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1. FUNDAMENTALS OF FINANCIAL MANAGEMENT
SOLUTIONS FOR CLASSROOM DISCUSSION

Answer for Illustration 1:

The future value (FV) of the invested amount at the end of 10 years will be

FV = PV $(1+r)n$

FV = Rs. 1,50,000 $(1+0.12)10$

FV = Rs. 1,50,000 × 3.106

FV = Rs. 4,65,900

Answer for Illustration 2:

The rule of 72 is

$$r = \frac{72}{n}$$

Where,

r = rate of interest or return

n = number of investment years

No. of years = $\dfrac{72}{Annual\,rate\,of\,Interest}$

No. of years (n) = $\dfrac{72}{8}$

No. of years (n) = 9 years

Answer for Illustration 3:

The present value can be calculated by discounting Rs. 1,000, to the present point of time, as follows:

Value of three years hence = Rs. 1,000

Value two years hence = Rs. 1,000 × Value one year hence = Rs. 1,000 $\times \dfrac{1}{(1+0.10)}$

Value one year hence = Rs. 1,000 $\times \dfrac{1}{(1+0.10)^2}$

Value now (present value) = Rs. 1,000 $\times \dfrac{1}{(1+0.10)^3}$ = Rs. 1,000 × 0.751 = Rs. 751

Answer for Illustration 4:

The future value interest factor for a 6-year annuity, given an interest rate 12% is:

FVIFAn = 6, r = 12% = $\dfrac{(1+0.12)-1}{0.122} = 8.115$

The annul sinking fund deposit should be:

$$= \frac{Rs.5,00,00,000}{8.115} = Rs.\ 61,61,429.00$$

Answer for Illustration 5:

Rs. 1,000 × PVIF10%, 6 = Rs. 1,000 × 0.5645 = Rs. 564.5

Answer for Illustration 6:

We obtain the answer as follows:

$$Rs.\ 1000 \times \left(\frac{1}{1.08}\right)^{20}$$

$$= Rs.\ 1000 \times \left(\frac{1}{1.08}\right)^{10} \times \left(\frac{1}{1.08}\right)^{10}$$

$$= Rs.1000 \times PVIF_{8\%,10} \times PVIF_{8\%,10}$$

$$= Rs.1,000 \times 0.463 \times 0.463$$

$$= Rs.\ 214$$

Answer for Illustration 7:

FV= PV (1+r) n

Or, FV= PV (FVIFr, n),

Where,

PV = Present value or sum invested Rs. 100,000

FV = Future value

r = Interest rate i.e 12% or 0.12

n = Number of years i.e., 20

FV = PV (FVIFr, n)

FV = Rs.100,000 × 9.646

FV = Rs. 9,64,600

Answer for Illustration 8:

Formula for calculating future value of annuity

FVAn= A[{(1+r)n-1}/r]

where,

FVAn = Future value of an annuity which is the sum of the compound amounts of all payments and a duration of n periods

A = Amount of each instalment or constant periodic flow

r = Interest rate per period

n = Number of periods

= Rs. 20,000 ×1 [{(1+0.09)5-1}/0.09]

= Rs. 1,19,694

Answer for Illustration 9:

At the end of	Amount Deposited (Rs.)	Term of the deposit (Years)	Future Value (Rs.)
1st year	8,000	4	8,000 × 1.464 = 11,713
2nd year	8,000	3	8,000 × 1.331 = 10,648
3rd year	8,000	2	8,000 × 1.210 = 9,680
4th year	8,000	1	8,000 × 1.110 = 8,800
5th year	8,000	-	8,000 × 1.000 = 8,000
Future Value of annuity at the end of 5 years			**48,841**

Alternatively, the future of annuity can be obtained by using the following formula:

Formula for calculating future value of

annuity $FVAn = A[\{(1+r)^n - 1\}/r]$

where,

FVAn = Future value of an annuity which is the sum of the compound amounts of all

payments and a duration of n periods

A = Amount of each instalment or constant periodic flow

R = Interest rate per period

n = Number of periods

= Rs. 8,000 × 6.1051 = Rs. 48,841

Future Value of Annuity at the end of 5 years = Rs. 48,841.

Answer for Illustration 10:

Amount Invested = Rs. 75,000

Rate of Interest = 8%

No. of Compounds = 2 × 5 = 10 times

Rate of Interest for half year = 8%/2 = 4%

Compound Value or Future Value = P (1+i)n

Where,

P = Principal Amount

i = Rate of Interest (in the given case half year interest)

n = No. of years (no. of compounds)

= Rs. 75,000 (1+4%)10

= Rs. 75,000 × 1.4802

= Rs. 1,11,018

Compound Value = Rs. 1,11,018

Compound Interest = Compound Value – Principal Amount

= Rs. 1,11,018 – Rs. 75,000 = Rs. 36, 018.

Answer for Illustration 11:

Present value of a perpetuity = $\dfrac{\text{Perpetuity}}{\text{InterestRate}}$

Pv= A/i = Rs. 50,000

Answer for Illustration 12:

Initial investment	= Rs. 600 × 100 = Rs. 60,000
Dividend earned	= Rs. 30 × 100 = Rs. 3,000
Capital Gains	= Rs. (720-600) × 100 = Rs. 12,000
Total return	= Rs. 3,000 + Rs. 12,000 = Rs. 15,000
Total return (%)	= [(Rs. 3,000 + Rs. 12,000) / Rs. 60,000] × 100 = 25%

Answer for Illustration 13:

(a) Expected Rate of Return

Expected Return can be calculated by using the following formula:

E(R) = R1 × P1+ R2 × P2+ R3 × P3+ R4 × P4+ ....+ Rn × Pn

= (-20 × 0.05) + (-10 × 0.05) + (-5 × 0.10) + (5 × 0.10) + (10 × 0.15) + (18 × 0.25) + (-20 × 0.05) + (20 × 0.25) + (30 × 0.05) = 11%

(b) Variance of Return

Variance can be calculated by using the following formula

$\sigma^2 = R_1 - E(R)]^2 \times p_1 + [R_2 - E(R)]^2 \times p_2 + [R_3 - E(R)]^2 \times p_3 + [R_4 - E(R)]^2 \times p_4 \ldots\ldots\ldots\ldots[R_n - E(R)]^2 \times p_n$

$(-20-11)^2 \times 0.05 + (-10-11)^2 \times 0.05 + (-5-11)^2 \times 0.10 + (5-11)^2 \times 0.10 + (10-11)^2 \times 0.15 + (18-11)^2 \times 0.25 + (20-11)^2 \times 0.25 + (300-11)^2 \times 0.05$

= 150%

(c) Standard Deviation of Return

$\sigma = \sqrt{150} = 12.25$

Answer for Illustration 14:

From the above information it is found that the standard deviation of Security B is larger than that of Securty A. So, Security B is the riskier investment opportunity with standard deviation as risk measurement tool.

However, relative to the size of expected return, Security A has greater variation. So, Security A is higher risky investment than Security B.

