed production costs. The following information are available:

Year	2020	2021
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	Units	units
Opening Stock	nil	300
Production	1,500	1,500
Sales	1,200	1,800
Closing Stock	300	nil

What would be the profit in each product using

- (a) Absorption costing (assume normal output is 1,500 units per period); and  
(b) Marginal costing?

**Solution:**

**(a) Absorption Costing Method:**

The absorption rate for fixed production overhead is: Rs. 1500/1,500 units = Re 1 per unit.

Particulars	Product – I		Product – II		Total	
Sales @ Rs. 6 per unit		7,200		10,800		18,000
Variable cost @ Rs. 4 per unit	6,000		6,000		12,000	
Fixed cost @ Re. 1 per unit	1,500		1,500		3,000	
Total production cost	<u>7,500</u>		<u>7,500</u>		<u>15,000</u>	
Add: Opening Stock	--		1,500		1,500	
Less: Closing Stock (300 x Rs. 5)	<u>1,500</u>		<u>--</u>		<u>1,500</u>	
Cost of Goods Sold	500		500		1,000	
Other costs		6,500		9,500		16,000
Total/Cost of Sales		<u>700</u>		<u>1,300</u>		<u>2,000</u>
Profit		<u><u>        </u></u>		<u><u>        </u></u>		<u><u>        </u></u>

**(b) Marginal Costing Method:**

Particulars	Product – I	Product – II	Total
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Sales @ Rs. 6 per unit		7,200		10,800		18,000
Variable cost @ Rs. 4 per unit	6,000		6,000		12,000	
Add: Opening Stock	--		1,200		1,200	
	<u>6,000</u>		<u>7,200</u>		<u>13,200</u>	
Less: Closing Stock (300 x Rs. 4)	1,200		--		1,200	
	<u>4,800</u>		<u>7,200</u>		<u>12,000</u>	
Total Variable Cost of Sales		2,400		3,600		6,000
Contribution		2,000		2,000		4,000
Less: Fixed cost		400		1,600		2,000
Profit		<u>400</u>		<u>1,600</u>		<u>2,000</u>

### Various Elements of Marginal Costing

According to the institute of cost and management accountants (icma), london, marginal cost is 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'. Thus marginal cost is the added cost of an extra unit of output.

$$\begin{aligned} \text{Marginal Cost} &= \text{Direct Material} + \text{Direct Labour} + \text{Other Variable Costs} \\ &= \text{Total Cost} - \text{Fixed Cost.} \end{aligned}$$

### Contribution

Contribution of a product is the difference between sales and the marginal cost or variable cost of sales. It is also known as contribution margin or gross margin. It may be considered as some sort of fund from out of which all fixed costs are met. The difference between contribution and fixed cost represents either profit or loss, as the case may be. Contribution is calculated thus:

$$\begin{aligned} \text{Contribution} &= \text{Selling Price} - \text{Variable Cost} \\ &= \text{Fixed Cost} + \text{Profit or} - \text{Loss} \end{aligned}$$

From this, the following marginal cost equation is developed:

$$\text{Sales (S)} - \text{Variable cost (V)} = \text{Fixed cost (F)} + \text{Profit (P)}$$

It is clear from the above equation that profit arises only when contribution exceeds fixed costs. In other terms, the point of 'no profit no loss' will be at a level where contribution is equal to fixed costs.

The concept of contribution is extremely helpful in the study of break-even analysis and management decision-making.

### **Marginal cost equation**

The algebraic expression of contribution is known as marginal cost equation. It can be expressed thus:

$$S - V = F + P$$

$$S - V = C$$

$$C = F + P$$

And in case of Loss

$$C = F - L$$

Where: S = Sales

V = Variable Cost

C = Contribution

F = Fixed Cost

P = Profit

L = Loss

### **Example**

Calculate contribution in each of the following cases:

1. Variable cost Rs. 7,000 and sales Rs. Rs. 11,000.
2. Fixed cost Rs. 8,000 and profit Rs. 5,600.
3. Sales Rs. 12,000, Variable cost Rs. 7,000 and Fixed cost Rs. 4,000.

