

# **FINANCING DECISIONS- LEVERAGES**

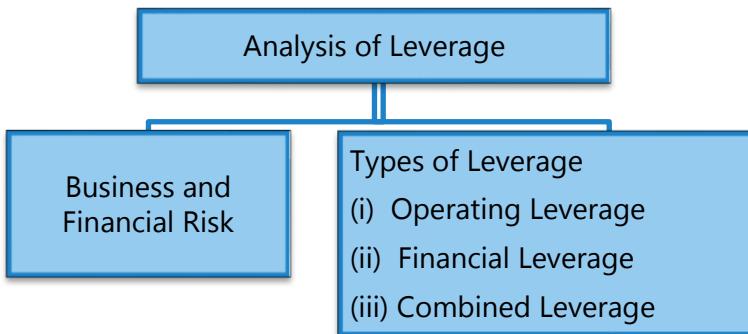


## **LEARNING OUTCOMES**

**After studying this chapter, you would be able to -**

- ◆ Understand the concept of business risk and financial risk.
- ◆ Discuss and interpret the types of leverages.
- ◆ Discuss the relationship between operating leverage, Break - even analysis & Margin of Safety.
- ◆ Discuss positive and negative Leverage.
- ◆ Discuss Financial leverage as 'Trading on equity'.
- ◆ Discuss Financial Leverage as 'Double Edged Sword'.

## CHAPTER OVERVIEW



## 1. INTRODUCTION

Objective of financial management is to **maximize wealth**. Here, wealth means market value. Value is directly related to performance of company and inversely related to expectation of investors. In turn, expectation of investor is dependent on risk of the company. Therefore, to maximize value, company should try to manage its risk. This risk may be business risk, financial risk or both as defined below:

**Business Risk:** It refers to the risk associated with the firm's operations. It is the uncertainty about the future operating income (EBIT) i.e., how well can the operating income be predicted?

**Financial Risk:** It refers to the additional risk placed on the firm's shareholders because of use of debt i.e., the additional risk, a shareholder bears when a company uses debt in addition to equity financing. Companies that issue more debt instruments would have higher financial risk than companies financed mostly or entirely by equity.

In this chapter we will discuss factors that influence business and financial risks.



## 2. MEANING AND TYPES OF LEVERAGE

### 2.1 Meaning of Leverage

The term leverage represents **influence or power**. In financial analysis, leverage represents the influence of one financial variable over some other related financial variable. These financial variables may be costs, output, sales revenue, Earnings Before Interest and Tax (EBIT), Earning Per Share (EPS) etc.

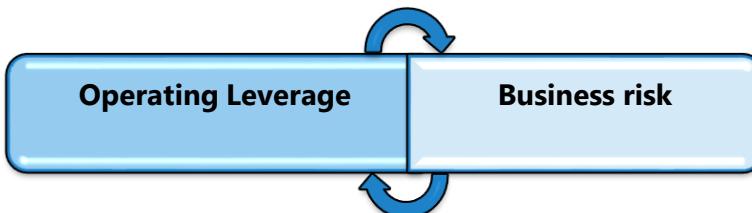
Generally, if we want to calculate the impact of change in variable X on variable Y, it is termed as Leverage of Y with X, and it is calculated as follows:

$$\text{Measurement of Leverage} = \frac{\text{Change in } Y \div Y}{\text{Change in } X \div X}$$

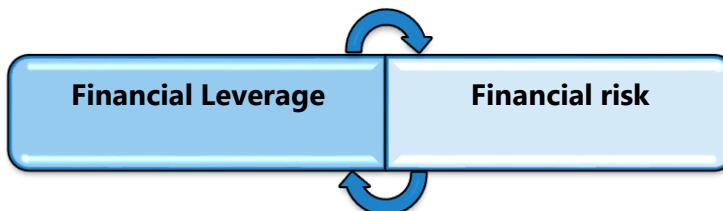
### 2.2 Types of Leverage

There are three commonly used measures of leverage in financial analysis. These are:

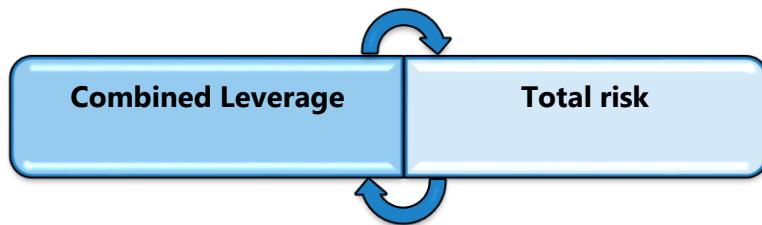
- (i) **Operating Leverage:** It is the relationship between Sales and EBIT and indicates **business risk**.



- (ii) **Financial Leverage:** It is the relationship between EBIT and EPS and indicates **financial risk**.



- (iii) **Combined Leverage:** It is the relationship between Sales and EPS and indicates **total risk** i.e., both business risk and financial risk.



### 2.3 Chart Showing Degree of Operating Leverage, Financial Leverage and Combined leverage

Profitability Statement			
Sales	xxx		
Less: Variable Cost	(xxx)		
Contribution	xxx		Degree of Operating Leverage
Less: Fixed Cost	(xxx)		
Operating Profit/ EBIT	xxx		
Less: Interest	(xxx)		
Earnings Before Tax (EBT)	xxx		Degree of Combined Leverage
Less: Tax	(xxx)		
Profit After Tax (PAT)	xxx		Degree of Financial Leverage
Less: Pref. Dividend (if any)	(xxx)		
Net Earnings available to equity shareholders/ PAT	xxx		
No. Equity shares (N)	xxx		
Earnings per Share (EPS) (PAT ÷ N)	xxx		



### 3. OPERATING LEVERAGE

Operating Leverage (OL) means tendency of operating income (EBIT) to change disproportionately with change in sale volume. This disproportionate change is caused by operating fixed cost, which does not change with change in sales volume.

In other words, Operating Leverage maybe defined **as the employment of an asset with a fixed cost** so that enough revenue can be generated to cover all the fixed and variable costs.

The use of assets for which a company pays a fixed cost is called operating leverage.

Operating leverage is a function of three factors:

- (i) Amount of fixed cost,
- (ii) Variable contribution margin, and
- (iii) Volume of sales.

### 3.1 Degree of Operating Leverage (DOL)

When we measure magnitude of disproportionate change, it is termed as degree of leverage. **Degree of Operating Leverage (DOL)** may be defined as percentage change in EBIT with respect to percentage change in sales quantity.

$$\text{Degree of Operating Leverage (DOL)} = \frac{\text{Percentage Change in EBIT}}{\text{Percentage Change in Sales}}$$

Mathematically:

$$DOL = \frac{\Delta EBIT}{EBIT} / \frac{\Delta Q}{Q}$$

Here,

$$\text{EBIT} = Q(S - V) - F$$

$Q$  = Sales quantity

$S$  = Selling price per unit

$V$  = Variable cost per unit

$\Delta$  Denotes change

$$\text{DOL} = \frac{\Delta [Q(S-V)-F] / [Q(S-V)-F]}{\Delta Q / Q}$$

Now  $\Delta F$  is nil because change in fixed cost is nil. Therefore:

$$\text{DOL} = \frac{\Delta Q(S-V)}{Q(S-V)-F} / \frac{\Delta Q}{Q} = \frac{\Delta Q(S-V)}{Q(S-V)-F} \times \frac{Q}{\Delta Q} = \frac{Q(S-V)}{Q(S-V)-F}$$

$$\text{DOL} = \frac{\text{Contribution}}{\text{Contribution} - \text{Fixed Cost}} = \frac{\text{Contribution}}{\text{EBIT}}$$

### 3.2 Break-Even Analysis and Operating Leverage

Break-even analysis is generally used to study the Cost Volume Profit analysis. It is concerned with computing the break-even point. At break-even point (BEP) of production level and sales, there will be no profit and loss i.e. total cost is equal to total sales revenue.

$$\text{Break-even point in units} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}}$$

Let us understand through the following example:

**Example - 1:**

Particulars	Product X	Product Y
	(₹)	(₹)
Selling Price p.u.	40	20
Variable Cost p.u.	20	12
Contribution p.u.	20	8
Total Contribution of 1,000 units	20,000	8,000
Fixed Cost	15,000	5,000
Profit (EBIT)	5,000	3,000
Break-even point (Fixed Cost / Contribution)	$\frac{15,000}{20} = 750 \text{ units}$	$\frac{5,000}{8} = 625 \text{ units}$
Operating Leverage $\left( \frac{\text{Contribution}}{\text{EBIT}} \right)$	$\frac{20,000}{5,000} = 4$	$\frac{8,000}{3,000} = 2.67$

There is a relationship between leverage and Break-even point. Both are used for profit planning.

In brief, the relationship between leverage, break-even point and fixed cost is as under:

Leverage	Break-even point
1. Firm with high leverage	1. Higher Break-even point
2. Firm with low leverage	2. Lower Break-even point
Fixed cost	Operating Leverage
1. High fixed cost	1. High degree of operating leverage
2. Lower fixed cost	2. Lower degree of operating leverage

### 3.3 Margin of Safety (MOS) and Operating Leverage (OL)

In cost accounting, margin of safety (MOS) may be calculated as follows:

$$MOS = \frac{\text{Sales} - \text{BEP Sales}}{\text{Sales}} \times 100$$

Higher margin of safety indicates lower business risk and higher profit and vice versa. MOS is inversely related to OL.

