

CA INTER FM FORMULA BOOK

ALL IN ONE PLACE!



CA DHANANJAY BHAVE

Investment Decision or Capital Budgeting

Concept of Compound Interest

Under Compound interest, Future value is calculated as below:

$$A = P (1 + r)^n$$

Where A = Future Value. P = Present Value. R = Rate of Interest per period. N = Number of periods of compounding.

Note: $(1 + r)^n$ is called Compounding factor.

Concept of CFAT

Particulars	Amount in Rs.
Profit before depreciation & tax	xxxxxxx
Less: Depreciation	(xxxxxx)
Profit Before Tax	xxxxxxx
Less: Tax @ 30%	(xxxxxxx)
Profit After Tax	xxxxxxx
Add back: Depreciation	xxxxxxx
Cash Flow After Tax	xxxxxxx

Payback Reciprocal

Payback Reciprocal = Average annual cash inflow / Initial Investment

IRR Method:

IRR is the rate at which NPV is equal to Zero. i.e., IRR is the rate at which present value of future cash inflow is equal to Present cash out flow. It is worked out using Trial and Error Method. Rule for decision: If IRR is greater than cost of capital, then 'Accept' or else 'Reject'. (To be discussed in detail along with practical problems).

IRR Decision Rule

If, $IRR > \text{Cost of capital}$, Then, Accept.

If, $IRR = \text{Cost of capital}$, Then, Break-even point, accept or reject.

If, $IRR < \text{Cost of capital}$, Then, Reject.

Accounting rate of return (ARR) or Average rate of return (ARR) or Book value rate of return.

Accounting rate of return is based on book value of cash flow. Here Discounting factors are ignored and decision is merely based on accounting profit and not cash flows.

$$ARR = (\text{Profit after tax} / \text{Initial investment}) * 100.$$

OR

$$ARR = (\text{Average Profit after tax} / \text{Average Investment}) * 100$$

The numerator is the average annual net income (PAT) generated by the project over its useful life. The denominator can be either the initial investment (including installation cost) or the average investment over the useful life of the project. Average investment means the average amount of fund remained blocked during the lifetime of the project.

Risk & Leverage

Sales Minus Variable cost = Contribution.

$$PV \text{ Ratio} = (\text{Contribution} / \text{Sales}) * 100$$

$$DOL = \% \text{ Change in EBIT} / \% \text{ Change in Sales (Use it when 2 period data is given)}$$

OR

$$DOL = \text{Contribution} / \text{EBIT (Use it when single period data is given)}$$

Same way,

$$DFL = \% \text{ Change in EBT} / \% \text{ Change in EBIT (Use it when 2 period data is given)}$$

Here we can use EPS also in place of EBT.

OR

$$DFL = \text{EBIT} / \text{EBT (Use it when single period data is given)}$$

$$\text{Combined Leverage} = DOL * DFL \text{ OR } \text{Contribution} / \text{EBT}.$$

Cost of Capital

Cost of Irredeemable debt

$$K_d = \frac{\text{Interest (1-Tax)}}{\text{Net Receipts}} \times 100$$

cost of redeemable debt (Approximation method)

$$K_d = \frac{\text{Interest (1-Tax)} + \frac{RV - NR}{N}}{\frac{RV + NR}{2}} \times 100$$

Cost of Debt using Present value method [Yield to maturity (YTM) approach]

The cost of redeemable debt (K_d) is also calculated by discounting the relevant cash flows using Internal rate of return (IRR). (The concept of IRR is discussed in the Chapter- Investment Decisions). Here YTM is the annual return of an investment from the current date till maturity date. So, YTM is the internal rate of return at which current price of a debt equals to the present value of all cash-flows.