Answer for Illustration 15:

Beta $(\beta) = \dfrac{r_{(AM)} \times \sigma_A \times \sigma_M}{\sigma^2_M}$

$\dfrac{12 \times 9 \times 0.72}{9^2} = \dfrac{77.76}{81} = 0.96$

Answer for Illustration 16:

(i) Computation of annual rates of return

Year	Closing Share Price (Rs.) (St)	Dividend per Share (Rs.) (Dt)	Annual rate of return [(St/St-1)-1) + Dt
2015	312	5.50	-
2016	389	6.75	7.00
2017	234	4.60	4.20
2018	345	5.90	6.37
2019	367	3.78	3.84
2020	389	4.10	4.15
2021	412	5.98	6.03
Total			**31.58**

(ii) Average rate of return = Arithmetic mean of annual

rates of return Total Annual Returns = 31.58

So, Average return = 31.58/6 = 5.27%

(iii) Calculation of Variance

Year	Annual Return (Rt)	Average Return (%) (Rm)	(Rt- Rm)	$(Rt - Rm)^2$
2016	7.00	5.27%	1.73	2.89
2017	4.20	5.27%	-1.07	1.14
2018	6.37	5.27%	1.10	1.22
2019	3.84	5.27%	-1.43	2.03
2020	4.15	5.27%	-1.11	1.23
2021	6.03	5.27%	0.77	0.59
Total				**9.20**

Variance $= \dfrac{1}{n-1} \sum_{i}^{n} (R_t - R_m)^2$

$= \dfrac{9.20}{6-1}$

$= 1.84$

(iv) Standard Deviation $(\sigma) = \sqrt{variance}$

$= \sqrt{1.84} = 1.35$

Answer for Illustration 17:

$$E(R_s) = R_F + \{\beta_s \times (R_M - R_F)\}$$

Substituting these data into the CAPM equation, we get

E(RS) = 4% + [1.20 × (12% - 4%)

= 4% + 9.6% = 13.6%.

SOLUTIONS FOR CLASSROOM DISCUSSION

Answer for Illustration 1:

Particulars	2021	2022
Net Sales	100%	100%
Less: Cost of Goods Sold $\left(\dfrac{\text{Cost of Goods Sold}}{\text{Net Sales}} \times 100\right)$	54.3%	47.8%
Gross Profit $\left(\dfrac{\text{Gross Profit}}{\text{Net Sales}} \times 100\right)$	45.7%	52.2%
Less: Other operating expenses $\left(\dfrac{\text{Other Operating Expenses}}{\text{Net Sales}} \times 100\right)$	14.3%	16%
Operating Profit $\left(\dfrac{\text{Operating Profit}}{\text{Net Sales}} \times 100\right)$	31.4%	36.2%
Less: Interest on Long-term Debt $\left(\dfrac{\text{Interest}}{\text{Net Sales}} \times 100\right)$	5.7%	3.8%
Profit Before Tax (PBT) $\left(\dfrac{\text{PBT}}{\text{Net Sales}} \times 100\right)$	25.7%	32.4%

Comments:

(i) The PBT to net sales has increased from 25.7% in the year 2020-21 to 32.4% in the year 2021-22. It indicates that the profit earning capacity of the company has improved during the study period. This improvement in the profitability of the company has been mainly due to significant reduction in the cost of goods sold of the company. It may occur due to fall down of input market or may occur due to improvement in the efficiency of the company. As other operating expenses are higher in 2021-22 so, it is clear that company has been operated with tight supervision, tight inventory control for reduction of Cost of Goods Sold.

(ii) The interest on long-term debt to net sales has declined from 5.7% in the 2020-21 to 3.8% in 2021-22. It implies that the financial burden of the company has reduced significantly during the study period. Higher operating profit or fund from operation has been utilised for repayment of long-term debt, so that the financial risk associated with the company has declined significantly during the study period.

Answer for Illustration 2:

Common Size Comparative Income Statement

Particulars	2017-18	2018-19	2019-20	2020-21	2021-22
Cost of Materials	12.5%	20%	25%	25%	21.05%

$\left(\dfrac{\text{Cost of Materials}}{\text{Sales}}\times100\right)$					
Labour Cost $\left(\dfrac{\text{Labour Cost}}{\text{Sales}}\times100\right)$	16.67%	12.73%	15%	15%	18.42%
Conversion Cost $\left(\dfrac{\text{Conversion Cost}}{\text{Sales}}\times100\right)$	12.50%	13.64%	14%	20%	18.42%
Total Manufacturing Cost $\left(\dfrac{\text{Total Manufacturing Cost}}{\text{Sales}}\times100\right)$	41.67%	46.36%	54%	55%	57.89%
Sales Revenue	100%	100%	100%	100%	100%
Gross Profit $\left(\dfrac{\text{Gross Profit}}{\text{Net Sales}}\times100\right)$	58.33%	53.64%	46%	45%	42.11%
Other Operating Expenses $\left(\dfrac{\text{Other Operating Expenses}}{\text{Net Sales}}\times100\right)$	25%	20%	20%	20%	18.95%
Operating Profit $\left(\dfrac{\text{Operating Profit}}{\text{Sales}}\times100\right)$	33.33%	33.64%	26%	25%	23.16%

Comments:

From the above analysis, it can be concluded that there was a clear upward rising trend in the manufacturing cost of goods sold during the study period. As a result, gross profit to sales has been decreased very significantly during the same period. It was 58.33% in the year 2017-18 which ultimately reduced to 42.11% in the ultimate year of the study period i.e., 2021-22. It implies that operational efficiency of the company has been reduced very significantly during the period.

Answer for Illustration 3:

Common Size Balance Sheet as on 31.03.2021 & 31.03.2022

particulars	On 31.03.2021 % of total	On 31.03.2022 % of total
Share holders' fund		
Equity Share Capital $\left(\dfrac{\text{Share Capital}}{\text{Total Liabilities}}\times100\right)$	40%	36.92%
Reserve & Surplus $\left(\dfrac{\text{Reserve \& Surplus}}{\text{Total Liabilities}}\times100\right)$	16%	28%
Total Shareholders Fund/Owners' Equity	56%	64.22%

Non-current liabilities		
Long-Term Debt $$\left(\frac{Long\,Term\,Debt}{Total\,Liabilities}\times100\right)$$	30.33%	26.05%
Current Liabilities		
Current Liabilities & Provision $$\left(\frac{Current\,Liabilities}{Total\,Liabilities}\times100\right)$$	13.33%	9%
Total labilities	**100%**	**100%**
Non-current Assets		
Fixed Assets $$\left(\frac{Fixed\,Assets}{Total\,Assets}\times100\right)$$	67%	60%
Current Assets		
Inventory $$\left(\frac{Inventory}{Total\,Assets}\times100\right)$$	14%	18%
Debtors $$\left(\frac{Debtors}{Total\,Assets}\times100\right)$$	10%	10%
Bank $$\left(\frac{Bank}{Total\,Assets}\times100\right)$$	9%	12%
Total Current Assets	33%	40%
Total Assets	**100%**	**100%**

Comments:

(i) The proportion of owner's equity to total liabilities of the company has been increased from 56% to 64.92% whereas the proportion of long-term debt to total liabilities has been decreased from 30.33% to 26.05% in the year 2021-22. So, we can conclude that the dependency on outsiders has been decreased and degree of financial risk associated with the company has been reduced during the study period.