If we both multiply and divide above formula with profit volume (PV) ratio then:

$$MOS = \frac{\text{Sales} - \text{BEP Sales}}{\text{Sales}} \times \frac{\text{PV Ratio}}{\text{PV Ratio}} = \frac{(\text{Sales} \times \text{PV Ratio}) - (\text{BEP} \times \text{PV Ratio})}{\text{Sales} \times \text{PV Ratio}}$$

We know that:

$$\text{PV ratio} = \frac{\text{Contribution}}{\text{Sales}} \quad \text{or} \quad \text{Sales} \times \text{PV ratio} = \text{Contribution}$$

And,

$$\text{BEP} = \frac{\text{Fixed Cost}}{\text{PV ratio}} \quad \text{or} \quad \text{BEP} \times \text{PV ratio} = \text{Fixed Cost}$$

So,

$$MOS = \frac{\text{Contribution} - \text{Fixed Cost}}{\text{Contribution}} = \frac{\text{EBIT}}{\text{Contribution}}$$

Further,

$$DOL = \frac{\text{Contribution}}{\text{EBIT}}$$

hence:

$$\text{Degree of Operating leverage} = \frac{1}{\text{Margin of Safety}}$$

Let us understand this through the following example:

**Example – 2:**

Particulars	Product X (₹)
Sales (50 x 1000 units)	50,000
Variable Cost (30 x 1000 units)	30,000
Contribution	20,000
Fixed Cost	15,000
Profit (EBIT)	5,000
Break- even Sales (Fixed Cost / PV ratio)	15,000/0.40 = 37,500
Margin of Safety = (50,000-37,500)/50,000	0.25
Operating Leverage = Contribution/EBIT = 20,000/5,000	4
Operating Leverage = 1/MOS = 1/0.25	4

If Margin of safety	Business Risk	DOL (1/MOS)
Rises	Falls	Falls
Falls	Rises	Rises

When DOL is more than one (1), operating leverage exists. More is the DOL, higher is operating leverage.

A positive DOL/ OL means that the firm is operating at higher level than the break- even level and both sales and EBIT moves in the same direction. In case of negative DOL/ OL, firm operates at lower than the break-even sales and EBIT is negative.

**Situation 1: No Fixed Cost**

Particulars	20,000 units	30,000 units
	(₹)	(₹)
Sales @ ₹ 10	2,00,000	3,00,000
Variable cost @ ₹ 5	1,00,000	1,50,000
EBIT	1,00,000	1,50,000

$$\text{Degree of Operative leverage (DOL)} = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in Sales}} = \frac{50\%}{50\%} = 1$$

**Situation 2:** Positive Leverage

Particulars	20,000 units	30,000 units
	(₹)	(₹)
Sales @ ₹ 10	2,00,000	3,00,000
Variable Cost @ ₹ 5	1,00,000	1,50,000
Contribution	1,00,000	1,50,000
Fixed Cost	50,000	50,000
EBIT	50,000	1,00,000

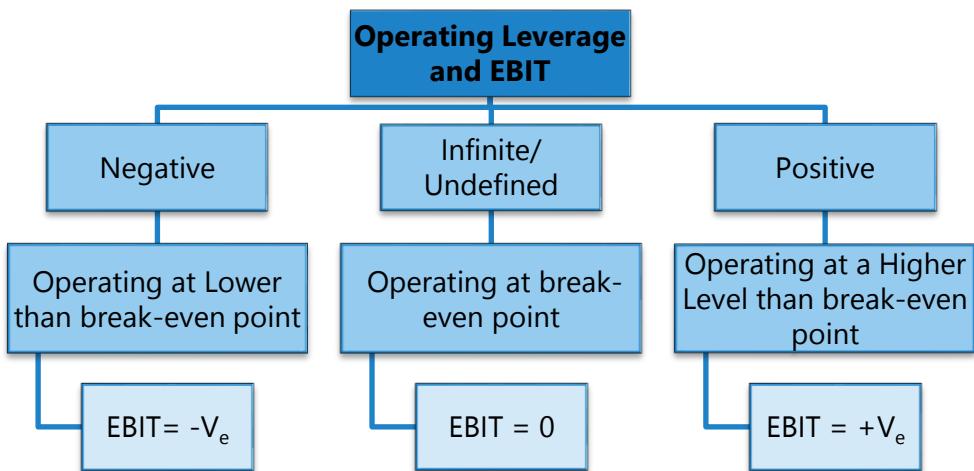
$$\text{Degree of Operative leverage (DOL)} = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}} = \frac{100\%}{50\%} = 2$$

**Situation 3:** When EBIT is Nil (Contribution = Fixed cost)

$$\text{Degree of Operating Leverage (DOL)} = \frac{\text{Contribution}}{0} = \text{Undefined}$$

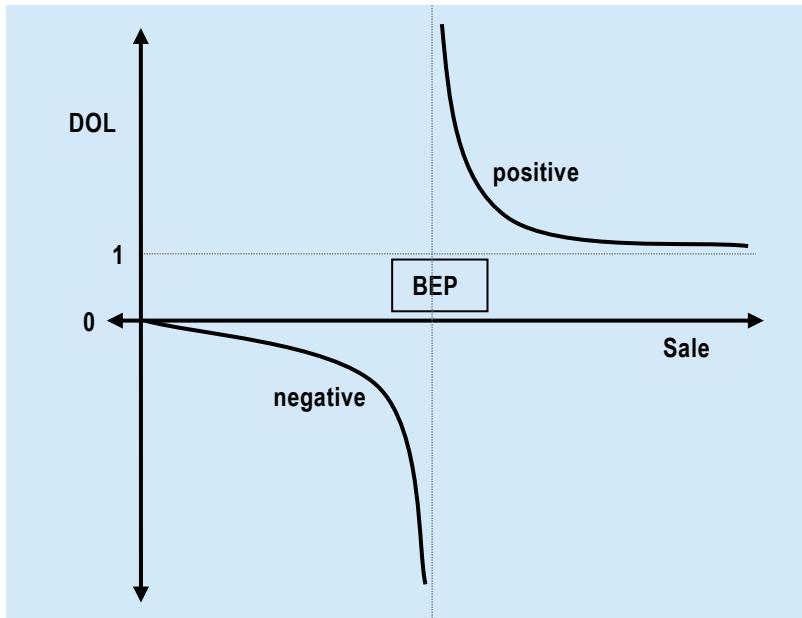
**Analysis and Interpretation of operating leverage**

S. No.	Situation	Result
1	No Fixed Cost	No operating leverage
2.	Higher Fixed cost	Higher Break-even point
3.	Higher than Break-even level	Positive operating leverage
4.	Lower than Break-even level	Negative operating leverage



### Positive and Negative Operating Leverage

**Note:** DOL can never be between zero and one. It can be zero or less or it can be one or more.



When Sales is much higher than BEP sales, DOL will be slightly more than one. With decrease in sales, DOL will increase. At BEP, DOL will be infinite. When sales is slightly less than BEP, DOL will be negative infinite. With further reduction in sale, DOL will move towards zero. At zero sales, DOL will also be zero.

**ILLUSTRATION 1**

A Company produces and sells 10,000 shirts. The selling price per shirt is ₹ 500. Variable cost is ₹ 200 per shirt and fixed operating cost is ₹ 25,00,000.

- (a) CALCULATE operating leverage.
- (b) If sales are up by 10%, then COMPUTE the impact on EBIT?

**SOLUTION**

- (a)** Statement of Profitability

	₹
Sales Revenue ( $10,000 \times 500$ )	50,00,000
Less: Variable Cost ( $10,000 \times 200$ )	20,00,000
Contribution	30,00,000
Less: Fixed Cost	25,00,000
EBIT	5,00,000

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{₹ } 30 \text{ lakhs}}{\text{₹ } 5 \text{ lakhs}} = 6 \text{ times}$$

**(b)** Operating Leverage (OL) =  $\frac{\% \text{Change in EBIT}}{\% \text{Change in Sales}}$

$$6 = \frac{X / 5,00,000}{5,00,000 / 50,00,000}$$

$$X = ₹ 3,00,000$$

$$\therefore \Delta \text{EBIT} = ₹ 3,00,000 / ₹ 5,00,000 = 60\%$$

**ILLUSTRATION 2**

CALCULATE the operating leverage for each of the four firms A, B, C and D from the following price and cost data:

	<b>Firms</b>			
	<b>A (₹)</b>	<b>B (₹)</b>	<b>C (₹)</b>	<b>D (₹)</b>
Sale price per unit	20	32	50	70
Variable cost per unit	6	16	20	50
Fixed operating cost	60,000	40,000	1,00,000	Nil

What calculations can you draw with respect to levels of fixed cost and the degree of operating leverage result? EXPLAIN. Assume number of units sold is 5,000.

### SOLUTION

	<b>Firms</b>			
	<b>A (₹)</b>	<b>B (₹)</b>	<b>C (₹)</b>	<b>D (₹)</b>
Sales (units)	5,000	5,000	5,000	5,000
Sales revenue (Units × sale price per unit)	1,00,000	1,60,000	2,50,000	3,50,000
Less: Variable cost (Units × variable cost per unit)	(30,000)	(80,000)	(1,00,000)	(2,50,000)
Less: Fixed operating costs	(60,000)	(40,000)	(1,00,000)	Nil
EBIT	10,000	40,000	50,000	1,00,000

$$DOL = \frac{\text{Current sales (S) - Variable costs (VC)}}{\text{Current EBIT}}$$

$$DOL_{(A)} = \frac{\text{₹ } 1,00,000 - \text{₹ } 30,000}{\text{₹ } 10,000} = 7$$

$$DOL_{(B)} = \frac{\text{₹ } 1,60,000 - \text{₹ } 80,000}{\text{₹ } 40,000} = 2$$

$$DOL_{(C)} = \frac{\text{₹ } 2,50,000 - \text{₹ } 1,00,000}{\text{₹ } 50,000} = 3$$

$$DOL_{(D)} = \frac{\text{₹ } 3,50,000 - \text{₹ } 2,50,000}{\text{₹ } 1,00,000} = 1$$

The operating leverage exists only when there are fixed costs. In the case of firm D, there is no magnified effect on the EBIT due to change in sales. A 20 per cent increase in sales has resulted in a 20 per cent increase in EBIT. In the case of other firms, operating leverage exists. It is maximum in firm A, followed by firm C and minimum in firm B. The interpretation of DOL of 7 is that 1 per cent change in sales results in 7 per cent change in EBIT level in the direction of the change of sales level of firm A.