The relevant cash flows are as follows:

Year	Cash flows
0	Net proceeds in case of new issue/ Current market price in case of existing debt (NP or NR or P ₀)
1 to n	Interest net of tax [$I(1-t)$]
N	Redemption value (RV)

Amortisation of Bond

Value of Bond = $CIF \times DF_1 + CIF \times DF_2 + \dots \dots \dots CIF \times DF_n$

Cost of Convertible Debenture

Holders of the convertible debentures have the option to either get the debentures redeemed into the cash or get specified numbers of companies shares in lieu of cash. (i.e., either redemption or conversion). The calculation of cost of convertible debentures are very much similar to the redeemable debentures. While determining the redemption value of the debentures, it is assumed that all the debenture holders will choose the option which has the higher value (either redemption or conversion) and accordingly the same is considered to calculate cost of debt.

Cost of Preference shares

All the calculations would remain same as that of debt funds except following changes.

- We pay dividend to preference shareholders and not the interest. So in place of interest, we should use preference dividend (PD).
- Dividend is not treated as expenditure under tax laws. It is an appropriation of profit. Therefore, there will be NO Tax benefit on payment of dividend.

Cost of Equity shares**Methods to calculate cost of equity shares**

- Dividend price approach

$$\text{Formula: } K_e = \frac{D}{P}$$

D = Dividend

P = Market Price of the shares less flotation cost if any. (Basically this is Net Receipt)

Earnings approach

$$\text{Formula: } K_e = \frac{E}{P}$$

E = Earning per Share i.e., EPS.

P = Market Price of the shares less flotation cost if any. (Basically this is Net Receipt)

Growth approach or Gordon's Model

$$\text{Formula: } K_e = \frac{D_1}{P} + G$$

Realized Yield Approach :

This method uses Trial & Error approach (Like YTM method used in cost of debt).

CAPM Approach (Capital Asset Pricing Model)

$$\text{Cost of Equity (} K_e \text{)} = R_f + \beta (R_m - R_f)$$

Where,

K_e = Cost of equity capital

R_f = Risk free rate of return

β = Beta coefficient

R_m = Rate of return on market portfolio

$R_m - R_f$ = Market risk premium

Cost of retained earnings

The cost of retained earnings is often used interchangeably with the cost of equity, as cost of retained earnings is nothing but the expected return of the shareholders from the investment in shares of the company. But for the purpose of calculation of K_e : P = net proceeds realized = issue price less flotation cost. And for the purpose of calculation of K_r : P = current market price (As there won't be any flotation cost for using retained earnings).

Weighted Average cost of capital (WACC)

Format of WACC Calculation –

Source of capital	Book Value or Market Value	Weights	Cost of capital	WACC (Ko)
	(Rs)	(a)	(b)	(c) = (a) × (b)
Equity shares	6,00,000	0.3	0.12	0.036
Debt	14,00,000	0.7	0.08	0.056
	20,00,000	1	Total =	0.092
			WACC =	9.20%

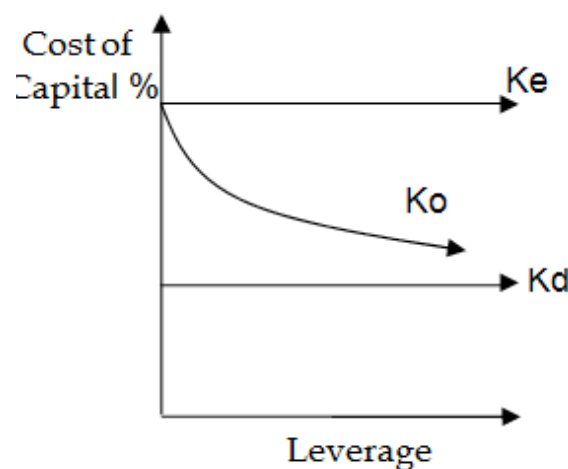
Capital Structure

$$\text{Value of Firm} = \frac{\text{EBIT}}{\text{WACC or } K_o}$$

Capital Structure theories

There are 2 types of capital structure theories –

1. Relevancy theory – Net income approach & Traditional approach
2. Irrelevancy theory – Net Operating income approach & MM approach

Net income approach

The value of the firm on the basis of Net Income Approach can be ascertained as follows:

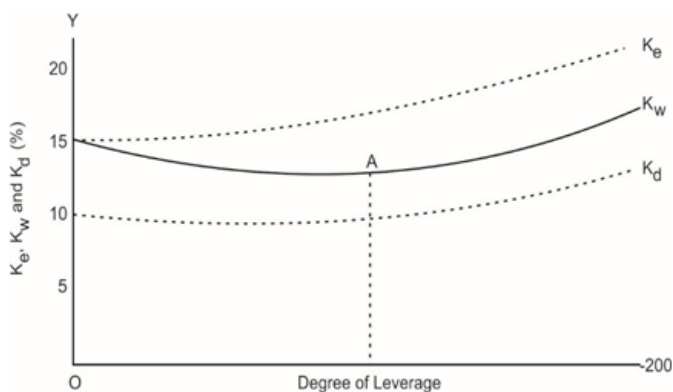
$$\text{Value of Firm (V)} = \frac{\text{Market Value of equity} + \text{Market Value of Debt}}{\text{EBIT}}$$

$$\text{WACC or } K_o = \frac{\text{Earnings available for equity shareholders}}{\text{Value of Firm}}$$

$$\text{Market Value of equity} = \frac{\text{Earnings available for equity shareholders}}{K_e \text{ or Equity Capitalization Rate}}$$

Traditional Approach

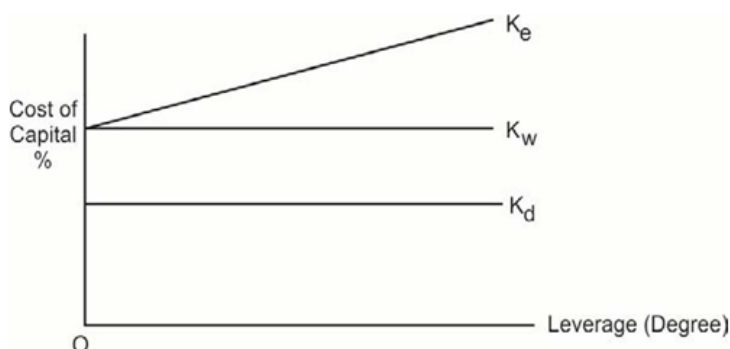
This approach believes that upto a level (say an optimum point), debt is good for the company. It reduces WACC & increases value of firm. But beyond that point, debt is not preferred. Optimum capital structure occurs at the point where value of the firm is highest and the cost of capital is the lowest.



IRRELEVANCY MODELS

Net Operating Income Approach (NOI)

Under this approach, Always calculate the Total Value of the firm. Then deduct value of debt from it. You will get Value of equity.



Modigliani-Miller Approach (MM)

$$\text{Value of Unlevered firm} = \frac{\text{Net Operating Income (1-Tax)}}{K_e}$$

$$\text{Value of Levered Firm} = \text{Value of Unlevered Firm} + \text{Debt} \times \text{Tax Rate}$$

Financial Break Even Point

It denotes the level of EBIT which is sufficient to cover Interest, Tax and Preference Dividend. In other words, it is the level of EBIT at which Earnings available to equity shareholders (Residual Earnings) is Zero.

EBIT-EPS Indifference point

$$\frac{\text{EBIT} - \text{Interest} - \text{Tax} - \text{Preference Dividend}}{\text{No. of Equity Shares in option 1}} = \frac{\text{EBIT} - \text{Interest} - \text{Tax} - \text{Preference Dividend}}{\text{No. of Equity Shares in option 2}}$$

Dividend Decision**Walter Model:**

$$P_o = \frac{D + (E - D) r / k}{K}$$

P = Market Price per share. D = Dividend per share. E = EPS i.e., Earning Per Share.

r = Company's ability to earn (Company's rate of return).

k = Cost of Equity (Shareholders capacity to earn),

It is assumed that r & k are constant. This model also assumes No tax & No Floatation cost.