### **Solution**

1. Contribution = Sales – Variable cost  
= Rs. 11,000 – Rs. 7,000 = Rs. 4,000
2. Contribution = Fixed cost + Profit  
= Rs. 8,000 + Rs. 5,600 = Rs. 13,600
3. Contribution = Sales – Variable cost

$$= \text{Rs. } 12,000 - \text{Rs. } 7,000 = \text{Rs. } 5,000$$

$$\text{Profit} = \text{Sales} - \text{Variable cost} - \text{Fixed cost}$$

$$= \text{Rs. } 12,000 - \text{Rs. } 7,000 - \text{Rs. } 4,000 = \text{Rs. } 1,000$$

Alternatively,

$$\text{Contribution} = \text{Fixed cost} + \text{Profit}$$

$$= \text{Rs. } 4,000 + \text{Rs. } 1,000 = \text{Rs. } 5,000$$

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

The Profit-Volume Ratio (i.e. P/V Ratio) brings a relationship between the contribution and the sales of a product. It is also known as 'marginal-income ratio', 'contribution-sales ratio' or 'variable-profit ratio'. The profitability of business operations can be found out by calculating the P/V ratio. It shows the relationship between contribution and sales and is usually expressed in percentage. P/V ratio thus is the ratio of contribution to sales, and is calculated in the following ways:

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} = \frac{C}{S} = \frac{S-V}{S} = \frac{F+P}{S} = 1 - \frac{V}{S}$$

$$\text{P/V Ratio (in \%)} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{C}{S} \times 100 = \frac{S-V}{S} \times 100 = \frac{F+P}{S} \times 100 = \left(1 - \frac{V}{S}\right) \times 100$$

Where: S = Sales

V = Variable Cost

C = Contribution

F = Fixed Cost

P = Profit

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

The ratio can also be shown by comparing the change in contribution to change in sales, or change in profit to change in sales. Any increase in contribution, obviously, would mean increase in profit, as fixed expenses are assumed to be constant at all levels of production.

$$\text{P/V Ratio} = \frac{\text{Changes in Contribution}}{\text{Changes in Sales}} = \frac{\text{Changes in Profit or loss}}{\text{Changes in Sales}}$$

$$\text{P/V Ratio (in \%)} = \frac{\text{Changes in Contribution}}{\text{Changes in Sales}} \times 100 = \frac{\text{Changes in Profit or loss}}{\text{Changes in Sales}} \times 100$$

The importance of P/V ratio lies in its use for evaluating the profitability of alternative products, proposals or schemes. A higher ratio shows greater profitability. Management should, therefore, try to increase p/v ratio by widening the gap between the selling price and the variable costs. This can be achieved by increasing sale price, reducing variable costs or switching over to more profitable products.

Usually, Sales = Cost + Profit

i.e. it can also be written as Sales = Variable Cost + Fixed Cost + Profit

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 profitability of the products as well as the priorities for profitability of the products. In particular, it is useful in determination of profitability of the products. The concept of P/V ratio helps in ascertain the Break-Even Point (B.E.P.), Margin of Safety (M.O.S.), contribution and profit at any sales revenue, desired sales, etc. and the effect of changes in fixed cost, variable cost, volume of output, selling price, etc.

### Example

The following details are obtained from S & Co. For the year 2020:

	Rs.
Selling price per unit	20
Variable cost per unit	16
Fixed expenses	40,000

Compute P/V Ratio.

### Solution

Contribution per unit (C) = Selling price per unit (S) – Variable cost per unit (V) = S – V

Here, S = Rs. 20, V = Rs. 16 and Fixed cost (F) = Rs. 40,000

$$C = \text{Rs. } 20 - \text{Rs. } 16 = \text{Rs. } 4$$

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{C}{S} \times 100 = \frac{4}{20} \times 100 = 20\% = 0.20$$

Or,

$$\text{P/V Ratio} = \frac{S-V}{S} \times 100 = \frac{20-16}{20} \times 100 = \frac{4}{20} \times 100 = 20\% = 0.20$$

Or,

$$\text{P/V Ratio} = \left(1 - \frac{V}{S}\right) \times 100 = \left(1 - \frac{16}{20}\right) \times 100 = (1 - 0.80) \times 100 = 20\% = 0.20$$

### Example

The following details are obtained from S & Co. For the year 2020:

	Rs.
Sales	4,00,000
Profit	40,000
Fixed expenses	60,000

Compute P/V Ratio.