## 4. FINANCIAL LEVERAGE

Financial leverage (FL) maybe defined as '**the use of funds with a fixed cost in order to increase earnings per share**'. In other words, it is the use of company funds on which it pays a limited return. Financial leverage involves the use of funds obtained at a fixed cost in the hope of increasing the return to common stockholders.

$$\text{Financial Leverage (FL)} = \frac{\text{Earnings before interest and tax (EBIT)}}{\text{Earnings before tax (EBT)}}$$

Where,       $\text{EBIT} = \text{Sales} - (\text{Variable cost} + \text{Fixed cost})$

$\text{EBT} = \text{EBIT} - \text{Interest}$

### 4.1 Degree of Financial Leverage (DFL)

Degree of financial leverage is the ratio of the percentage increase in Earnings Per Share (EPS) to the percentage increase in Earnings Before Interest and Taxes (EBIT). Financial Leverage (FL) is also defined as "**the ability of a firm to use fixed financial charges to magnify the effect of changes in EBIT on EPS**

Degree of Financial Leverage (DFL)

$$= \frac{\text{Percentage change in earnings per share (EPS)}}{\text{Percentage change in earnings before interest and tax (EBIT)}}$$

$$\text{DFL} = \frac{\Delta \text{EPS}}{\text{EPS}} / \frac{\Delta \text{EBIT}}{\text{EBIT}}$$

$\Delta \text{EPS}$  means change in EPS and  $\Delta \text{EBIT}$  means change in EBIT.

Now,  $\text{EPS} = [(\text{EBIT} - I)(1-t)] - D/\text{No. of Shares}$

Here,

$T$  = Tax Rate

$D$  = Dividend on Preference Shares (inclusive of dividend tax if any)

On simplifying the above we get,

$$\text{DFL} = \frac{\text{EBIT}(1-t)}{(\text{EBIT}-\text{Int.})(1-t) - D_p}$$

$$\text{DFL} = \frac{\text{EBIT}}{(\text{EBIT}-\text{Int.}) - \frac{D_p}{1-t}}$$

If the company has not issued preference shares, then:

$$\text{DFL} = \frac{\text{EBIT}}{\text{EBIT}-\text{Int.}} = \frac{\text{EBIT}}{\text{PBT}}$$

When DFL is more than one (1), financial leverage exists. More is DFL, higher is financial leverage.

A positive DFL/ FL means firm is operating at a level higher than break-even point and EBIT and EPS moves in the same direction. Negative DFL/ FL indicates the firm is operating at lower than break-even point and EPS is negative.

Let us understand through the following analysis:

#### Situation 1: No Fixed Interest charges

Particulars	X	Y
	(₹)	(₹)
EBIT	1,00,000	1,50,000
Tax @ 50%	50,000	75,000
PAT	50,000	75,000
No. of shares	10,000	10,000
EPS	5	7.5

$$\text{Degree of Finance Leverage (DFL)} = \frac{\text{Change in EP}}{\text{Change in EBIT}} = \frac{50\%}{50\%} = 1$$

**Situation 2:** Positive Financial Leverage

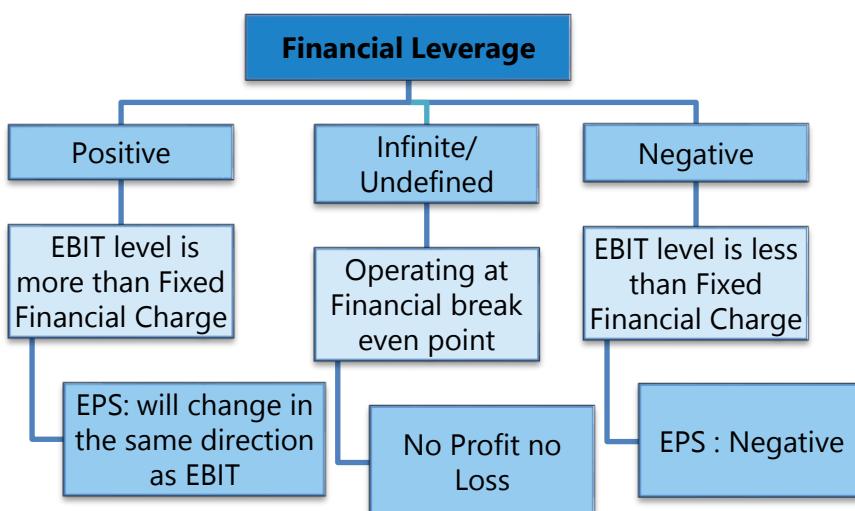
Particulars	X (₹)	Y (₹)
EBIT	1,00,000	1,50,000
Interest	20,000	20,000
EBT	80,000	1,30,000
Tax @ 50%	40,000	65,000
PAT	40,000	65,000
No of Shares	10,000	10,000
EPS	4	6.5

$$\text{Degree of Finance Leverage (DFL)} = \frac{\text{Change in EPS}^*}{\text{Change in EBIT}} = \frac{62.5\%}{50\%} = 1.25$$

$$^*\text{Change in EPS} = \frac{\left(\frac{2.5}{4} \times 100\right)}{50\%} = 62.5\%$$

**Situation 3.** When EBT is nil (EBIT = Fixed Interest)

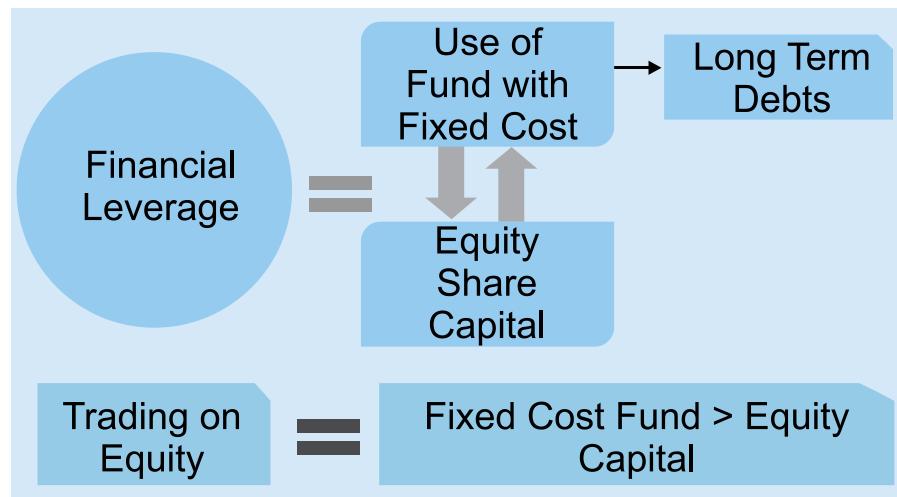
$$\text{Degree of Finance Leverage (DFL)} = \frac{\text{EBIT}}{\text{Nil}} = \text{Undefined}$$

**Positive and Negative Financial Leverage**

### Analysis and Interpretation of Financial leverage

Sl. No.	Situation	Result
1	No Fixed Financial Cost	No Financial leverage
2.	Higher Fixed Financial cost	Higher Financial Leverage
3.	When EBIT is higher than Financial Break-even point	Positive Financial leverage
4.	When EBIT is less than Finance Break-even point	Negative Financial leverage

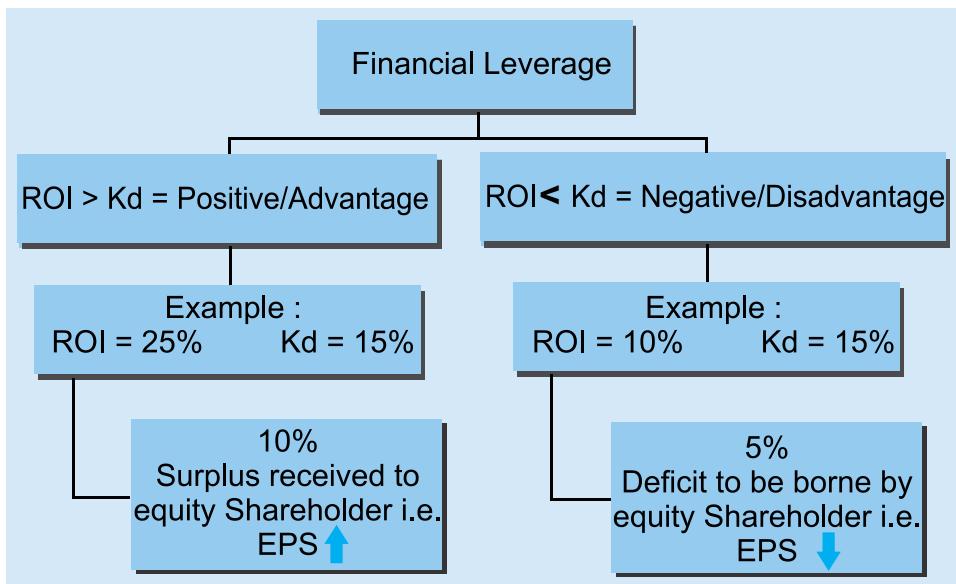
### 4.2 Financial Leverage as 'Trading on Equity'



Financial leverage indicates the use of funds with fixed cost like long term debts and preference share capital along with equity share capital which is known as trading on equity. The basic aim of financial leverage is to increase the earnings available to equity shareholders using fixed cost fund.