(ii) The percentage of current assets to total assets has been increased from 33% to 40% whereas the percentage of current liabilities to total liabilities decreased from 13.33% to 9% in the year 2021-22. Therefore, it indicates that the liquidity position of the company has been significantly improved during the period under study. But reduction of fixed assets may hamper the long-term stability and operating efficiency of the company

Answer for Illustration 4:

Particulars	31.03.2021 (Rs.)	31.03.2022 (Rs.)	Amount of increase(+) or decrease (-) (Rs.)	percentage increase(+) or decrease (-)
Net Sales	1,70,000	1,90,400	(+) 20,400	Note (i) (+) 12.0
Less: Cost of goods sold	1,05,000	1,20,000	(+) 15,000	Note (ii) (+) 14.3
Gross Profit (P)	65,000	70,400	(+) 5,400	(+) 8.3
Administrative expenses (A)	13,200	14,960	(+) 1,760	(+) 13.3
Selling expenses:				
Advertisement expenses	3,000	4,000	(+) 1,000	(+) 33.3
Other selling expenses	40,800	41,800	(+) 1,000	(+) 2.5
Total selling expenses (B)	43,800	45,800	(+) 2,000	(+) 4.6
Operating expenses (A + B)	57,000	60,760	(+) 3,760	(+) 6.6
Operating Profit (D) [D = P – (A + B)]	8,000	9,640	(+) 1,640	(+) 20.5
Other Incomes (E)	6,400	9,200	(+) 2,800	(+) 43.8
Other expenses (F)	6,800	4,800	(–) 2,000	(–) 29.4
Profit before tax (PBT) [PBT = D + E – F]	7,600	14,040	(+) 6,440	84.7
Income tax (T)	3,800	6,200	(+) 2,400	(+) 63.2
Profit after tax (PAT) [PAT = PBT – T]	3,800	7,840	(+) 4,040	(+) 106.3

Notes: Calculation for percentage increase (+) or decrease (–):

(i) $\left(\dfrac{20,400}{1,70,000} \times 100\right) = 12\%$

(ii) $\left(\dfrac{15,000}{1,05,000} \times 100\right) = 14.3\%$ and so on.

Comments:

Comparative income statement shows the income and expenses of two periods of same company, absolute changes of each item for the year ended 31.03.2022 over 31.03.2021 and also shows percentage change.

The following comments can be made on the performance of A Ltd.:

(i) Sales of A Ltd. has been increased by Rs.20,400 during the year 2021-22 over 2020-21. But, the cost of goods sold has also increased by Rs.15,000 in the same period. i.e., sales have improved by 12% and cost of goods sold has increased by 14.3%. So, Gross Profit has not improved markedly. Cost of goods sold may increase due to higher quantity of sales or due to higher input cost. As sale value has increased so it is clear cost of goods sold has increased due to higher

quantity of sales. If such quantity has been sold at previous price, then sales value has been increased with higher amount. But here sales value has not increased significantly. It indicates that the addition in sales has been due to lowering of sale price. It is also clear from advertisement expenses. The increase in advertisement expenses (33.3%) has been much higher than the percentage increase in net sales (12%). It indicates there was tough selling market where mass advertisement was necessary and reduction of sale price was necessary in order to higher quantity of sales. Such situation may also arise due to new product launching where huge advertisement is necessary and reduction of sale price is necessary.

(ii) There has been a substantial improvement in other incomes, both in relative term (43.8%) and in absolute term (Rs.2,800). Similarly, there has been a considerable reduction in other expenses in relative term (29.4%) as well as in absolute term (Rs.2,000). These items have been responsible for the increase in profit before tax (PBT) for the period under study by 84.7%. It implies that more emphasis has been given by the management of the company on earning non-operating profits as compared to the operating profits.

Answer for Illustration 5

Comparative Balance Sheets of Maharaj Ltd. as on 31.03.2021and 31.03.2022

	31.03.2021 (Rs.)	31.03.2022 (Rs.)	Amount of increase(+) or decrease (-) (Rs.)	percentage increase(+) or decrease (-)
Current Assets:				
Cash and Bank Balance	23,600	2,000	(–) 21,600	(–) 91.5
Debtors	41,800	38,000	(–) 3,800	(–) 9.1
Inventory	32,000	26,000	(–) 6,000	(–) 18.8
Other Current Assets	6,400	2,600	(–) 3,800	(–) 59.4
Total Current Assets(A)	1,03,800	68,600	(–) 35,200	(–) 33.9
Fixed Assets:				
Land and Building	54,000	34,000	(–) 20,000	(–) 37
Plant and Machinery	62,000	1,57,200	(+) 95,200	(+) 153.5
Furniture	5,800	9,600	(+) 3,800	(+) 65.5
Total Fixed Assets (B)	1,21,800	2,00,800	(+) 79,000	(+) 64.9
Long-term Investment (C)	9,200	11,800	(+) 2,600	(+) 28.3
Total Assets (A + B + C)	2,34,800	2,81,200	(+) 46,400	(+) 19.8
Current Liabilities (D)	52,400	25,400	(–) 27,000	(–) 51.5
Long-term Debt (E)	40,000	65,000	(+) 25,000	(+) 62.5
Owners' Equity:				
Equity Share Capital	80,000	1,20,000	(+) 40,000	(+) 50.0

Reserve and Surplus	62,400	70,800	(+) 8,400	(+) 13.5
Total Owner's Equity (F)	1,42,400	1,90,800	(+) 48,400	(+) 34
Total liabilities and capital (D + E + F)	2,34,800	2,81,200	(+) 46,400	(+) 19.8

Interpretation of Results

Comparative balance sheet shows the balance of different assets and liabilities of two different periods of

same company and shows absolute increase / decrease of each item in 2021-22 over 2020-21 and also shows the percentage change. Interpretation of these changes are as follows:

(i) The current assets of Maharaj Ltd. have decreased by Rs.35,200 in the year 2021-22 over 2020-21, whereas current liabilities have decrease by Rs.27,000 only. But it has no adverse effect on short term liquidity or on current ratio because current assets have decreased by 33.9% and current liabilities have decreased by 51.5%.

(ii) Cash and Bank balance have decreased by 91.5% during the study period. It implies an adverse cash position of the company. The company may face problem in meeting its short-term obligations.

(iii) The long-term debt of the company has increased by 62.5%, whereas its owners' equity has improved by 34% only. It implies that the financial risk (in terms of dependency on outsiders and in terms of contractual obligation) associated with the company has increased significantly during the period under study.

(iv) There has been a substantial increase in the fixed assets by the company. The fixed assets have increased by Rs. 79,000 (64.9%). This is mainly due to significant increase in the plant and machinery of the company.

The plant and machinery have increased by Rs.95,200 (153.5%). It indicates a remarkable improvement in the production capacity of the company during the study period. Such cost of assets has financed by proprietors' fund and long-term loan raised. It indicates the long-term stability of the business.