### Solution

Contribution (C) = Fixed Cost (F) + Profit (P) = F + P

Here, S = Rs. 4,00,000, P = Rs. 40,000 and Fixed cost (F) = Rs. 60,000

$$C = F + P = \text{Rs. } 60,000 + \text{Rs. } 40,000 = \text{Rs. } 1,00,000$$

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{F+P}{S} \times 100 = \frac{1,00,000}{4,00,000} \times 100 = 25\% = 0.25$$

### Example

S & Co. sold in two successive periods 7,000 units and 9,000 units of an article and has incurred a loss of Rs. 10,000 and earned Rs. 10,000 as profit respectively. The selling price per unit of article can be assumed at Rs. 100.

Compute (i) P/V Ratio and (ii) the amount of Fixed cost.

**Solution**

	Period I	Period II	
Changes	Rs.	Rs.	Rs.
Sales (@ Rs. 100 per unit)	7,00,000	9,00,000	
			2,00,000
Profit/ Loss	(-) 10,000	10,000	20,000

$$(i) \text{ P/V Ratio (in \%)} = \frac{\text{Changes in Profit or loss}}{\text{Changes in Sales}} \times 100 = \frac{20,000}{2,00,000} \times 100 = 10\% = 0.10$$

(ii) Fixed cost = Contribution (C) – Profit (or + Loss)

Contribution = P/V Ratio x Sales

Contribution for Period I (10% of Rs. 7,00,000) = Rs.70,000

Add: Loss in Period I = Rs. 10,000

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**Fixed cost = Rs. 80,000**

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**Break-Even-Point (B.E.P.) or Cost-Volume-Profit (C-V-P) Analysis**

The Break-Even Point (B.E.P.) is that point of output level of a business concern during a particular period at which total sales revenue is exactly equal to the total cost. The B.E.P. is also known as no-profit no-loss point. Break-Even analysis is a specific method of presenting and studying the inner relationship between costs, volume and profits alternatively known as Cost-Volume Profit (C-V-P) analysis). At B.E.P. level, the contribution is just sufficient to meet the total fixed cost. It is an important tool of financial analysis whereby the impact on profit of the

changes in volume, price, costs and mix can be found out with a certain amount of accuracy. At this point contribution is equal to fixed costs.

### **Assumptions of B.E.P. analysis**

The B.E.P. analysis is underlying on the following assumptions:

1. There will be no change in the general selling price of the product for every level or volume of sales.
2. Total fixed cost remains unchanged or constant and not changeable at any level of output.
3. Variable costs per unit remain unchanged and total variable cost varies in direct proportion to the volume of production.
4. Only variable costs will be considered as the cost of production of the product.
5. All costs can be separated into variable and fixed costs.
6. Costs and sales revenue depends only on volume or quantity of the product, but no any other factors.
7. Pricing policy will not change due to change in change in quantity of sales.
8. Productivity per worker does not change.
9. There is synchronisation between production and sales i.e. volume of production is equal to volume of sales.
10. There is only one product or in the case of multiple products, the sales mix does not change.

Break-Even-Point (B.E.P.) can be calculated in the following ways:

$$\begin{aligned} \text{B.E.P. (in units)} &= \frac{\text{Fixed Cost}}{\text{Contribution per Unit}} \\ &= \frac{\text{Fixed Cost}}{\text{Selling Price per Unit} - \text{Marginal Cost per Unit}} \end{aligned}$$

$$\text{B.E.P. (Sales)} = \frac{\text{Fixed Cost}}{\text{Contribution per Unit}} \times \text{Selling Price per unit}$$

$$= \frac{\text{Fixed Cost}}{\text{Total Contribution}} \times \text{Total Sales}$$

Or

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

Or

$$= \frac{\text{Fixed Cost}}{1 - \frac{\text{Variable Cost per Unit}}{\text{Selling Price per Unit}}}$$

Or

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

At break-even point the desired profit is zero. Where the volume of output or sales is to be calculated so as to earn a desired amount of profit, the amount of desired profits has to be added to the fixed cost given in the above formula.

$$\text{Units to Earn a Desired Profit} = \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{Contribution per Unit}}$$