A firm is known to have a positive/favourable leverage when its earnings are more than the cost of debt. If earnings are equal to or less than cost of debt, it will be an negative/unfavourable leverage. When the quantity of fixed cost fund is relatively high in comparison to equity capital it is said that the firm is "**trading on equity**".

### 4.3 Financial Leverage as a 'Double edged Sword'



When the cost of 'fixed cost fund' is less than the return on investment, financial leverage will help to increase return on equity and EPS. The firm will also benefit from the saving of tax on interest on debts etc. However, when cost of debt will be more than the return it will affect return of equity and EPS unfavourably and as a result firm can be under financial distress. Therefore, financial leverage is also known as "**double edged sword**".

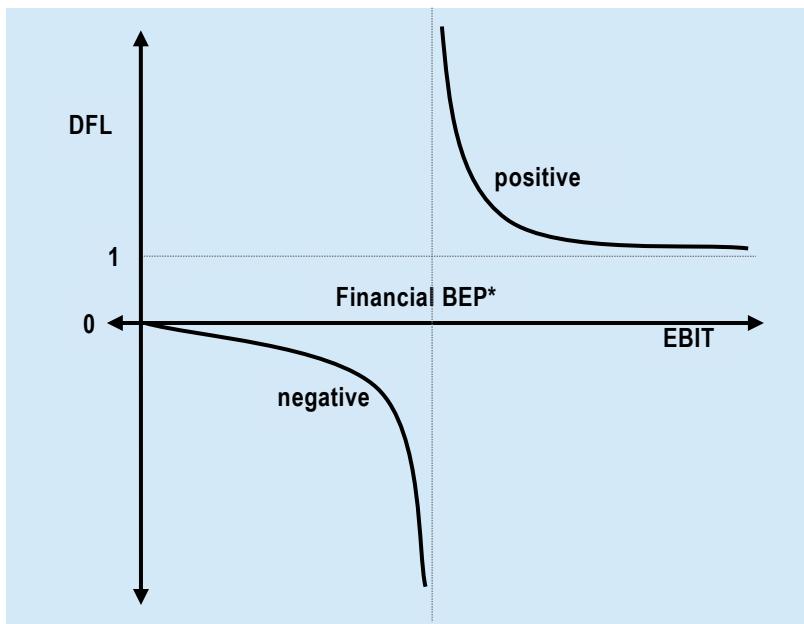
**Effect on EPS and ROE:**

When,  $\text{ROI} > \text{Interest}$  – Favourable – Advantage

When,  $\text{ROI} < \text{Interest}$  – Unfavourable – Disadvantage

When,  $\text{ROI} = \text{Interest}$  – Neutral – Neither advantage nor disadvantage

**Note:** DFL can never be between zero and one. It can be zero or less or it can be one or more.



\*Financial BEP is the level of EBIT at which earning per share is zero. If a company has not issued preference shares, then Financial BEP is simply equal to amount of Interest.

When EBIT is much higher than Financial BEP, DFL will be slightly more than one. With decrease in EBIT, DFL will increase. At Financial BEP, DFL will be infinite. When EBIT is slightly less than Financial BEP, DFL will be negative infinite. With further reduction in EBIT, DFL will move towards zero. At zero EBIT, DFL will also be zero.



## 5. COMBINED LEVERAGE

Combined leverage may be defined as the potential use of fixed costs, both operating and financial, **which magnifies the effect of sales volume change on the earning per share of the firm.**

$$\text{Combined Leverage (CL)} = \text{Operating Leverage (OL)} \times \text{Financial Leverage (FL)}$$

$$= \frac{C}{EBIT} \times \frac{EBIT}{EBT}$$

$$= \frac{C}{EBT}$$

## 5.1 Degree of Combined Leverage (DCL)

Degree of combined leverage (DCL) is the ratio of percentage change in earning per share to the percentage change in sales. **It indicates the effect the changes in sales will have on EPS.**

$$\begin{aligned}
 DCL &= DOL \times DFL \\
 &= \frac{\% \text{Change in EBIT}}{\% \text{Change in Sales}} \times \frac{\% \text{Change in EPS}}{\% \text{Change in EBIT}} \\
 &= \frac{\% \text{Change in EPS}}{\% \text{Change in Sales}}
 \end{aligned}$$

Like operating leverage and financial leverage, combined leverage can also be positive and negative combined leverage.

## 5.2 Analysis of Combined Leverage

Combined leverage measures total risk. It depends on combination of operating and financial risk.

DOL	DFL	Comments
Low	Low	Lower total risk. Cannot take advantage of trading on equity.
High	High	Higher total risk. Very risky combination.
High	Low	Moderate total risk. Not a good combination. Lower EBIT due to higher DOL and lower advantage of trading on equity due to low DFL.
Low	High	Moderate total risk. <b>Best combination.</b> Higher financial risk is balanced by lower total business risk.

**ILLUSTRATION 3**

A firm's details are as under:

*Sales (@100 per unit)*      ₹ 24,00,000

*Variable Cost*                  50%

*Fixed Cost*                    ₹ 10,00,000

*It has borrowed ₹ 10,00,000 @ 10% p.a. and its equity share capital is ₹ 10,00,000 (₹ 100 each).*

*Consider tax @ 50 %.*

**CALCULATE:**

- (a) *Operating Leverage*
- (b) *Financial Leverage*
- (c) *Combined Leverage*
- (d) *Return on Investment*
- (e) *If the sales increases by ₹ 6,00,000; what will the new EBIT?*

**SOLUTION**

	(₹)
Sales	24,00,000
<i>Less: Variable cost</i>	12,00,000
Contribution	12,00,000
<i>Less: Fixed cost</i>	10,00,000
EBIT	2,00,000
<i>Less: Interest</i>	1,00,000
EBT	1,00,000
<i>Less: Tax (50%)</i>	50,000
EAT	50,000
No. of equity shares	10,000
EPS	5

(a) Operating Leverage =  $\frac{\text{₹}12,00,000}{\text{₹}2,00,000} = 6$  times

(b) Financial Leverage =  $\frac{\text{₹}2,00,000}{\text{₹}1,00,000} = 2$  times

(c) Combined Leverage = OL × FL = 6 × 2 = 12 times.

(d) ROI =  $\frac{\text{₹}50,000}{\text{₹}10,00,000} \times 100 = 5\%$

Here ROI is calculated as ROE i.e.  $\frac{\text{EAT-Pref.Dividend}}{\text{Equity shareholders'fund}}$

(e) Operating Leverage = 6

$$6 = \frac{\Delta \text{EBIT}}{0.25}$$

$$\Delta \text{EBIT} = \frac{6 \times 1}{4} = 1.5$$

Increase in EBIT = ₹ 2,00,000 × 1.5

$$= ₹ 3,00,000$$

$$\text{New EBIT} = ₹ 5,00,000$$

#### ILLUSTRATION 4

The following information is related to Yizi Company Ltd. for the current Financial Year:

Equity share capital (of ₹ 10 each)	₹ 50 lakhs
12% Bonds of ₹ 1,000 each	₹ 37 lakhs
Sales	₹ 84 lakhs
Fixed cost (excluding interest)	₹ 6.96 lakhs
Financial leverage	1.49
Profit-volume Ratio	27.55%
Income Tax Applicable	40%

You are required to CALCULATE:

- (i) Operating Leverage;
- (ii) Combined leverage; and
- (iii) Earnings per share.

Show calculations up-to two decimal points.

### SOLUTION

#### Computation of Profits after Tax (PAT)

Particulars	(₹)
Sales	84,00,000
Contribution (Sales × P/V ratio)	23,14,200
Less: Fixed cost (excluding Interest)	(6,96,000)
EBIT (Earnings before interest and tax)	16,18,200
Less: Interest on debentures (12% × ₹37 lakhs)	(4,44,000)
Less: Other fixed Interest (balancing figure)	(88,160)*
EBT (Earnings before tax)	10,86,040
Less: Tax @ 40%	4,34,416
PAT (Profit after tax)	6,51,624

#### (i) Operating Leverage:

$$= \frac{\text{Contribution}}{\text{EBIT}} = \frac{₹ 23,14,200}{₹ 16,18,200} = 1.43$$

#### (ii) Combined Leverage:

$$\begin{aligned} &= \text{Operating Leverage} \times \text{Financial Leverage} \\ &= 1.43 \times 1.49 = 2.13 \end{aligned}$$

Or,

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBT}} = \frac{₹ 23,14,200}{₹ 10,86,040} = 2.13$$

$$\text{*Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{\text{₹ } 16,18,200}{\text{EBT}} = 1.49$$

$$\text{So, EBT} = \frac{\text{₹ } 16,18,200}{1.49} = \text{₹ } 10,86,040$$

Accordingly, other fixed interest = ₹ 16,18,200 - ₹ 10,86,040 - ₹ 4,44,000  
= ₹ 88,160

### (iii) Earnings per share (EPS):

$$= \frac{\text{PAT}}{\text{No. of shares outstanding}} = \frac{\text{₹ } 6,51,624}{5,00,000 \text{ equity shares}} = \text{₹ } 1.30$$

### ILLUSTRATION 5

Following are the selected financial information of A Ltd. and B Ltd. for the current Financial Year:

	A Ltd.	B Ltd.
Variable Cost Ratio	60%	50%
Interest	₹ 20,000	₹ 1,00,000
Operating Leverage	5	2
Financial Leverage	3	2
Tax Rate	30%	30%

You are required to FIND out:

- (i) EBIT
- (ii) Sales
- (iii) Fixed Cost
- (iv) Identify the company which is better placed with reasons based on leverages.