Answer for Illustration 6:

Computation of Trend Ratio (%)

	2018-19	2019-20 $\left(\dfrac{2019\text{-}20}{2018\text{-}19}\times100\right)$	2020-21 $\left(\dfrac{2020\text{-}21}{2018\text{-}19}\times100\right)$	2021-22 $\left(\dfrac{2021\text{-}22}{2018\text{-}19}\times100\right)$
Cost of materials consumed	100	125	100	90
Labour cost	100	100	133.3	83.3
Other expenses	100	133.3	66.7	100

Cost of sales	100	120	100	91
Profit	100	100	83.3	115
Sales	100	112.5	93.8	100

Comment: The reduction in cost of sales in the year 2020-21 and 2021-22 is mainly due to reduction in cost of material consumed. Except that there is fluctuating trend in all the items disclosed in the financial statement during the period under study. So, no definite conclusion can be drawn from the above analysis.

Note:

Calculation of Trend Ratio:

$$\frac{\text{Current year's cost of material Consumed}}{\text{Base year's cost of material consumed}} \times 100$$

$$= \frac{Rs.2,50,000}{Rs.2,00,000} \times 100$$
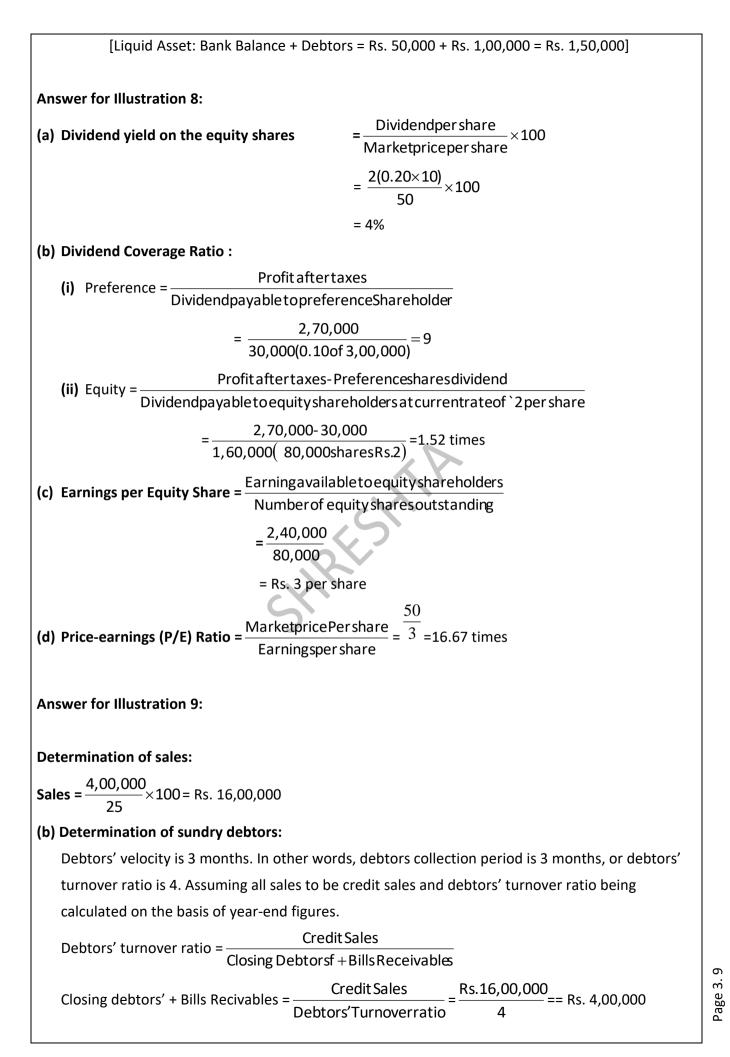
= 125% and so on

Answer for Illustration 7:

Jai Hind Ltd.

Income Statement for the year ended 31st March, 2022

Particulars	Amount (Rs.)	Amount (Rs.)
Sales		1,000,000
(-) Cost of goods sold:		
Raw material consumed	2,00,000	
Wages	2,00,000	
Manufacturing expenses	1,00,000	
Cost of production	5,00,000	
(+) Opening stock of finished goods	1,00,000	
(-) Closing stock of finished goods	(1,00,000)	(5,00,000)
Gross profit		5,00,000
(-) Operating expenses:		
Administrative expenses	50,000	
Selling and distribution	50,000	(1,00,000)
Operating profit		4,00,000
(+) Non operating income (profit on sale of shares)		50,000
(-) Loss on sale of plant		(55,000)
EBIT		3,95,000
(-) Interest		(10,000)
EBT / Net Profit		3,85,000

Statement of Financial Position

Particulars	(Rs.)
Bank	50,000
Debtors	1,00,000
Liquid assets	1,50,000
(+) Stock (Raw Materials and Furnished Goods)	2,50,000
Current assets	4,00,000
(−) Current liabilities (Sundry Creditors and Bills Payable)	(1,50,000)
Working capital	2,50,000
(+) Fixed assets	2,50,000
Capital employed in business	5,00,000
(−) External liabilities	(2,00,000)
Shareholders' funds	3,00,000
(−) Preference share capital	(1,00,000)
Equity share capital	2,00,000
Represented by	
Equity share capital	1,00,000
(+) Reserves	1,00,000
	2,00,000

(i) Gross Profit Ratio $= \dfrac{\text{Gross Profit}}{\text{Sales}} \times 100 = \dfrac{\text{Rs. }5,00,000}{\text{Rs. }10,00,000} \times 100 = 50\%$

(ii) Overall Profitability Ratio $= \dfrac{\text{Operating Profit}}{\text{Capital Employed}} \times 100 = \dfrac{\text{Rs. }4,00,000}{\text{Rs. }5,00,000} \times 100 = 80\%$

(iii) Current Ratio $= \dfrac{\text{Current Assets}}{\text{Current Liabilities}} = \dfrac{4,00,000}{1,50,000} = 2.67 \text{ times}$

(iv) Debt Equity Ratio $= \dfrac{\text{Long-term Debt}}{\text{Long-term Fund}} = \dfrac{2,00,000}{5,00,000} = 0.4 \text{ times}$

(v) Stock Turnover Ratio $= \dfrac{\text{Raw Materials Consumed}}{\text{Average Stock of Raw Materials}} = \dfrac{2,00,000}{1,00,000} = 2 \text{ times}$

[Average Stock of Raw Materials $= \dfrac{50,000 + \text{Rs. }1,50,000}{2} = \text{Rs. }1,00,000$]

(vi) Finished Goods Turnover Ratio $= \dfrac{\text{Cost of goods sold}}{\text{Average stock of Raw Materials}} = \dfrac{5,00,000}{1,00,000} = 5 \text{ times}$

[Average Stock of Raw Materials $= \dfrac{1,00,000 + \text{Rs. }1,00,000}{2} = 1,00,000$]

(vii) Liquid Ratio $= \dfrac{\text{Liquid Assets}}{\text{Current Liabilities}} = \dfrac{1,50,000}{1,50,000} = 1$