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

### **Cash Break-Even Point**

It is the level of output or sales where the cash inflow will be equivalent to cash needed to meet immediate cash liabilities. To this end, fixed costs have to be divided into two parts (i) fixed cost which do not need immediate cash outlay (depreciation etc.) and (ii) fixed cost which need immediate cash outlay (rent etc.). Cash break-even point can be calculated thus:



$$\text{Cash Break-Even Point (B.E.P.) of output} = \frac{\text{Cash Fixed Cost}}{\text{Cash Contribution per Unit}}$$

### **Composite Break-Even Point**

Where a firm is dealing with several products, a composite breakeven point can be calculated using the following formula:

$$\text{Composite Break Even Point (Sales)} = \frac{\text{Cash Fixed Cost}}{\text{Composit P/V Ratio}}$$

Or

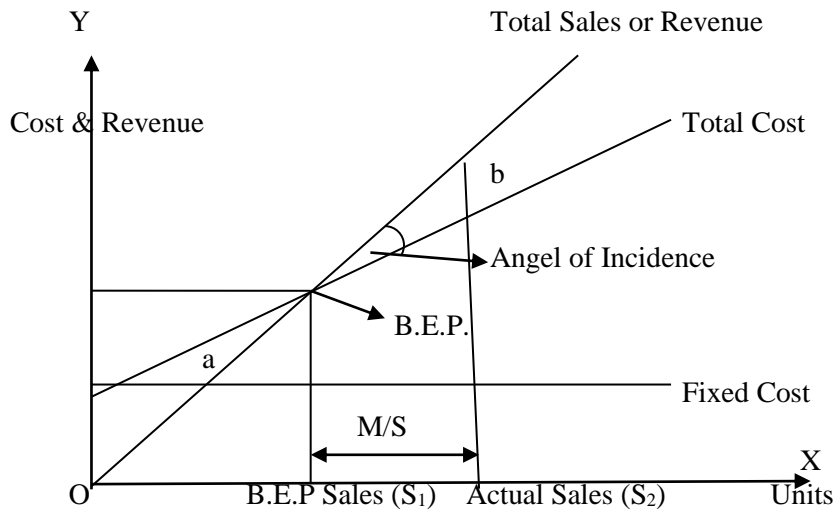
$$= \frac{\text{Total Fixed Cost} \times \text{Total Sales}}{\text{Total Contribution}}$$

Or

$$= \frac{\text{Total Contribution}}{\text{Total Sales}} \times 100$$

### **The formal Break-Even chart**

The Break-Even chart is a graphical presentation of the Break-Even Analysis, more explicitly the Cost-Volume-Profit Analysis. This chart takes its name from the fact that the point at which the total cost line and the sales or revenue line intersect is the break-even point. This chart not only shows the break-even point but also shows profit and loss at various levels of activity. This chart is an important device used in management accounting which shows the relationship among sales revenue, fixed cost, variable cost/ marginal cost, total cost and profit / loss at different levels of activities of the product. It is very important to the management because it provides ready-made information regarding marginal analysis and decision making at a glance.



Where, a = Losses region & b = Profits region

$$\text{Margin of Safety} = S_1 - S_2$$

In the Break-Even chart the number 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.

The Break-Even chart depicts the following information:

- a) The relationship between variable cost, fixed cost and total cost.
- b) Break-Even Point (B.E.P.) – the point at which neither profit nor loss is made (i.e. total sales = total cost, profit/ loss = nil).
- c) The amount of contribution at various levels of sales.
- d) The angle of incidence – it indicating the rate at which profit is being made.
- e) The profit or loss at different levels of output.
- f) The margin of safety (M/S) (i.e. excess of actual sales over the B,E.P. sales).

### Example

The following details are obtained from S & Co. for the year 2020:

Selling price per unit	Rs. 20
Variable cost per unit	Rs. 10
Fixed cost	Rs. 40,000
Production and sales	8,000 units

Compute (i) P/V Ratio, (ii) B.E.P. (in units) and (iii) B.E.P. (in sales value)

### Solution

Computation of Contribution and Profit (Unit produced = 8,000 units)