**SOLUTION****Company A**

$$\begin{aligned}
 \text{(i) Financial Leverage} &= \frac{\text{EBIT}}{\text{EBT i.e EBIT} - \text{Interest}} \\
 \text{So, } 3 &= \frac{\text{EBIT}}{\text{EBIT} - ₹ 20,000} \\
 \text{Or, } 3 (\text{EBIT} - 20,000) &= \text{EBIT} \\
 \text{Or, } 2 \text{ EBIT} &= 60,000 \\
 \text{Or, } \text{EBIT} &= 30,000 \\
 \text{(ii) Operating Leverage} &= \frac{\text{Contribution}}{\text{EBIT}} \quad \text{Or, } 5 = \frac{\text{Contribution}}{₹ 30,000} \\
 \text{Or, Contribution} &= ₹ 1,50,000 \\
 \text{Sales} &= \frac{\text{contribution}}{\text{P/V Ratio}(1 - \text{variable cost ratio})} = \frac{₹ 1,50,000}{40\%} = ₹ 3,75,000 \\
 \text{(iii) Fixed Cost} &= \text{Contribution} - \text{EBIT} \\
 &= ₹ 1,50,000 - 30,000 \\
 \text{Or, Fixed cost} &= ₹ 1,20,000
 \end{aligned}$$

**Company B**

$$\begin{aligned}
 \text{(i) Financial Leverage} &= \frac{\text{EBIT}}{\text{EBT i.e EBIT} - \text{Interest}} \\
 \text{So, } 2 &= \frac{\text{EBIT}}{\text{EBIT} - ₹ 1,00,000} \\
 \text{Or, } 2 (\text{EBIT} - ₹ 1,00,000) &= \text{EBIT} \\
 \text{Or, } 2 \text{ EBIT} - ₹ 2,00,000 &= \text{EBIT} \\
 \text{Or, } \text{EBIT} &= ₹ 2,00,000 \\
 \text{(ii) Operating Leverage} &= \frac{\text{Contribution}}{\text{EBIT}} \\
 \text{Or, } 2 &= \frac{\text{Contribution}}{₹ 2,00,000}
 \end{aligned}$$

Or, Contribution = ₹ 4,00,000

$$\text{Sales} = \frac{\text{Contribution}}{\text{P/V Ratio (1 - variable cost ratio)}} = \frac{₹ 4,00,000}{50\%} = ₹ 8,00,000$$

$$\begin{aligned} \text{(iii) Fixed Cost} &= \text{Contribution} - \text{EBIT} \\ &= ₹ 4,00,000 - ₹ 2,00,000 \end{aligned}$$

$$\text{Or, Fixed cost} = ₹ 2,00,000$$

### Income Statements of Company A and Company B

	<b>Company A ₹)</b>	<b>Company B ₹)</b>
Sales	3,75,000	8,00,000
Less: Variable cost	2,25,000	4,00,000
Contribution	1,50,000	4,00,000
Less: Fixed Cost	1,20,000	2,00,000
Earnings before interest and tax (EBIT)	30,000	2,00,000
Less: Interest	20,000	1,00,000
Earnings before tax (EBT)	10,000	1,00,000
Less: Tax @ 30%	3,000	30,000
Earnings after tax (EAT)	7,000	70,000

### Comment based on Leverage

Comment based on leverage – Company B is better than company A of the following reasons:

- Capacity of Company B to meet interest liability is better than that of companies A (from EBIT/Interest ratio)

$$[A = \frac{₹30,000}{₹20,000} = 1.5, B = \frac{₹2,00,000}{₹1,00,000} = 2]$$

- Company B has the least financial risk as the total risk (business and financial) of company B is lower (combined leverage of Company A – 15 and Company B- 4)

## SUMMARY

DOL	DFL	DCL
Shows level of business risk.	Shows level of financial risk.	Shows level of total or combined risk.
It is dependent upon fixed cost.	It is dependent upon interest and preference dividend	It is dependent upon fixed cost, interest & preference dividend.
Measures % change in EBIT which results from a 1% change in Sales.	Measures % change in EPS which results from a 1% change in EBIT.	Measures % change in EPS which results from a 1% change in Sales.
For example, if DOL is 3 and there is 8% increase in output then EBIT will increase by 24% & if there is a 8% decrease in output then EBIT will decrease by 24%.	For example, if DFL is 2 and there is 5% increase in EBIT then EPS will increase by 10% and if there is a 5% decrease in EBIT then EPS will decrease by 10%.	For example, if DCL is 6 and there is a 8% increase in sales then EPS will increase by 48% and if there is a 8% decrease in sales then EPS will decrease by 48%.
There is a unique DOL for each level of output.	There is a unique DFL for each level of EBIT.	There is a unique DCL for each level of sales.
It is undefined at Operating B.E.P.	It is undefined at Financial B.E.P.	It is undefined at Financial B.E.P.

## TEST YOUR KNOWLEDGE

### Multiple Choice Questions (MCQs)

1. Given

Operating fixed costs	₹ 20,000
Sales	₹ 1,00,000
P/V ratio	40%

The operating leverage is:

- (a) 2.00
  - (b) 2.50
  - (c) 2.67
  - (d) 2.47
2. If EBIT is ₹ 15,00,000, interest is ₹ 2,50,000, corporate tax is 40%, degree of financial leverage is;
- (a) 1.11
  - (b) 1.20
  - (c) 1.31
  - (d) 1.41
3. If DOL is 1.24 and DFL is 1.99, DCL would be:
- (a) 2.14
  - (b) 2.18
  - (c) 2.31
  - (d) 2.47
4. Operating Leverage is calculated as:
- (a) Contribution ÷ EBIT
  - (b) EBIT ÷ PBT
  - (c) EBIT ÷ Interest
  - (d) EBIT ÷ Tax
5. Financial Leverage is calculated as:
- (a) EBIT ÷ Contribution
  - (b) EBIT ÷ PBT
  - (c) EBIT ÷ Sales
  - (d) EBIT ÷ Variables Cost

6. Which of the following is correct?

- (a)  $CL = OL + FL$
- (b)  $CL = OL - FL$
- (c)  $CL = OL \times FL$
- (d)  $OL = OL \div FL$

7. Which of the following indicates business risk?

- (a) Operating leverage
- (b) Financial leverage
- (c) Combined leverage
- (d) Total leverage

8. Degree of combined leverage is the fraction of:

- (a) Percentage change in EBIT on Percentage change in Sales.
- (b) Percentage change in EPS on Percentage change in Sales.
- (c) Percentage change in Sales on Percentage change in EPS.
- (d) Percentage change in EPS on Percentage change in EBIT.

9. From the following information, calculate combined leverage:

Sales	₹ 20,00,000
Variable Cost	40%
Fixed Cost	₹ 10,00,000
Borrowings	₹ 10,00,000 @ 8% p.a.

- (a) 10 times
- (b) 6 times
- (c) 1.667 times
- (d) 0.10 times

10. *Operating leverage is a function of which of the following factors?*
  - (a) *Amount of variable cost.*
  - (b) *Variable contribution margin.*
  - (c) *Volume of purchases.*
  - (d) *Amount of semi-variable cost.*
11. *Financial leverage may be defined as:*
  - (a) *Use of funds with a product cost in order to increase earnings per share.*
  - (b) *Use of funds with a contribution cost in order to increase earnings before interest and taxes.*
  - (c) *Use of funds with a fixed cost in order to increase earnings per share.*
  - (d) *Use of funds with a fixed cost in order to increase earnings before interest and taxes.*
12. *If Margin of Safety is 0.25 and there is 8% increase in output, then EBIT will be:*
  - (a) *Decrease by 2%*
  - (b) *Increase by 32%*
  - (c) *Increase by 2%*
  - (d) *Decrease by 32%*
13. *If degree of financial leverage is 3 and there is 15% increase in Earning per share (EPS), then EBIT will be:*
  - (a) *Decrease by 15%*
  - (b) *Increase by 45%*
  - (c) *Decrease by 45%*
  - (d) *Increase by 5%*

14. When *EBIT* is much higher than *Financial break-even point*, then degree of financial leverage will be slightly:
  - (a) Less than 1
  - (b) Equals to 1
  - (c) More than 1
  - (d) Equals to 0
15. Firm with high operating leverage will have:
  - (a) Higher breakeven point
  - (b) Lower business risk
  - (c) Higher margin of safety
  - (d) All of above
16. When sales are at breakeven point, the degree of operating leverage will be:
  - (a) Zero
  - (b) Infinite
  - (c) One
  - (d) None of above
17. If degree of combined leverage is 3 and margin of safety is 0.50, then degree of financial leverage is:
  - (a) 6.00
  - (b) 3.00
  - (c) 0.50
  - (d) 1.50

## Theoretical Questions

1. DIFFERENTIATE between Business risk and Financial risk.
2. "Operating risk is associated with cost structure, whereas financial risk is associated with capital structure of a business concern." Critically EXAMINE this statement.
3. EXPLAIN the concept of "Double edged sword" in Financial leverage analysis.

## Practical Problems

1. From the following information extracted from the books of accounts of Imax Ltd., CALCULATE percentage change in earnings per share, if sales increase by 10% and Fixed Operating cost is ₹ 1,57,500.

<b>Particulars</b>	<b>(₹)</b>
EBIT (Earnings before Interest and Tax)	31,50,000
Earnings before Tax (EBT)	14,00,000

2. Consider the following information for Mega Ltd.:

<i>Production level</i>	2,500 units
<i>Contribution per unit</i>	₹ 150
<i>Operating leverage</i>	6
<i>Combined leverage</i>	24
<i>Tax rate</i>	30%

*Required:*

*COMPUTE its earnings after tax.*

3. From the following information, prepare Income Statement of Company A & B:

<b>Particulars</b>	<b>Company A</b>	<b>Company B</b>
<i>Margin of safety</i>	0.20	0.25
<i>Interest</i>	₹ 3,000	₹ 2,000
<i>Profit volume ratio</i>	25%	33.33%
<i>Financial Leverage</i>	4	3
<i>Tax rate</i>	45%	45%

4. The capital structure of PS Ltd. at the end of the current Financial Year consisted as follows:

<b>Particulars</b>	<b>(₹)</b>
Equity share capital (face value ₹ 100 each)	10,00,000
10% debentures (₹ 100 each)	10,00,000

During the year, sales decreased to 1,00,000 units as compared to 1,20,000 units in the previous year. However, the selling price stood at ₹ 12 per unit and variable cost at ₹ 8 per unit for both the years. The fixed expenses were at ₹ 2,00,000 p.a. and the income tax rate is 30%.