[Liquid Asset: Bank Balance + Debtors = Rs. 50,000 + Rs. 1,00,000 = Rs. 1,50,000]

Answer for Illustration 8:

(a) Dividend yield on the equity shares

$$= \frac{\text{Dividend per share}}{\text{Market price per share}} \times 100$$

$$= \frac{2(0.20 \times 10)}{50} \times 100$$

$$= 4\%$$

(b) Dividend Coverage Ratio :

(i) Preference $= \dfrac{\text{Profit after taxes}}{\text{Dividend payable to preference Shareholder}}$

$$= \frac{2,70,000}{30,000(0.10 \text{ of } 3,00,000)} = 9$$

(ii) Equity $= \dfrac{\text{Profit after taxes - Preference shares dividend}}{\text{Dividend payable to equity shareholders at current rate of } `2 \text{ per share}}$

$$= \frac{2,70,000 - 30,000}{1,60,000(80,000 \text{ shares Rs.2})} = 1.52 \text{ times}$$

(c) Earnings per Equity Share $= \dfrac{\text{Earning available to equity shareholders}}{\text{Number of equity shares outstanding}}$

$$= \frac{2,40,000}{80,000}$$

$$= \text{Rs. 3 per share}$$

(d) Price-earnings (P/E) Ratio $= \dfrac{\text{Market price Per share}}{\text{Earnings per share}} = \dfrac{\dfrac{50}{3}}{} = 16.67 \text{ times}$

Answer for Illustration 9:

Determination of sales:

Sales $= \dfrac{4,00,000}{25} \times 100 =$ Rs. 16,00,000

(b) Determination of sundry debtors:

Debtors' velocity is 3 months. In other words, debtors collection period is 3 months, or debtors' turnover ratio is 4. Assuming all sales to be credit sales and debtors' turnover ratio being calculated on the basis of year-end figures.

Debtors' turnover ratio $= \dfrac{\text{Credit Sales}}{\text{Closing Debtorsf + Bills Receivables}}$

Closing debtors' + Bills Recivables $= \dfrac{\text{Credit Sales}}{\text{Debtors' Turnover ratio}} = \dfrac{\text{Rs.16,00,000}}{4} ==$ Rs. 4,00,000

Closing Debtors = Rs. 4,00,000 – Rs. 25,000 = Rs. 3,75,000

(c) Determination of Closing Stock:

Stock velocity of 8 months signifies that the inventory holding period is 8 months, stock turnover ratio is 1.5

i.e., (12 months / 8).

$$\text{Stock Turnover} = \frac{\text{Cost of Goods Sold (Sales - Gross Profit)}}{\text{Average Stock}} = \frac{Rs.12,00,000}{\text{Average Stock}} = 1.5$$

$$\text{Average Stock} = \frac{Rs.12,00,000}{1.5} = Rs.8,00,000$$

Closing Stock – Opening Stock = Rs. 10,000 ....(i)

$$\frac{\text{Closing Stock} + \text{Opening Stock}}{2} = Rs.\ 8,00,000 \ ....(ii)$$

Closing Stock + Opening stock = Rs. 16,00,000 ....(iii)

Subtracting (i) from (iii) we have,

2 Opening Stock = Rs. 15,90,000

Opening Stock = Rs. 7,95,000

Therefore, Closing Stock = Rs. 8,05,000

(d) Determination of Sundry Creditors':

Creditors' velocity of 2 months signifies that the credit payment period is 2 months. In other words, creditors' turnover ratio is 6 (i.e., 12 months/2). Assuming all purchases to be credit purchases and creditors turnover is based on year- end figures.

$$\text{Creditors Turnover Ratio} = \frac{\text{Credit purchase}}{\text{Creditors} + \text{Bills payable}}$$

$$6 = \frac{12,00,000}{\text{Creditors} + 10,000}$$

or, Creditors + Rs. 10,000 = $\dfrac{12,00,000}{6}$

or, Creditors = Rs. 2,01,667 – Rs. 10,000

Therefore, Creditors = Rs.1,91,667

Credit purchases are calculated as follows:

Cost of Goods Sold = Opening Stock + Purchases + Closing Stock

or, Rs. 12,00,000 = Rs. 7,95, 000 + Purchases – Rs. 8,05,000

or, Rs. 12,00,000 + Rs. 10,000 = Purchases

or, Rs. 12,10,000 = Purchases (credit)

Illustration: 10:

As per Altman's Model (1968) of Corporate Distress Prediction:

$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5$

Here, the five variables are as follows:

X_1 = Working Capital to Total Assets = 25%

X_2 = Retained Earnings to Total Assets = 30%

X_3 = EBIT to Total Assets = 15%

X_4 = Market Value of Equity Shares to Book Value of Total Debt =150%

X_5 = Sales to Total Assets = 2 times

Hence, Z-score = (1.2 × 25%) + (1.4 × 30%) + (3.3 × 15%) + (0.6 × 150%) + (1 × 2.00)

= 0.30 + 0.42 + 0.495 + 0.90 + 2.00

= 4.115

Comment: As the calculated value of Z-score is much higher than 2.99, it can be strongly predicted that the company is a non-bankrupt company.

Answer for Illustration 11:

A. Calculation of changes in Working Capital

Current Asset	2020 (Rs.)	2021 (Rs.)
Debtors	1,60,000	2,00,000
Stock	77,000	1,09,000
Bills Receivable	20,000	30,000
Cash in hand	15,000	10,000
Cash at Bank	10,000	8,000
A: Total Current Assets	**2,82,000**	**3,57,000**

Current Liabilities	2021	2022
Creditors	55,000	83,000
Bill Payable	20,000	16,000
B: Total Current Liabilities	75,000	99,000
Working capital (A-B)	2,07,000	2,58,000

Increase in working capital   Rs. 2,58,000 – Rs. 2,07,000 = Rs. 51,000

Funds Flow Statement

Sources	Amount (Rs.)	Application	Amount (Rs.)
Funds from Operations	2,30,000	Purchases of Plant	1,30,000

Sale proceeds of Land & Building	10,000	Increase in Working Capital	51,000
Issue of Equity Share Capital	1,00,000	Tax Paid	35,000
		Redemption of Preference Share Capital	50,000
		Proposed Dividend	42,000
		Interim Dividend paid	20,000
		Preference Dividend paid	12,000
	3,40,000		3,40,000

Working note

Dr.   1. Land & Buildings A/c   Cr.

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)
To, Balance b/d	2,00,000	By, Depreciation provided	20,000
		By, Bank – sale proceeds (b/f)	10,000
		By, Balance c/f	1,70,000
	2,00,000		**2,00,000**

Dr.   2. Plant A/c   Cr.

	Rs.		Rs.
To, Balance b/d	80,000	By, Depreciation provided	10,000
To, Bank (b/f)	1,30,000	By, Balance c/f	2,00,000
	2,10,000		**2,10,000**

Dr.   3. Provision for Tax A/c   Cr.

	Rs.		Rs.
To, Bank – paid	35,000	By, Balance b/d	40,000
To, Balance c/f	50,000	By, P & L A/c –provided	45,000
	85,000		**85,000**

Dr.   4. P/L Adjustment A/c   Cr.