	Total (Rs.)	Per unit (Rs.)
Selling price (@ Rs. 20 per unit)	1,60,000	20.00
Less: Variable cost (@ Rs. 10 per unit)	80,000	10.00
	-----	-----
Contribution	80,000	10.00
Less: Fixed cost	40,000	5.00
	-----	-----
Profit	40,000	5.00
	=====	=====

$$(i) \text{ P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{\text{Rs. } 80,000}{\text{Rs. } 1,60,000} \times 100 = 50\% = 0.50$$

$$(ii) \text{ B.E.P. (in units)} = \frac{\text{Fixed Cost}}{\text{Contribution per Unit}} = \frac{\text{Rs. } 40,000}{\text{Rs. } 10} = 4,000 \text{ units}$$

$$\text{B.E.P. (in sales value)} = \frac{\text{Fixed Cost}}{\text{Contribution per Unit}} \times \text{Selling Price per unit} = \frac{\text{Rs. } 40,000}{\text{Rs. } 10} \times$$

Rs.20

$$= \text{Rs. } 80,000$$

Or

$$\text{B.E.P. (in sales value)} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{\text{Rs.40,000}}{0.50} = \text{Rs. 80,000}$$

### Margin of Safety (M/S)

Margin of Safety (M/S) may be defined as the difference actual sales and break-even sales. In other words, it is the amount by which actual volume of sales over the break-even sales. Lower break-even point means a higher margin of safety. Margin of safety can also be expressed in absolute money terms or as a percentage of total sales. The formula is:

$$\text{Margin of Safety (M/S)} = \text{Total Sales} - \text{Sales at B.E.P.}$$

Or

$$\text{M/S (in values)} = \frac{\text{Profit}}{\text{P/V Ratio}}$$

Or

$$\text{M/S (in units)} = \frac{\text{Profit}}{\text{Contribution per unit}}$$

Or

$$\text{M/S (as a \%)} = \frac{\text{M/S}}{\text{Total Sales}} \times 100$$

The Margin of Safety (M/S) is an indicator of strength of the business house. The size of M/S indicates soundness of business. Higher margin of safety shows that the business is sound and when sales substantially come down, (but not below break-even sales) profit might be earned by the business. Lower margin of safety, as pointed out earlier, means that when sales come down slightly profit position might be affected adversely. Thus, margin of safety can be used to test the soundness of a business. In order to improve the margin of safety a business can increase selling prices (without affecting demand, of course) reducing fixed or variable costs and replacing

unprofitable products with profitable one. The management of a business should maintain its present sales at a high M/S level.

### Example

The following details are obtained from S & Co. for the year 2020:

Selling price per unit	Rs. 20
Variable cost per unit	Rs. 10
Fixed cost	Rs. 40,000
Production and sales	8,000 units

Compute (i) P/V Ratio and (ii) Margin of Safety (M/S)

### Solution

Computation of Contribution and Profit (Unit produced = 8,000 units)

	Total (Rs.)	Per unit (Rs.)
Selling price (@ Rs. 20 per unit)	1,60,000	20.00
Less: Variable cost (@ Rs. 10 per unit)	80,000	10.00
	-----	-----
Contribution	80,000	10.00
Less: Fixed cost	40,000	5.00
	-----	-----
Profit	40,000	5.00
	=====	=====

$$(i) \text{ P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{\text{Rs. } 80,000}{\text{Rs. } 1,60,000} \times 100 = 50\% = 0.50$$

$$(ii) \text{ Margin of Safety (M/S)} = \text{Total Sales} - \text{Sales at B.E.P.}$$

Or

$$\text{M/S} = \frac{\text{Profit}}{\text{P/V Ratio}}$$

$$\text{B.E.P. (in sales value)} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{\text{Rs. } 40,000}{0.50} = \text{Rs. } 80,000$$

Here, Total sales = Rs.1,60,000 and Sales at B.E.P. = Rs. 80,000

Therefore, M/S = Rs, 1,60,000 – Rs. 80,000 = Rs. 80,000

Or

$$M/S = \frac{\text{Profit}}{\text{P/V Ratio}} = \frac{\text{Rs.40,000}}{0.50} = \text{Rs. 80,000}$$

Or

$$M/S \text{ (as a \%)} = \frac{\text{M/S}}{\text{Total Sales}} \times 100 = \frac{\text{Rs.80,000}}{\text{Rs.1,60,000}} \times 100 = 50\%$$

### Example

Compute Margin of Safety (M/S) in each of the following cases:

1. Actual sales – 40,000 units, B.E.P. - 25,000 units
2. B.E.P. – 40%, actual sales Rs. 40,000
3. B.E.P. – 75%
4. Contribution per unit Rs. 20, profit Rs. 15,000
5. P/V Ratio – 40%, profit Rs. 35,000

### Solution

1. Margin of Safety (M/S) = Actual sales – B.E.P. sales  
= 40,000 units – 25,000 units = 15,000 units
2. Margin of Safety (M/S) = Actual sales – B.E.P. sales  
= Rs. 40,000 – Rs. 40,000 x 40% = Rs. 40,000 – Rs. 16,000  
= Rs. 24,000
3. Margin of Safety (M/S) = 100 – B.E.P. =(100 – 75)% = 25%
4. Margin of Safety (M/S) =  $\frac{\text{Profit}}{\text{Contribution per unit}}$   
=  $\frac{\text{Rs.15,000}}{\text{Rs.20}}$  = 750 units
5. Margin of Safety (M/S) =  $\frac{\text{Rs.35,000}}{40\%}$  = Rs. 87,500

### **Angle of Incidence (AOI):**

Angle of Incidence (AOI) 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. The angle of incidence is of particular importance in boom periods when sales are expanding. AOI taken in conjunction with margin of safety, therefore, a large angle of incidence with a higher margin of safety indicates an extremely favourable position. On the other hand, if AOI is narrow, the rate of profit would be lower and then the profit earning capacity would be very low.

The angle of incidence (AOI) is an indicator of high P/V ratio; i.e. if once B.E.P. level is achieved, the business can be able to maintain high rate of contribution or profit from its increased trading activities. The AOI, in fact, would be large if the variable cost forms a small part of total cost and vice versa. Thus the AOI is widely used as an indicator of profitability, especially in marginal analysis and managerial decision making.

### **Need for Marginal Costing**

Let us see why marginal costing is required:

- Marginal costing helps to determine the optimum profit to be available through proper utilisation of available resources and capacity.
- Marginal costing provides a better guidance to the business house in fixation of price of the products not only in a normal situation but also in abnormal situations.
- Variable cost per unit remains constant; any increase or decrease in production changes the total cost of output.
- It also specifies the range of output within which the firm can earn profit and the range of output within which it would incur loss.
- Total fixed cost remains unchanged up to a certain level of production and does not vary with increase or decrease in production. It means the fixed cost remains constant in terms of total cost.
- Fixed expenses are excluded from the total cost in marginal costing technique and provide us the same cost per unit up to a certain level of production.

- It supplies information to the management so that they can take proper decisions and ensures proper utilisation of limiting factors.

### **Features of Marginal Costing**

Features of marginal costing are as follows:

- Costs are classified on the basis of fixed and variable costs only. Semi-fixed prices are also segregated into either as fixed cost or as variable cost.
- Under this technique of costing all items of fixed costs are treated as period cost. As they are affected by the volume of output. The fixed cost is charged to costing profit and loss account or against contribution.
- Marginal costing is used to know the impact of variable cost on the volume of production or output.
- Break-even analysis is an integral and important part of marginal costing.
- Contribution of each product or department is a foundation to know the profitability of the product or department.
- Addition of variable cost and profit to contribution is equal to selling price.
- Marginal costing is the base of valuation of stock of finished product and work in progress.
- Fixed cost is recovered from contribution and variable cost is charged to production.
- Marginal costing can indicate the profitability and acceptability of different alternatives available for decision making through analysis of contribution, P/V ratio, margin of safety, angle of incidence, etc.

### **Advantages of Marginal Costing**

The advantages of marginal costing are as follows:

- It is easy to operate and simple to understand.
- Marginal costing is useful in profit planning; it is helpful to determine profitability at different level of production and sale.
- It is useful in decision making about fixation of selling price, export decision and make or buy decision.



- Break even analysis and P/V ratio are useful techniques of marginal costing.
- Evaluation of different departments is possible through marginal costing.
- By avoiding arbitrary allocation of fixed cost, it provides control over variable cost.
- Fixed overhead recovery rate is easy.
- Under marginal costing, valuation of inventory is done at marginal cost. Therefore, it is not possible to carry forward illogical fixed overheads from one accounting period to the next period.
- Since fixed cost is not controllable in short period, it helps to concentrate in control over variable cost.