As per this model, dividend alone will not decide the price of the share (wealth of shareholders). This model suggest:

- If $r > K$ Lower dividend is better. i.e., Higher reserve is preferred.
- If $r < K$ Higher dividend is better. i.e., Lower reserve is preferred.
- If $r = K$, Dividend decision will make no impact on Price of the share.

Gordon Model:

The proposition is same as that of Walter model.

$$P = \frac{E(1-b)}{K-g}$$

E= EPS, b = Retention ratio, k= Cost of Equity (Shareholders capacity to earn), r = Company's ability to earn(Company's rate of return), and Growth is computed as "g = b*r".

This approach assumes there is some dividend that is paid every year i.e., "No Dividend" policy is not followed by company. It also assumes that "K > g". Like Walter model, even this approach assumes that r & k are constant and there is No tax & No Floatation cost.

Note for students to remember the difference– Walter Model's retention is in "Amount". Gordon Model's retention is in "Percentage".

Modigliani – Miller Model (MM Model)

$$P_0 = \frac{D_1 + P_1}{1 + K_e}$$

P₀= Price in the beginning of the period. P₁= Price at the end of the period.

D₁= Dividend at the end of the period & K_e= Cost of equity/ rate of capitalization/ discount rate.

Other Models in dividend theory**Dividend Discount Model**

Here there are 3 possibilities,

- Dividend remains same forever (No Growth model)
- Dividend grows at a constant rate (Constant Growth model)
- Dividend grows at a random rate (Variable Growth model)

Under No Growth model,

$$\text{Price of the share} = \frac{\text{Annual Dividend (D)}}{\text{Required rate of return (Ke)}}$$

$$P_o = \frac{D}{K_e}$$

Under Constant Growth model,

$$P_o = \frac{D_o (1+g)}{K_e - g}$$

Note : It is assumed that K_e is always greater than 'g'.

Under Variable growth rate also, the same formula as used in "constant growth" formula will be used. But different rate will be taken.

Graham & Dodd Model

$$P_o = M \left(D + \frac{E}{3} \right)$$

Where, P = Market price per share D = DPS, E = EPS, m = multiplier.

Lintner's Model

$$D_1 = D_0 + [(EPS \times \text{Target Payout}) - D_0] \times \text{Adjustment Factor}$$

Ratio Analysis

Liquidity Ratios

Current Asset

$$1. \text{ Current Ratio} = \frac{\text{Current Asset}}{\text{Current Liabilities}}$$

Current Liabilities

Current Assets = Stock + Debtors + Cash & Bank + Other Receivables / Accruals + Loans and Advances + Disposable Investments + Any other current assets.

Current Liabilities = Creditors for goods and services + Short term Loans + Bank OD + Cash Credit + O/s Expenses + Provision for Tax + Proposed Dividend + Unclaimed Dividend + Any other current liabilities

Quick Assets

$$2. \text{ Quick Ratio or Acid Test Ratio or Liquid Ratio} = \frac{\text{Quick Assets}}{\text{Current Liabilities}}$$

Current Liabilities

Quick Assets = Current Assets – Stock – Prepaid Expenses

Cash + Bank + Marketable Securities

$$3. \text{ Cash Ratio / Absolute Liquidity Ratio} = \frac{\text{Cash + Bank + Marketable Securities}}{\text{Current Liabilities}}$$

Current Liabilities

Marketable securities are also called as temporary investments or current investments.

$$4. \text{ Basic Defense Interval / Interval Measure:}$$

Cash + Bank + Marketable Securities

$$\text{Basic Defense interval} = \frac{\text{Cash + Bank + Marketable Securities}}{\text{Daily cash operating expenses}}$$

Daily cash operating expenses

If for some reason all the company's revenues were to suddenly cease, the Basic Defense Interval would help determine the number of days for which the company can cover its cash expenses without the aid of additional financing.