	Rs.		Rs.
To, Depreciation	30,000	By, Balance b/d	30,000
To, Preference Dividend (1,50,000 × 8%)	12,000		
To, Transfer to G/R	30,000		
To, Provision for Tax	45,000		
To, Proposed Dividend	50,000		
To, Goodwill written off	25,000		
To, Interim Dividend	20,000		

To, Balance C/f	48,000	By, Funds from Operation, (b/f)	2,30,000
	2,60,000		**2,60,000**

Answer for Illustration 12:

In the books of Gama Ltd.

Funds Flow Statement For the year ended March 31, 2022

Sources of Fund	Amount (Rs.)	Application of Funds	Amount (Rs.)
Increase in Share Capital	1,12,500	Debenture Redemption	1,12,500
Sale of Assets	9,000	Redemption Premium	11,250
Fund from Operations	3,84,750	Tax paid	61,875
Sale of Investment	1,01,250	Dividend paid	33,750
		Increase in Working Capital	28,125
		Purchase of Fixed Assets	2,70,000
		Purchase of Investment	90,000
	6,07,500		**6,07,500**

Working notes:

Statement showing Funds from Operations

Particulars	Amount (Rs.)	Amount (Rs.)
Net Profit [2,25,000 – 1,12,500]		1,12,500
Add: Transfer to General Reserve	56,250	
Loss on sale of fixed assets	2,250	
Premium on Redemption of Debentures	11,250	
Provision for Tax	68,625	
Provision for Dividend	38,250	
Depreciation	90,000	
Misc. Expenses. write off	5,625	2,72,250
Funds from Operations		**3,84,750**

Statement showing changes in Working Capital

Particulars		(Rs.)	
Current Assets			
Stock		2,25,000	3,03,750
Debtors		2,53,125	2,75,625

Bills Receivables		45,000	73,125
Prepaid Expenses		11,250	13,500
Total Current Assets (A)		5,34,375	6,66,000
Current Liabilities			
Accrued Expenses		11,250	13,500
Creditors		1,80,000	2,81,250
Total Current Liabilities		1,91,250	2,94,750
Working Capital (A) – (B)		3,43,125	3,43,125
Increase in Working Capital			28,125

Dr. Provision for Doubtful Debt A/c Cr.

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)
To Bad debts	15,750	By Balance b/d By P & L A/c	45,000
To Balance c/d	56,250		27,000
	72,000		**72,000**

Dr.   Provision for Dividends   Cr.

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)
To Divend paid	33,750	By Balance b/d By P & L A/c	33,750
To Balance c/d	38,250		38,250
	72,000		**72,000**

Dr.   Provision for Tax   Cr.

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)
To Tax paid To Balance c/d	61,875	By Balance B/d	78,750
	85,500		68,625
	1,47,375	By P & L A/c	**1,47,375**

Dr.   Accumulated Depreciation A/c   Cr.

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)
To Asset sold	33,750	By Balance b/d	2,25,000
To Balance c/d		By P & L A/c	
	2,81,250		90,000
	3,15,000		**3,15,000**

Dr.   Fixed Assets A/c   Cr.

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)

To Balance b/d	11,25,000	By Account depreciation	33,750
To Bank	2,70,000	By Bank	9,000
		By P & L	2,250
		By Balance c/d	13,50,000
	13,95,000		**13,95,000**

Answer for Illustration 13

Working Notes:

1. **Cash receipt from customers:** (Rs.)

Sales revenue	2,52,00,000
Add: Debtor at beginning	16,80,000
	2,68,80,000
Less: Debtors at the end	18,60,000
Total cash receipt from customers	2,50,20,000

2. **Income tax paid:** (Rs.)

Tax payable at beginning Add: Provision for taxation	1,20,000
	8,80,000
	10,00,000
Less: Tax payable at the end	1,32,000
Tax paid during the year	8,68,000

3. **Cash paid to supplier and employees** (Rs.)

Cost of goods sold		1,98,00,000
Add: Operating expenses Salary and wages		8,00,000
		24,00,000
		2,30,00,000
Add: Creditor at the beginning	24,00,000	
Stock at the end	9,60,000	
Advance at the end	90,000	
Outstanding exp. at the beginning	2,40,000	36,90,000
		2,66,90,000
Less: Creditors at the end	23,40,000	
Stock at the beginning	26,40,000	
Advance at the beginning	78,000	
Outstanding expenses at the end	4,80,000	55,38,000
Total Cash Paid		**2,11,52,000**

4. **Accumulated depreciation on equipment sold** (Rs.)

Accumulated depreciation at beginning Add: Depreciation for the year	12,00,000
	6,00,000

		18,00,000
Less: Accumulated depreciation at the end		13,20,000
Accumulated depreciation on equipment sold		4,80,000

5. Sale price of equipment		**(Rs.)**
Cost Price		7,20,000
Less: Accumulated depreciation		4,80,000
		2,40,000
Add: Profit on sale		1,20,000
Sale price		3,60,000

6. Purchase of building and equipments		**(Rs.)**
Opening balance		36,00,000
Less: Cost of equipment sold		7,20,000
		28,80,000
Balance at end of the year		57,60,000
Purchase during the year		28,80,000

Cash Flow Statement of A Ltd. for the year ended 31st March 2022

(A) Cash flow from Operating Activities:	(Rs.)	(Rs.)
Cash receipts from customers	2,50,20,000	
Less: Cash paid to supplier & employees	2,11,52,000	
Cash generated from operations	38,68,000	
Less: Income tax paid	(8,68,000)	
Net cash from operating activities		30,00,000
(B) Cash flow from Investing Activities:		
Purchase of land	(4,80,000)	
Purchase of building & equipment	(28,80,000)	
Sale of equipment	3,60,000	
Net cash used in financing activities		(30,00,000)
(C) Cash flow from Financing Activities:		
Issue of share capital	8,40,000	
Dividends paid	(7,20,000)	
Net cash from financing activities		1,20,000
Net increase in cash & cash equivalents		1,20,000
Cash & cash equivalent at beginning		6,00,000
Cash & cash equivalent at the end		7,20,000

Answer for Illustration 14

Cash Flow Statement for the year ending 31st March, 2022

Particulars	(Rs.)	(Rs.)
Cash flow from Operating Activities		
Profit and Loss A/c as on 31.3.2022		3,00,000
Less: Profit and Loss A/c as on 31.3.2021		2,10,000
		90,000
Add: Transfer to General Reserve	25,000	
Provision for Tax	96,000	
Proposed Dividend	1,44,000	2,65,000
Profit before Tax		3,55,000
Adjustment for Depreciation		
Land and Building	50,000	
Plant and Machinery	1,20,000	1,70,000
Profit on Sale of Investments		(15,000)
Loss on Sale of Plant and Machinery		9,000
Goodwill written off		20,000
Interest on Debenture		33,000
Operating Profit before Working Capital changes		5,72,000
Adjustment for Working Capital changes:		
Decrease in Prepaid Expenses		4,000
Decrease in Stock		15,000
Increase in Debtors		(1,27,000)
Increase in Creditors		30,000
Cash generated from Operations		4,94,000
Income tax paid		(71,000)
Net Cash Inflow from Operating Activities (A)		**4,23,000**
Cash flow from Investing Activities		
Sale of Investment		35,000
Sale of Plant and Machinery Purchase of Plant and		36,000
Machinery		(2,25,000)
Net Cash Outflow from Investing Activities (B)		**(1,54,000)**
Cash flow from Financing Activities		
Issue of Preference Shares		1,00,000
Premium received on issue of securities		25,000