You are required to CALCULATE the following:

- (i) The degree of financial leverage at 1,20,000 units and 1,00,000 units.
- (ii) The degree of operating leverage at 1,20,000 units and 1,00,000 units.
- (iii) The percentage change in EPS.

5. The Sale revenue of TM excellence Ltd. @ ₹ 20 Per unit of output is ₹ 20 lakhs and Contribution is ₹ 10 lakhs. At the present level of output, the DOL of the company is 2.5. The company does not have any Preference Shares. The number of Equity Shares are 1 lakh. Applicable corporate Income Tax rate is 50% and the rate of interest on Debt Capital is 16% p.a. CALCULATE the EPS (at sales revenue of ₹ 20 lakhs) and amount of Debt Capital of the company if a 25% decline in Sales will wipe out EPS.
6. Betatronics Ltd. has the following balance sheet and income statement information:

**Balance Sheet**

<b>Liabilities</b>	<b>(₹)</b>	<b>Assets</b>	<b>(₹)</b>
Equity capital (₹ 10 per share)	8,00,000	Net fixed assets	10,00,000
10% Debt	6,00,000	Current assets	9,00,000
Retained earnings	3,50,000		
Current liabilities	1,50,000		
	19,00,000		19,00,000

***Income Statement for the year***

<b>Particulars</b>	<b>(₹)</b>
Sales	3,40,000
Operating expenses (including ₹ 60,000 depreciation)	1,20,000
EBIT	2,20,000
Less: Interest	60,000
Earnings before tax	1,60,000
Less: Taxes	56,000
<b>Net Earnings (EAT)</b>	<b>1,04,000</b>

- (a) DETERMINE the degree of operating, financial and combined leverages at the current sales level, if all operating expenses, other than depreciation, are variable costs.
- (b) If total assets remain at the same level, but sales (i) increase by 20 percent and (ii) decrease by 20 percent, COMPUTE the earnings per share at the new sales level?
7. A company had the following Balance Sheet at the end of the current Financial Year:

<b>Liabilities</b>	<b>(₹ in crores)</b>	<b>Assets</b>	<b>(₹ in crores)</b>
Equity Share Capital (50 lakhs shares of ₹ 10 each)	5	Fixed Assets (Net)	12.5
Reserves and Surplus	1	Current Assets	7.5
15% Debentures	10		
Current Liabilities	4		
	20		20

The additional information given is as under:

<i>Fixed cost per annum (excluding interest)</i>	₹ 4 crores
<i>Variable operating cost ratio</i>	65%
<i>Total assets turnover ratio</i>	2.5
<i>Income Tax rate</i>	30%

Required :

CALCULATE the following and comment:

- (i) Earnings Per Share
- (ii) Operating Leverage
- (iii) Financial Leverage
- (iv) Combined Leverage

8. CALCULATE the operating leverage, financial leverage and combined leverage from the following data under Situation I and II and Financial Plan A and B :

<i>Installed Capacity</i>	4,000 units
<i>Actual Production and Sales</i>	75% of the Capacity
<i>Selling Price</i>	₹ 30 Per Unit
<i>Variable Cost</i>	₹ 15 Per Unit

Fixed Cost:

<i>Under Situation-I</i>	₹ 15,000
<i>Under Situation-II</i>	₹ 20,000

Capital Structure:

	<b>Financial Plan</b>	
	<b>A (₹)</b>	<b>B (₹)</b>
<i>Equity</i>	10,000	15,000
<i>Debt (Rate of Interest at 20%)</i>	10,000	5,000
	20,000	20,000

9. The following particulars relating to Navya Ltd. for the year ended 31<sup>st</sup> March is given:

<i>Output</i>	1,00,000 units at normal capacity
<i>Selling price per unit</i>	₹ 40
<i>Variable cost per unit</i>	₹ 20
<i>Fixed cost</i>	₹ 10,00,000

The capital structure of the company as on 31<sup>st</sup> March is as follows:

<b>Particulars</b>	<b>₹</b>
<i>Equity share capital (1,00,000 shares of ₹ 10 each)</i>	10,00,000
<i>Reserves and surplus</i>	5,00,000
<i>7% debentures</i>	10,00,000
<i>Current liabilities</i>	5,00,000
<b>Total</b>	<b>30,00,000</b>

Navya Ltd. has decided to undertake an expansion project to use the market potential, that will involve ₹ 10 lakhs. The company expects an increase in output by 50%. Fixed cost will be increased by ₹ 5,00,000 and variable cost per unit will be decreased by 10%. The additional output can be sold at the existing selling price without any adverse impact on the market.

The following alternative schemes for financing the proposed expansion programme are planned:

- (i) Entirely by equity shares of ₹ 10 each at par.
- (ii) ₹ 5 lakh by issue of equity shares of ₹ 10 each and the balance by issue of 6% debentures of ₹ 100 each at par.
- (iii) Entirely by 6% debentures of ₹ 100 each at par.

FIND out which of the above-mentioned alternatives would you recommend for Navya Ltd. with reference to the risk and return involved, assuming a corporate tax of 40%.

10. The following details of a company for the year ended 31<sup>st</sup> March are given below:

<i>Operating leverage</i>	2:1
<i>Combined leverage</i>	2.5:1
<i>Fixed Cost excluding interest</i>	₹ 3.4 lakhs
<i>Sales</i>	₹ 50 lakhs
<i>8% Debentures of ₹ 100 each</i>	₹ 30.25 lakhs
<i>Equity Share Capital of ₹ 10 each</i>	34 lakhs
<i>Income Tax Rate</i>	30%

**CALCULATE:**

- (i) *Financial Leverage*
- (ii) *P/V ratio and Earning per Share (EPS)*
- (iii) *If the company belongs to an industry, whose assets turnover is 1.5, does it have a high or low assets turnover?*
- (iv) *At what level of sales, the Earning before Tax (EBT) of the company will be equal to zero?*

11. You are given the following information of 5 firms of the same industry:

<b>Name of the Firm</b>	<b>Change in Revenue</b>	<b>Change in Operating Income</b>	<b>Change in Earning per share</b>
M	28%	26%	32%
N	27%	34%	26%
P	25%	38%	23%
Q	23%	43%	27%
R	25%	40%	28%

You are required to CALCULATE for all firms:

- (i) *Degree of operating leverage and*
- (ii) *Degree of combined leverage.*

12. The following data have been extracted from the books of LM Ltd:

*Sales - ₹ 100 lakhs*

*Interest Payable per annum - ₹ 10 lakhs*

*Operating leverage - 1.2*

*Combined leverage - 2.16*

*You are required to calculate:*

(i) *The financial leverage,*

(ii) *Fixed cost and*

(iii) *P/V ratio*

## ANSWERS\SOLUTION

### Answers to the MCQs

1.	(a)	2.	(b)	3.	(d)	4.	(a)	5.	(b)	6.	(c)
7.	(a)	8.	(b)	9.	(a)	10.	(b)	11.	(c)	12.	(b)
13.	(d)	14.	(c)	15.	(a)	16.	(b)	17.	(d)		

### Answers to the Theoretical Questions

1. Please refer paragraph 1
2. Please refer paragraph 1
3. Please refer paragraph 4.3

### Answers to the Practical Problems

#### 1. Operating Leverage (OL)

$$= \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{EBIT} + \text{Fixed Cost}}{\text{EBIT}} = \frac{\text{₹ }31,50,000 + \text{₹ }1,57,500}{\text{₹ }31,50,000} = 1.05$$

#### Financial Leverage (FL)

$$= \frac{\text{EBIT}}{\text{EBT}} = \frac{\text{₹ }31,50,000}{\text{₹ }14,00,000} = 2.25$$

**Combined Leverage (CL)**

$$= 1.05 \times 2.25 = 2.3625$$

**Percentage Change in Earnings per share**

$$DCL = \frac{\% \text{ change in EPS}}{\% \text{ change in Sales}} = 2.3625 = \frac{\% \text{ change in EPS}}{10\%}$$

$$\therefore \% \text{ change in EPS} = 23.625\%$$

Hence, if sales increases by 10%, EPS will be increased by 23.625%.

**2. Workings:**

$$\begin{aligned} 1. \quad \text{Operating Leverage} &= \frac{\text{Contribution}}{\text{EBIT}} \\ &= \frac{\text{₹ } 150 \times 2,500}{\text{EBIT}} = \frac{\text{₹ } 3,75,000}{\text{EBIT}} = 6 \\ \therefore \text{EBIT} &= \frac{\text{₹ } 3,75,000}{6} = \text{₹ } 62,500 \end{aligned}$$

$$2. \quad \text{Operating Leverage (OL)} \times \text{Financial Leverage (FL)} = \text{Combined Leverage (CL)}$$

$$6 \times \text{Financial Leverage} = 24$$

$$\therefore \text{Financial Leverage} = 4$$

$$\text{Also, Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = 4$$

$$\therefore \text{EBT} = \frac{\text{EBIT}}{4} = \frac{\text{₹ } 62,500}{4} = \text{₹ } 15,625$$

**Computation of Earnings after tax**

$$\text{Earnings after Tax (EAT)} = \text{EBT} (1 - t)$$

$$= \text{₹ } 15,625 (1 - 0.30) = \text{₹ } 15,625 \times 0.70$$

$$\therefore \text{Earnings after Tax (EAT)} = \text{₹ } 10,938$$

3.