Long-term Solvency Ratios /Leverage Ratios

$$5. \text{ Equity Ratio} = \frac{\text{Shareholders fund}}{\text{Total Capital Employed}}$$

$$6. \text{ Debt Ratio} = \frac{\text{Total Debt}}{\text{Total Capital Employed}}$$

$$7. \text{ Debt Equity Ratio} = \frac{\text{Total Debt}}{\text{Shareholders fund}}$$

In Ratio number 5,6& 7, Shareholders fund should be considered as equity shareholders fund and debt can be taken as either total debt or long term depending upon question.

$$8. \text{ Debt to Total Asset Ratio} = \frac{\text{Total Debt}}{\text{Total Asset}}$$

This ratio measures the proportion of total assets financed with debt.

$$9. \text{ Capital Gearing ratio} = \frac{\text{Long Term Debt + Preference share capital}}{\text{Equity Shareholders fund}}$$

In addition to debt-equity ratio, sometimes capital gearing ratio is also calculated to show the proportion of fixed interest (dividend) bearing capital to funds belonging to equity shareholders.

$$10. \text{ Proprietary ratio} = \frac{\text{Proprietary funds}}{\text{Total Assets}}$$

Proprietary fund includes Equity Share Capital + Preference Share Capital + Reserve & Surplus. Basically it is Total shareholders fund. Total assets exclude fictitious assets.

Interpretation - It indicates the proportion of total assets financed by shareholders

Coverage Ratios

$$11. \text{Debt Service Coverage ratio} = \frac{\text{Earning available for debt service}}{\text{Interest + Principal}}$$

Earning available for debt service = Net profit after taxes + Non-cash operating expenses + Interest + other non-operating expenses (like loss on sale of Fixed Asset etc.)

Lenders are interested in debt service coverage to judge the firm's ability to pay off current interest and instalments. Normally DSCR of 1.5 to 2 is satisfactory.

$$12. \text{Interest Service Coverage ratio} = \frac{\text{EBIT}}{\text{Interest}}$$

This ratio also known as "times interest earned ratio" indicates the firm's ability to meet interest. Normally ISCR of more than 1 is satisfactory.

$$13. \text{Preference Dividend Coverage ratio} = \frac{\text{EAT}}{\text{Preference Dividend}}$$

Normally PDCR of more than 1 is satisfactory.

Activity Ratios/ Efficiency Ratios/ Performance Ratios/ Turnover Ratios

$$14. \text{Total Asset Turnover ratio} = \frac{\text{Turnover or COGS}}{\text{Total Assets}}$$

$$15. \text{Fixed Asset Turnover ratio} = \frac{\text{Turnover or COGS}}{\text{Fixed Assets}}$$

$$16. \text{Current Asset Turnover ratio} = \frac{\text{Turnover or COGS}}{\text{Current Assets}}$$

$$17. \text{Working Capital Turnover ratio} = \frac{\text{Turnover or COGS}}{\text{Working Capital}}$$

$$18. \text{Capital Turnover ratio} = \frac{\text{Turnover or COGS}}{\text{Capital employed}}$$

Note – Capital employed can be replaced with Net Assets. (As Net assets = FA+CA-CL, It will be same as Capital employed)

COGS or Turnover

19. Inventory Turnover ratio= -----

Average Inventory

Note – Avg. inventory = (Opening stock + Closing stock)/2.

If opening inventory is not given, then we can take closing stock itself as denominator.

Credit Sales

20. Debtor Turnover ratio= -----

Average debtors

Note – This ratio is called as Receivable turnover ratio.

Credit Purchases

21. Creditor Turnover ratio= -----

Average Creditors

Note – This ratio is called as Payable turnover ratio.

Profitability Ratios

Gross Profit

22. Gross Profit ratio= ----- X 100

Sales

Net Profit

23. Net Profit ratio= ----- X 100

Sales

Operating Profit

24. Operating Profit ratio= ----- X 100

Sales

Profits

25. Return on Investment = ----- X 100

Investment

The concept of investment varies and accordingly there are three broad categories of ROI i.e. Return on Assets (ROA), Return on Capital Employed (ROCE) & Return on Equity (ROE).