### **Disadvantages or Limitations of Marginal Costing**

In spite of a number of advantages of marginal costing it suffers certain disadvantages or limitations, which are as follows:

- The marginal cost analysis in M/St cases is very complicated and too difficult to understand by the ordinary businessman. As a result they avoid such analysis.
- Marginal cost assumes that all costs can be classified into fixed and variable but it is not so as there are costs which are either fixed or variable. For example, various amenities provided to workers may have no relation either to volume of production or time factor.
- In practice however, it may be difficult to segregate all costs into fixed and variable components. Certain costs e.g. amenities to employees, bonus to workers, etc. are caused purely by management decisions and cannot be strictly classified as fixed or variable.
- Contribution of a product itself is not a guide for optimum profitability unless it is linked with the key factor.
- Where price are fixed by competition, marginal costing gives the impression that so long as prices exceed variable cost, production is profitable. It ignores the danger of too much sales being made at variable cost or variable cost plus some contribution as it may result in overall losses.

### **Ascertainment of Profit under Marginal Cost**

‘Contribution’ is a fund that is equal to the selling price of a product less marginal cost.

Contribution may be described as follows:

Contribution = Selling Price – Marginal Cost

Contribution = Fixed Expenses + Profit

Contribution – Fixed Expenses = Profit

**Example:**

Marginal cost is the change in the total cost when the quantity produced is incremented by one.

That is, it is the cost of producing one more unit of a good. For example, let us suppose:

Variable cost per unit	= Rs 25
Fixed cost	= Rs 1,00,000
Cost of 10,000 units	= 25 × 10,000 = Rs 2,50,000
Total Cost of 10,000 units	= Fixed Cost + Variable Cost
	= 1,00,000 + 2,50,000
	= Rs 3,50,000
Total cost of 10,001 units	= 1,00,000 + 2,50,025
	= Rs 3,50,025
Marginal Cost	= 3,50,025 – 3,50,000
	= Rs 25

**Income Statement under Marginal Costing**

Income Statement

For the year ended 31-03-2014

Particulars	Amount	Total
	Rs,	Rs.
Sales		25,00,000
Less: Variable Cost:		
Cost of goods manufactured	12,00,000	
Variable Selling Expenses	3,00,000	
Variable Administration Expenses	50,000	

	-----	15,50,000
		-----
Contribution		9,50,000
Less: Fixed Cost:		
Fixed Administration Expenses	70,000	
Fixed Selling Expenses	1,30,000	
	-----	
		2,00,000
		-----
<b>Profit</b>		<b>7,50,000</b>
		=====

### Illustration

A factory budget for a production of 1,50,000 units. The variable cost per unit is Rs. 14 and fixed cost is Rs. 2 per unit. The company fixes its selling price to fetch a profit of 15% on cost.

- (a) What is the Break Even Point (B.E.P.)?
- (b) What is the Profit Volume (P/V) ratio?
- (c) If it reduces its selling price by 5% how does the revised selling price affect the BEP and the profit volume ratio?
- (d) If a profit increase of 10% is desired more than the budget what should be the sale at the reduced prices?

### Solution:

(Rs.)

Variable cost = 14

Fixed cost = 2  
 Total cost = 16  
 (+) Profit @ 15% = 2.4  
 Selling price = 18.40

Particulars	Rs.
Selling price	18.40
Variable cost	14.00
Contribution	4.40
Total contribution (1,50,000 x 4.4)	6,60,000
Fixed cost (1,50,000 x 2)	3,00,000
Profit	3,60,000

(a)  $BEP = 3,00,000 / 4.4 = 68,182$  units

(b)  $P/V \text{ ratio} = (4.4 / 18.4) \times 100 = 23.91\%$

(c) Affect the BEP and the P/V ratio if it reduces its selling price by 5%

Particulars	Rs.
Selling price (18.4 x 95%)	17.48
Variable cost	14.00
Contribution	3.48
P/V ratio (3.48 / 17.48) x 100	19.908%

Breakeven point = 3,00,000 / 3.48	86,207 (units)
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(d) Desired profit = 3,60,000 x (110/100) = Rs. 3,96,000

Sales required = (3,00,000 + 3,96,000) / 3.48 x 17.48

= Rs. 34,96,000