**Income Statement**

<b>Particulars</b>	<b>Company A (₹)</b>	<b>Company B (₹)</b>
Sales	80,000	36,000
Less: Variable Cost	60,000	24,000
Contribution	20,000	12,000
Less: Fixed Cost	16,000	9,000
EBIT	4,000	3,000
Less: Interest	3,000	2,000
EBT	1,000	1,000
Tax (45%)	450	450
EAT	550	550

**Workings:****(i) Company A**

$$\begin{aligned}
 \text{Financial Leverage} &= \text{EBIT}/(\text{EBIT} - \text{Interest}) \\
 4 &= \text{EBIT}/(\text{EBIT} - ₹ 3,000) \\
 4\text{EBIT} - ₹ 12,000 &= \text{EBIT} \\
 3\text{EBIT} &= ₹ 12,000 \\
 \text{EBIT} &= ₹ 4,000
 \end{aligned}$$

**Company B**

$$\begin{aligned}
 \text{Financial Leverage} &= \text{EBIT}/(\text{EBIT} - \text{Interest}) \\
 3 &= \text{EBIT}/(\text{EBIT} - ₹ 2,000) \\
 3\text{EBIT} - ₹ 6,000 &= \text{EBIT} \\
 2\text{EBIT} &= ₹ 6,000 \\
 \text{EBIT} &= ₹ 3,000
 \end{aligned}$$

**(ii) Company A**

$$\begin{aligned}
 \text{Operating Leverage} &= 1/\text{Margin of Safety} \\
 &= 1/0.20 = 5
 \end{aligned}$$

Operating Leverage	= Contribution/EBIT
5	= Contribution/₹ 4,000
Contribution	= ₹ 20,000

**Company B**

Operating Leverage	= 1/Margin of Safety
= 1/0.25	= 4
Operating Leverage	= Contribution/EBIT
4	= Contribution/₹ 3,000
Contribution	= ₹ 12,000

**(iii) Company A**

Profit Volume Ratio	= 25%(Given)
Profit Volume Ratio	= Contribution/Sales × 100
25%	= ₹ 20,000/Sales
Sales	= ₹ 20,000/25%
Sales	= ₹ 80,000

**Company B**

Profit Volume Ratio	= 33.33%
Therefore, Sales	= ₹ 12,000/33.33%
Sales	= ₹ 36,000

**4. Income Statement with required calculations**

Particulars	(₹)	(₹)
Sales in units	1,20,000	1,00,000
Sales Value	14,40,000	12,00,000
Variable Cost	(9,60,000)	(8,00,000)
Contribution	4,80,000	4,00,000
Fixed expenses	(2,00,000)	(2,00,000)
EBIT	2,80,000	2,00,000

Debenture Interest	(1,00,000)	(1,00,000)
EBT	1,80,000	1,00,000
Tax @ 30%	(54,000)	(30,000)
Profit after tax (PAT)	1,26,000	70,000
No. of shares	10,000	10,000
(i) Financial Leverage $= \frac{\text{EBIT}}{\text{EBT}}$	$\frac{\text{₹ } 2,80,000}{\text{₹ } 1,80,000} = 1.56$	$\frac{\text{₹ } 2,00,000}{\text{₹ } 1,00,000} = 2$
(ii) Operating leverage $= \frac{\text{Contribution}}{\text{EBIT}}$	$\frac{\text{₹ } 4,80,000}{\text{₹ } 2,80,000} = 1.71$	$\frac{\text{₹ } 4,00,000}{\text{₹ } 2,00,000} = 2$
(iii) Earnings per share (EPS) $= \frac{\text{PAT}}{\text{No. of shares}}$	$\frac{\text{₹ } 1,26,000}{10,000} = \text{₹ } 12.6$	$\frac{\text{₹ } 70,000}{10,000} = \text{₹ } 7$
Decrease in EPS	$= \text{₹ } 12.6 - \text{₹ } 7 = \text{₹ } 5.6$	
	$\% \text{ decrease in EPS} = \frac{5.6}{12.6} \times 100 = 44.44\%$	

### 5. (i) Calculation of Fixed Cost

$$\text{DOL} = \frac{\text{Contribution}}{\text{Contribution-Fixed Cost}} \text{ or } 2.5 = \frac{\text{₹ } 10,00,000}{\text{EBIT}} \text{ or } \text{EBIT} = \text{₹ } 4,00,000$$

$$\text{EBIT} = \text{Contribution} - \text{Fixed Cost}$$

$$\text{₹ } 4,00,000 = \text{₹ } 10,00,000 - \text{Fixed Cost}$$

$$\text{Fixed Cost} = \text{₹ } 10,00,000 - \text{₹ } 4,00,000 = \text{₹ } 6,00,000$$

### (ii) Calculation of Degree of Combined Leverage (DCL)

Question says that 25% change in sales will wipe out EPS. Here, wipe out means it will reduce EPS by 100%.

$$\text{DCL} = \frac{\text{Percentage Change in EPS}}{\text{Percentage Change in Sales}} = \frac{100\%}{25\%} = 4$$

**(iii) Calculation of Degree of Financial Leverage (DFL)**

$$DCL = DOL \times DFL$$

$$4 = 2.5 \times DFL$$

$$\text{So, } DFL = 1.6$$

**(iv) Calculation of Interest and amount of Debt**

$$DFL = \frac{EBIT}{EBIT-Int} \text{ Or, } 1.6 = \frac{\text{₹ } 4,00,000}{\text{₹ } 4,00,000 - \text{Int}} \text{ Or, Int} = \text{₹ } 1,50,000$$

$$\text{Debt} \times \text{Interest rate} = \text{Amount of Interest}$$

$$\text{Debt} \times 16\% = \text{₹ } 1,50,000$$

$$\text{Debt} = \text{₹ } 9,37,500$$

**(v) Calculation of Earnings per share (EPS)**

$$EPS = \frac{(EBIT-Int)(1-t)}{N} = \frac{(\text{₹ } 4,00,000 - \text{₹ } 1,50,000)0.5}{1,00,000} = \text{₹ } 1.25$$

**6. (a) Calculation of Degree of Operating (DOL), Financial (DFL) and Combined leverages (DCL).**

$$DOL = \frac{\text{₹ } 3,40,000 - \text{₹ } 60,000}{\text{₹ } 2,20,000} = 1.27$$

$$DFL = \frac{\text{₹ } 2,20,000}{\text{₹ } 1,60,000} = 1.38$$

$$DCL = DOL \times DFL = 1.27 \times 1.38 = 1.75$$

**(b) Earnings per share at the new sales level**

	<b>(i) Increase by 20%</b>	<b>(ii) Decrease by 20%</b>
	(₹)	(₹)
Sales level	4,08,000	2,72,000
Less: Variable expenses	72,000	48,000
Less: Fixed cost	60,000	60,000
Earnings before interest and taxes	2,76,000	1,64,000

<i>Less:</i> Interest	60,000	60,000
Earnings before taxes	2,16,000	1,04,000
<i>Less:</i> Taxes	75,600	36,400
Earnings after taxes (EAT)	1,40,400	67,600
Number of equity shares	80,000	80,000
EPS	1.76	0.85

**Working Notes:**

(i) Variable Costs = ₹ 60,000 (total cost – depreciation)

(ii) Variable Costs at:

(a) Sales level of ₹ 4,08,000 = ₹ 72,000 (increase by 20%)

(b) Sales level of ₹ 2,72,000 = ₹ 48,000 (decrease by 20%)

**7. Workings:**

Total Assets = ₹ 20 crores

Total Asset Turnover Ratio = 2.5

Hence, Total Sales =  $20 \times 2.5 = ₹ 50$  crores

**Computation of Profit after Tax (PAT)**

	(₹) in crores
Sales	50.00
<i>Less:</i> Variable Operating Cost @ 65%	32.50
Contribution	17.50
<i>Less:</i> Fixed Cost (other than Interest)	4.00
EBIT	13.50
<i>Less:</i> Interest on Debentures ( $15\% \times ₹ 10$ crores)	1.50
PBT	12.00
<i>Less:</i> Tax @ 30%	3.60
PAT	8.40

**(i) Earnings per Share**

$$\text{EPS} = \frac{\text{PAT}}{\text{Number of Equity Shares}} = \frac{\text{₹ } 8.40 \text{ crores}}{50,00,000} = \text{₹ } 16.80$$

It indicates the amount, the company earns per share. Investors use this as a guide while valuing the share and making investment decisions. It is also an indicator used in comparing firms within an industry or industry segment.

**(ii) Operating Leverage**

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{₹ } 17.50 \text{ crores}}{\text{₹ } 13.50 \text{ crores}} = 1.296$$

It indicates the choice of technology and fixed cost in cost structure. It is level specific. When firm operates beyond operating break-even level, then operating leverage is low. It indicates sensitivity of earnings before interest and tax (EBIT) to change in sales at a particular level.

**(iii) Financial Leverage**

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{PBT}} = \frac{\text{₹ } 13.50 \text{ crores}}{\text{₹ } 12.00 \text{ crores}} = 1.125$$

The financial leverage is very comfortable since the debt service obligation is small vis-à-vis EBIT.

**(iv) Combined Leverage**

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{PBT}}$$

Or,

$$\begin{aligned} &= \text{Operating Leverage} \times \text{Financial Leverage} \\ &= 1.296 \times 1.125 = 1.458 \end{aligned}$$

The combined leverage studies the choice of fixed cost in cost structure and choice of debt in capital structure. It studies how sensitive the change in EPS is vis-à-vis change in sales. The leverages, operating, financial and combined are used as measurement of risk.