Profit After Tax + Interest

26. Return on Assets = ----- X 100

Average Total Assets

In some questions, if it is mentioned as return on fixed assets or return on tangible fixed assets, then denominator should be changed accordingly.

EBIT

$$27. \text{Return on Capital Employed} = \frac{\text{EBIT}}{\text{Capital Employed}} \times 100$$

EATESH

$$28. \text{Return on Equity} = \frac{\text{EATESH}}{\text{Equity Shareholders fund}} \times 100$$

Return on Equity using the Du Pont Model:

Return on Equity = (Net Profit Margin) * (Asset Turnover) * (Equity Multiplier).

(a) Net profit margin = Net Income or Profit ÷ Revenue

(b) Asset Turnover = Revenue ÷ Assets

(c) Equity Multiplier = Assets ÷ Shareholders' Equity.

Profitability Ratios Required for Analysis from Owner's Point of View

EATESH

$$29. \text{EPS} = \frac{\text{EATESH}}{\text{Number of Equity Shares}}$$

Total Divided to Equity Shareholders

$$30. \text{DPS} = \frac{\text{Total Divided to Equity Shareholders}}{\text{Number of Equity Shares}}$$

DPS

$$31. \text{Dividend Payout Ratio} = \frac{\text{DPS}}{\text{EPS}} \times 100$$

Profitability Ratios related to market/ valuation/ Investors

DPS

$$32. \text{Dividend Yield Ratio} = \frac{\text{DPS}}{\text{MPS}} \times 100$$

EPS

$$33. \text{Earning Yield Ratio} = \frac{\text{EPS}}{\text{MPS}} \times 100$$

MPS

$$34. \text{Price Earnings Ratio} = \frac{\text{MPS}}{\text{EPS}}$$

MPS

$$35. \text{Market Value Book Value Ratio (MVBV)} = \frac{\text{MPS}}{\text{Book Value per share}}$$

Working Capital Management

Treasury & Cash Management

Baumol's Model of Cash Management.

$$\text{Optimum Cash Balance} = \sqrt{\frac{2AT}{H}}$$

A = Annual Cash disbursements

T = Transaction cost (Fixed cost) per transaction

H = Opportunity cost one rupee per annum (Holding cost)

Inventory Management

EOQ:

$$\text{EOQ} = \sqrt{\frac{2 \times \text{Annual Requirement (A)} \times \text{Cost per order (O)}}{\text{Carrying Cost per unit per annum (C)}}$$

Receivable Management

Particulars	Amount in Rs. (Policy A)	Amount in Rs. (Policy B)
Sales	XXXX	XXXX
Less : variable cost	(XXXX)	(XXXX)
Less : Fixed cost	(XXXX)	(XXXX)
Less : Bad Debts	(XXXX)	(XXXX)
Less : Collection related expenses	(XXXX)	(XXXX)
Less : Taxes (If given in question)	(XXXX)	(XXXX)
Net Benefit before opportunity cost	XXXX	XXXX
Less : Opportunity cost*	(XXXX)	(XXXX)
Net Benefit	XXXX	XXXX

Note :

Opportunity cost = Total cost * Rate of Interest * credit period/365 Days

If the total cost is not available, then take sales.

Overall Working Capital Management

Estimation of WC

Operating Cycle approach or Working Capital cycle approach –

List of formulae –

One Operating Cycle Period = $R + W + F + D - C$

Where,

R = Raw material storage period.

W = Work-in-progress holding period.

F = Finished goods storage period.

D = Debtors collection period.

C = Credit period availed.

RM Period = $(\text{Average RM}) / (\text{RM Consumption}) * 365 \text{ Days}$

WIP Period = $(\text{Average WIP}) / (\text{RM} + \text{Labour} + \text{Factory Overhead} + \text{OpWIP} - \text{CI WIP}) * 365 \text{ Days}$

Denominator of above formula can be understood as "Cost of Production".