**8. (i) Operating Leverage (OL)**

	Situation-I	Situation-II
	(₹)	(₹)
Sales (3000 units @ ₹ 30 per unit)	90,000	90,000
Less: Variable Cost (@ ₹ 15 per unit)	45,000	45,000
Contribution (C)	45,000	45,000
Less: Fixed Cost	15,000	20,000
EBIT	30,000	25,000
Operating Leverage (OL) = $\frac{C}{EBIT}$	= $\frac{₹ 45,000}{₹ 30,000}$ = 1.5	= $\frac{₹ 45,000}{₹ 25,000}$ = 1.8

**(ii) Financial Leverage (FL)**

	A (₹)	B (₹)
<b>Situation I</b>		
EBIT	30,000	30,000
Less: Interest on debt	2,000	1,000
EBT	28,000	29,000
Financial Leverage (FL) = $\frac{EBIT}{EBT}$	= $\frac{₹ 30,000}{₹ 28,000}$ = 1.07	= $\frac{₹ 30,000}{₹ 29,000}$ = 1.034

	A (₹)	B (₹)
<b>Situation-II</b>		
EBIT	25,000	25,000
Less: Interest on debt	2,000	1,000
EBT	23,000	24,000
Financial Leverage (FL) = $\frac{EBIT}{EBT}$	= $\frac{₹ 25,000}{₹ 23,000}$ = 1.09	= $\frac{₹ 25,000}{₹ 24,000}$ = 1.04

## (iii) Combined Leverage (CL)

	A	B
<b>Situation-I</b>		
CL = FL x OL	$1.5 \times 1.07 = 1.61$	$1.5 \times 1.034 = 1.55$
<b>Situation-II</b>		
CL = FL x OL	$1.8 \times 1.09 = 1.96$	$1.8 \times 1.04 = 1.872$

## 9. Statement showing Profitability of Alternative Schemes for Financing

(₹ in '00,000)

Particulars	Existing	Alternative Schemes		
		(i)	(ii)	(iii)
Equity Share capital (existing)	10	10	10	10
New issues	-	10	5	-
	<b>10</b>	<b>20</b>	<b>15</b>	<b>10</b>
7% debentures	10	10	10	10
6% debentures	-	-	5	10
	<b>20</b>	<b>30</b>	<b>30</b>	<b>30</b>
Debenture interest (7%)	0.7	0.7	0.7	0.7
Debenture interest (6%)	-	-	0.3	0.6
	<b>0.7</b>	<b>0.7</b>	<b>1.0</b>	<b>1.3</b>
Output (units in lakh)	1	1.5	1.5	1.5
Contribution per. unit (₹) (Selling price - Variable Cost)	20	22	22	22

<b>Contribution (₹ lakh)</b>	<b>20</b>	<b>33</b>	<b>33</b>	<b>33</b>
Less: Fixed cost	10	15	15	15
<b>EBIT</b>	<b>10</b>	<b>18</b>	<b>18</b>	<b>18</b>
Less: Interest (as calculated above)	0.7	0.7	1.0	1.3
<b>EBT</b>	<b>9.3</b>	<b>17.3</b>	<b>17</b>	<b>16.7</b>
Less: Tax (40%)	3.72	6.92	6.8	6.68
EAT	5.58	10.38	10.20	10.02
Operating Leverage (Contribution /EBIT)	2.00	1.83	1.83	1.83
Financial Leverage (EBIT/EBT)	1.08	1.04	1.06	1.08
Combined Leverage (Contribution/EAT)	2.15	1.91	1.94	1.98
EPS (EAT/No. of shares) (₹)	5.58	5.19	6.80	10.02
<b>Risk</b>	-	<b>Lowest</b>	<b>Lower than option (3)</b>	<b>Highest</b>
<b>Return</b>	-	<b>Lowest</b>	<b>Lower than option (3)</b>	<b>Highest</b>

From the above figures, we can see that the Operating Leverage is same in all alternatives though Financial Leverage differs. Alternative (iii) uses the maximum amount of debt and result into the highest degree of financial leverage, followed by alternative (ii). Accordingly, risk of the company will be maximum in these options. Corresponding to this scheme, however, maximum EPS (i.e., ₹ 10.02 per share) will be also in option (iii).

So, if Navya Ltd. is ready to take a high degree of risk, then alternative (iii) is strongly recommended. In case of opting for less risk, alternative (ii) is the next best option with a reduced EPS of ₹ 6.80 per share. In case of alternative (i), EPS is even lower than the existing option, hence not recommended.

#### **10. (i) Financial leverage**

$$\begin{aligned}\text{Combined Leverage} &= \text{Operating Leverage (OL)} \times \text{Financial Leverage (FL)} \\ 2.5 &= 2 \times \text{FL} \\ \text{Or, FL} &= 1.25 \\ \text{Financial Leverage} &= 1.25\end{aligned}$$

#### **(ii) P/V Ratio and Earning per share (EPS)**

$$\begin{aligned}\text{Operating leverage} &= \frac{\text{Contribution}(C)}{\text{Contribution} - \text{Fixed Cost (FC)}} \\ 2 &= \frac{C}{C - 3,40,000} \\ \text{Or, } C &= 2(C - 3,40,000) \\ \text{Or, } C &= 2C - 6,80,000 \\ \text{Or, Contribution} &= ₹ 6,80,000 \\ \text{Now, P/V ratio} &= \frac{\text{Contribution (C)} \times 100}{\text{Sales (S)}} \\ &= \frac{6,80,000}{50,00,000} \times 100 = 13.6\%\end{aligned}$$

Therefore, P/V Ratio = 13.6%

$$\begin{aligned}\text{EBT} &= \text{Sales} - \text{Variable Cost} - \text{Fixed Cost} - \text{Interest} \\ &= ₹ 50,00,000 - ₹ 50,00,000 (1-0.136) - ₹ 3,40,000 - (8\% \times ₹ 30,25,000) \\ &= ₹ 50,00,000 - ₹ 43,20,000 - ₹ 3,40,000 - ₹ 2,42,000 \\ &= ₹ 98,000\end{aligned}$$

$$\text{PAT} = \text{EBT}(1-T) = ₹ 98,000(1-0.3) = ₹ 68,600$$

$$\text{EPS} = \frac{\text{Profit after tax}}{\text{No. of equity shares}}$$

$$\text{EPS} = \frac{₹ 68,600}{3,40,000 \text{shares}} = ₹ 0.202$$

**(iii) Assets turnover**

$$\begin{aligned}\text{Assets turnover} &= \frac{\text{Sales}}{\text{Total Assets}^*} \\ &= \frac{₹ 50,00,000}{₹ 34,00,000 + ₹ 30,25,000} = 0.78\end{aligned}$$

0.78 < 1.5 means lower than industry turnover.

\*Total Asset = Equity share capital + 8% Debentures

**(iv)** EBT zero means 100% reduction in EBT. Since combined leverage is 2.5, sales have to be dropped by  $100/2.5 = 40\%$ . Hence new sales will be  $₹ 50,00,000 \times (100 - 40)\% = ₹ 30,00,000$ .

Therefore, at ₹ 30,00,000 level of sales, the Earnings before Tax (EBT) of the company will be zero.

**Alternatively**

$$\begin{aligned}\text{Required sales when EBT is zero} &= \frac{\text{Fixed Cost} + \text{Interest} + \text{desired Profit}}{\text{P/V Ratio}} \\ &= \frac{₹ 3,40,000 + ₹ 2,42,000 + \text{zero}}{13.60\%} \\ &= \frac{₹ 5,82,000}{13.60\%} \\ &= ₹ 42,79,412\end{aligned}$$

**[Note:** The question can also be solved by first calculating EBIT with the help of Financial Leverage. Accordingly, answer to the requirement (ii) and (iv) will also vary.]

**11. Calculation of Degree of Operating leverage and Degree of Combined leverage**

Firm	Degree of Operating Leverage (DOL) = $\frac{\% \text{ change in Operating Income}}{\% \text{ change in Revenue}}$	Degree of Combined Leverage (DCL) = $\frac{\% \text{ change in EPS}}{\% \text{ change in Revenue}}$
M	$\frac{26\%}{28\%} = 0.929$	$\frac{32\%}{28\%} = 1.143$
N	$\frac{34\%}{27\%} = 1.259$	$\frac{26\%}{27\%} = 0.963$
P	$\frac{38\%}{25\%} = 1.520$	$\frac{23\%}{25\%} = 0.920$
Q	$\frac{43\%}{23\%} = 1.870$	$\frac{27\%}{23\%} = 1.174$
R	$\frac{40\%}{25\%} = 1.60$	$\frac{28\%}{25\%} = 1.120$

**12. (i) Calculation of Financial Leverage:**

Combined Leverage (CL) = Operating Leverage (OL) × Financial Leverage (FL)

$$2.16 = 1.2 \times FL$$

$$FL = 1.8$$

**(ii) Calculation of Fixed cost:**

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{EBIT i.e EBIT} - \text{Interest}}$$

$$1.8 = \frac{\text{EBIT}}{\text{EBIT} - 10,00,000}$$

$$1.8 (\text{EBIT} - 10,00,000) = \text{EBIT}$$

$$1.8 \text{ EBIT} - 18,00,000 = \text{EBIT}$$

$$\text{EBIT} = \frac{18,00,000}{0.8} = ₹ 22,50,000$$

$$\text{Further, Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$1.2 = \frac{\text{Contribution}}{₹ 22,50,000}$$

$$\text{Contribution} = ₹ 27,00,000$$

$$\text{Fixed Cost} = \text{Contribution} - \text{EBIT}$$

$$= ₹ 27,00,000 - ₹ 22,50,000$$

$$\text{Fixed cost} = ₹ 4,50,000$$

**(iii) Calculation of P/V ratio:**

$$\text{P/V ratio} = \frac{\text{Contribution (C)}}{\text{Sales (S)}} \times 100 = \frac{27,00,000}{100,00,000} \times 100 = 27\%$$