FG Period = $(\text{Average FG}) / (\text{RM} + \text{Labour} + \text{Factory Overheads} + \text{Op WIP} - \text{CI WIP} + \text{Op FG} - \text{CI FG}) * 365 \text{ Days}$

Denominator of above formula can be understood as "Sales – Gross Profit" or "COGS" in Trading Account.

Debtor Period = $(\text{Average Debtor}) / (\text{Credit Sales}) * 365 \text{ Days}$

Creditor Period = $(\text{Average Creditor}) / (\text{Credit Purchases}) * 365 \text{ Days}$

Number of Cycles in a year = $(365 \text{ Days}) / (\text{One Operating Cycle Period})$

Working Capital = $(\text{Annual Operating Cost (Total Cost)}) / (\text{Number of Cycles})$

(Note – This method uses Financial Accounting information as base and not Cost Accounting information i.e., Cost Sheet)

Estimation of Amount of Different Components of Current Assets and Current Liabilities

This is the 2nd method of estimating working capital where in each item of current asset and current liability will be calculated and WC will be then estimated.

Basic principles to be kept in mind while estimating Working Capital:

1. Working Capital = Total Current Assets – Total Current Liabilities
2. Current Assets include – RM, WIP, FG, Debtors & BR, Cash & Bank.
3. Current Liabilities include – Creditors & BP, O/s or Accrued expenses.
4. RM = RM Purchase price – Discount.
5. WIP = (RM + Labour + Factory Overheads) * Degree of completion.
6. FG = RM + Labour + Factory Overheads.
7. Debtor = "RM + Labour + All Overheads" OR "Total cost" OR "Sales – Net Profit".
8. Cash & Bank = As given in the question.
9. Creditor = RM Purchase price – Discount if any.....OR Same as RM.

Working capital is estimated on the basis of Cash Cost approach. i.e.,

- If we have sundry debtors worth Rs. 1 lakh and our cost of production is Rs. 75,000, the actual amount of funds blocked in sundry debtors is Rs. 75,000 the cost of sundry debtors, the rest (Rs. 25,000) is profit.
- Again some of the cost items also are non-cash costs; depreciation is a non-cash cost item. Suppose out of Rs. 75,000, Rs. 5,000 is depreciation; then it is obvious that the actual funds blocked in terms of sundry debtors totalling Rs. 1 lakh is only Rs. 70,000.

In simple,

Depreciation & other non-cash costs must be ignored in all calculations.

Debtors are valued at cost not at selling price.

Note to solve problems – If overheads are not segregated as factory overhead, office overhead, selling overhead; Students can consider “overhead” as factory overhead.

There is another approach for working capital estimation called as “Total Cost approach”. Under that approach, depreciation is treated as part of the cost and also Debtor is valued at Selling Price. Unless given as “total cost” approach, students are required to follow cash cost approach itself, as that is accepted by bankers & other financial institutions.

Maximum Permissible Bank Finance (MPBF) –

Tandon Committee Recommendation

- I. Borrower has to contribute a minimum of 25% of WC gap from long term funds.

$$\text{MPBF} = 75\% \text{ of } [\text{Current Assets Less Current Liabilities}]$$
- II. Borrower has to contribute a minimum of 25% of the total CA from long term funds.

$$\text{MPBF} = [75\% \text{ of Current Assets}] \text{ Less Current Liabilities}$$
- III. Borrower has to contribute the entire hard core current assets and a minimum of 25% of the balance of the current assets from long term funds.

$$\text{MPBF} = [75\% \text{ of Soft Core Current Assets}] \text{ Less Current Liabilities}$$

$$\text{Soft Core Current Assets} = \text{Currents Assets} - \text{Core Current Assets}$$

When companies are in need of money, they initially sell off non-core current assets (assets which are not important for continuous functioning of a business) to raise money. If a company is ready to raise cash by selling its core current assets, then this implies that the company is in dire situation or close to bankruptcy.

Examples of Core Current Assets are Raw materials, Work in Progress, Finished Goods, Cash in Hand and at Bank etc.

Examples of Non-Core Assets are natural resources, bonds, options and so on.



ALL THE BEST!!



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