Particulars	(Rs.)	(Rs.)
Redemption of Debentures at a premium Dividend paid		(2,20,000)
Interest paid to Debenture holders		(1,36,000)

		(33,000)
Net Cash outflow from Financing Activities (C)		**(2,64,000)**
Net increase in Cash and Cash Equivalents during the year (A + B + C)		5,000
Cash and Cash Equivalents at the beginning of the year		88,000
Cash and Cash Equivalents at the end of the year		93,000

Working Notes:

1. Dr.   **Provision for the Tax Account**   Cr.

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)
To, Bank (paid) To, Balance c/d	71,000	By, Balance b/d	80,000
	1,05,000	By, Profit and Loss A/c	96,000
	1,76,000		**1,76,000**

2. Dr.   **Investment Account**   Cr.

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)
To, Balance b/d	2,40,000	By, balance (bal fig) By, balance	35,000
To, profit and loss (profit on sale)	15,000	c/d	2,20,000
	2,55,000		**2,55,000**

3. Dr.   **Plant and Machinery Account**   Cr.

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)
To, Balance b/d	6,00,000	By, Bank (sale)	36,000
To, Bank A/c (Purchase)	2,25,000	By, Profit and Loss A/c (loss on sale)	9,000
		By, Depreciation	1,20,000
		By, Balance c/d	6,60,000
	8,25,000		**8,25,000**

Note:

In this question, the date of redemption of debentures is not mentioned. So, it is assumed that the debentures are redeemed at the beginning of the year.

4. **Schedule of Changes in Working Capital**

Particulars	31 March 2011 (Rs.)	31 March 2012 (Rs.)	Changes in Working Capital Increase (Rs.)	Decrease (Rs.)
Current Assets				
Stock	4,00,000	3,85,000	-	- 15,000
Debtors	2,88,000	4,15,000	1,27,000	
Prepaid Expenes	15,000	11,000		- 4,000
Cash and Bank	88,000	93,000	5,000	
Total (A)	**7,91,000**	**9,04,000**		

Current Liabilities				
Creditors	1,85,000	2,15,000		30,000
Total (B)	**1,85,000**	**2,15,000**		
Working Capital (A-B)	6,06,000	6,89,000		
Increase in Working Capital	83,000	--	--	83,000
	6,89,000	**6,89,000**	**1,32,000**	**1,32,000**

Answer for Illustration 15

Cash Flow Statement for the year ending 31st March, 2022

	Particulars	(Rs.)	(Rs.)
A	**Cash Flows from Operating Activities**		
	Profit and Loss A/c		72,000
	(Rs. 3,60,000 – Rs. 2,88,000)		
	Adjustments:		
	Increase in General Reserve	1,44,000	
	Depreciation	4,20,000	
	Provision for Tax	4,08,000	
	Loss on Sale of Machine	36,000	
	Premium on Redemption of Debentures	14,400	
	Proposed Dividend	1,72,800	
	Preliminary Expenses written off	48,000	
	Fixed Assets written of	12,000	
	Interest on Debentures	60,480	13,15,680
	Funds from Operations		13,87,680
	Increase in Sundry Creditors	40,000	
	Increase in Bills Payable	8,000	
		48,000	
	Increase in Sundry Debtors	(2,00,000)	
	Increase in Stock	(44,000)	(1,96,000)
	Cash before tax		11,91,680
	Less: Tax paid		4,32,000
	Cash in flows from Operating Activities		**7,59,680**
B	**Cash in flows from Investing Activities**		

	Particulars	(Rs.)	(Rs.)
	Purchase of Fixed Assets	(10,20,000)	
	Sale of Investment	1,44,000	
	Sale of Fixed Assets	1,20,000	
	Cash out flows from Investing Activities		**(7,56,000)**

	Issue of share capital	4,80,000
	Redemption of Debentures	(3,02,400)
	Dividend Paid (1,44,000 – 19,200)	(1,24,800)
	Interest on Debentures	(60,480)
C	**Cash outflow from Financing Activities**	
	Net Increase in Cash and Cash Equivalents	(7,680)
	Cash and Cash Equivalents at the beginning of the year	(4,000)
	Cash and Cash Equivalents at the end of the year	4,000

- It is presumed that the 30% debentures have been redeemed at the beginning of the year.

Working Note:

Dr.		Fixed Assets Account		Cr.
Particulars	**Amount (Rs.)**	**Particulars**	**Amount (Rs.)**
To, Balance b/d	27,36,000	By, Cash	1,20,000
To, Purchases (balance figure)	10,20,000	By, Loss on sales	36,000
		By, Depreciation	4,20,000
		By, Assets written off	12,000
		By, Balance c/d	31,68,000
	37,56,000		**37,56,000**

4. SOURCES OF FINANCE AND COST OF CAPITAL
SOLUTIONS FOR CLASSROOM DISCUSSION

Answer for Illustration 1:

(i) Debt issued at par –

$$\text{Before}-\text{tax cost}, k_i = \text{Rs.}\frac{10,000}{1,00,000} = 10.00\%$$

After-tax cost, kd = ki(1-t) = 10%(1-0.35) = 6.5 %

(ii) Issued at discount –

$$\text{Before}-\text{tax cost}, k_i = \text{Rs.}\frac{10,000}{90,000} = 11.11\%$$

After-tax cost, kd = 11.11%(1-0.35) = 7.22 %

(iii) Issued at premium –

$$\text{Before}-\text{tax cost}, k_i = \text{Rs.}\frac{10,000}{1,10,000} = 9.09\%$$

After-tax cost, kd = 9.09% (1-0.35) = 5.91 %

When both net Proceed of issue and market price of debenture are given –

Answer for Illustration 2:

Cost of irredeemable debenture:

$$k_d = \frac{I}{NP}(1-t)$$

kd = Cost of debt after tax

I = Annual interest payment = Rs. 12

NP= Net proceeds of debentures or

current market price = Rs. 95, t = Tax

rate=35%

$$k_d = \frac{12(1-0.35)}{95} = 0.08211 \text{ or } 8.21\%$$

Answer for Illustration 3:

Cost of perpetual (non-redeemable) debt is calculated by using following formula:

$$k_d = \frac{I}{NP}(1-t)$$

Here,

I = Coupon rate =15%

NP = Market price = Rs. 100 (as

sold at par) t = Tax = 35%

$$k_d = \frac{15(1-0.35)}{100} = 9.75\%$$

(a) If the market price is at 5% premium to the face value (Rs. 105); then

$$\text{Cost of debt} = k_d = \frac{15(1-0.35)}{105} = 9.25\%$$

(b) If the market price is at 5% discount to the face value (Rs. 95); then

$$\text{Cost of debt} = k_d = \frac{15(1-0.35)}{95} = 10.26\%$$

Answer for Illustration 4:

The cost of debenture (kd) will be calculated as below:

$$k_d = \frac{I(1-t) + \left(\dfrac{RV-NP}{n}\right)}{\dfrac{RV+NP}{2}}$$

Here,

I= Interest on debenture = 10% of Rs. 100 =

Rs.12 NP = Net proceeds = 110% of Rs. 100

= Rs. 110

RV = Redemption value = Rs. 100

n= Period of debenture = 5

Year t= Tax rate = 35 % or 0.35

$$k_d = \frac{12(1-0.35) + \left(\dfrac{100-110}{5}\right)}{\dfrac{100+110}{2}}$$

$$\text{Or } k_d = \frac{=12 \times 0.65-2}{105} = \frac{5.8}{105}$$

=0.05524 or 5.52%

Answer for Illustration 5:

$$\text{Cost of debenture (kd)} = k_d = \frac{I(1-t) + \left(\dfrac{RV-NP}{n}\right)}{\dfrac{RV+NP}{2}}$$

I= Interest on debenture = 10% of Rs. 100 =Rs. 12

NP = Net proceeds = Rs. 80

RV = Redemption value = Rs. 100

n= Period of debenture =

5Years t= Tax rate = 35 % or

0.35

$$k_d = \dfrac{12(1-0.35)+\left(\dfrac{100-80}{5}\right)}{\dfrac{100+80}{2}}$$

$$k_d = \dfrac{12\times0.65+4}{90} = \dfrac{11.8}{90} = 13.111 = 13.11\%$$

Answer for Illustration 6:

After tax cost of debenture (kd) may be calculated as follows:

$$\text{Cost of debenture (kd)} = k_d = \dfrac{I(1-t)+\left(\dfrac{RV-NP}{n}\right)}{\dfrac{RV+NP}{2}}$$

Where,

kd = Cost of debt after tax

I = Rate of interest i.e., 12% or Rs. 12 per

debenture t = Tax rate i.e. 50% or 0.50

n = Number of years in which debenture is to be redeemed i.e. 10 years

RV = Principal value at the time of redemption i.e. Rs. 100 + (5% of Rs. 100) or Rs. 105 per debenture

NP = Net cash proceeds at the time of issue i.e. Rs. 100 – (5% of Rs. 100) – Rs. 5 or Rs. 90 per debenture

$$k_d = \dfrac{12(1-0.50)+\left(\dfrac{105-90}{10}\right)}{\dfrac{105+90}{2}}$$

$$= \dfrac{6+1.5}{97.5} = 0.07692 \text{ or } 7.69\%$$

Answer for Illustration 7:

The amount of interest will go on declining as the outstanding amount of bond will be reducing due to amortization. Since X Ltd. will have to return Rs. 2,000 every year, the outstanding amount of bond will be zero at the end of fifth year. The outflows every year will consist of interest payment and repayment of principal as follows:

Year	Amount of Interest	Interest and Payment of Princpal
First year	Rs. 10,000 × 0.10 = 1,000	= (2,000 + 1,000) = Rs. 3,000
Second year	(Rs. 10,000 - Rs. 2000) × 0.10 = 800	= (2,000 + 800) = Rs. 2,800
Third year	(Rs. 8,000 - Rs. 2,000) × 0.10 = 600	= (2,000 + 600) = Rs. 2,600
Fourth year	(Rs. 6,000 - Rs. 2000) × 0.10 = 400	= (2,000 + 400) = Rs. 2,400
Fifth year	(Rs. 4,000 - Rs. 2000) × 0.10 = 200	= (2,000 + 200) = Rs. 2,200

The above cash flows of all five years will be discounted with the cost of capital. Here the expected rate i.e. 6% will be used.

$$v_b = \frac{c_1}{\left(1+k_d\right)^1} + \frac{c_2}{\left(1+k_d\right)^2} + \cdots\cdots + \frac{c_n}{\left(1+k_d\right)^n}$$

Where,

kd= 6% = 0.06

Value of the bond is calculated as follows:

$$v_b = \frac{3000}{\left(1.06\right)^1} + \frac{2,800}{\left(1.06\right)^2} + \frac{2,600}{\left(1.06\right)^3} + \frac{2,400}{\left(1.06\right)^4} + \frac{2,200}{\left(1.06\right)^5}$$

$$v_b = \frac{3000}{1.06} + \frac{2,800}{1.1236} + \frac{2,600}{1.1910} + \frac{2,400}{1.2624} + \frac{2,200}{1.3382}$$

= Rs. 2830.18 + Rs. 2491.99 + Rs. 2183.04 + Rs. 1901.14 + Rs. 1643.99

= Rs. 11,050.34

Answer for Illustration 8:

Determination of Redemption value:

Higher of,

(i) The cash value of debentures = Rs. 100

(ii) Value of equity shares = 10 shares × Rs. 14(1+0.05)5

= 10 shares × 17.868 = Rs.178.68

Therefore, Rs. 178.68 will be taken as redemption value as it is higher than the cash option and attractive to the investors.

$$k_d = \frac{I(1-t) + \left(\dfrac{RV-NP}{n}\right)}{\dfrac{RV+NP}{2}}$$

$$= \frac{12(1+0.35) + \dfrac{178.68-100}{5}}{\dfrac{178.68+100}{2}}$$

$$= \frac{7.8+15.736}{139.34} \qquad =0.1689 \;\; 16.89\%$$

Answer for Illustration 9:

Calculation of cost of preference shares (kp)

Preference Dividend (PD) = Rs.100 × 60,000 shares × 0.12 = Rs. 7,20,000

Flotation Cost = 60,000 shares × Rs. 3 = Rs. 1,80,000

Net Proceeds (NP) = Rs. 105 × 60,000 shares - 1,80,000 = Rs. 61,20,000

Redemption Value (RV) = 60,000 shares × Rs. 110 = Rs. 66,00,000

Cost of Redeemable Preference Shares (kp) $= kp = \dfrac{PD + \left(\dfrac{RV - NP}{n}\right)}{\dfrac{RV + NP}{2}}$

$= \dfrac{7,20,000 + \dfrac{66,00,000 - 61,20,000}{10}}{\dfrac{66,00,000 + 61,20,000}{2}} = \dfrac{7,20,00048,000}{63,60,000} = 0.1208 = 12.08\%$

Answer for Illustration 10:

The cost of capital of redeemable preference share Kp may be computed as follows:

$$k_d = \dfrac{D(1 + D_t) + \dfrac{RV - NP}{n}}{\dfrac{RV + NP}{2}}$$

Where,

k p = Cost of preference share capital;

D = Annual preference dividend, i.e. Rs. 12 per share

RV = Redeemable value; i.e. , Rs. 100 + (20% of Rs. 100)= Rs.120

NP = Net Proceeds of the share; Rs. 100 + (10% of Rs. 100) – 5% of Rs. 110

= 1104.50

N = No. of years to redemption, i.e. 5 years

Dt = Dividend tax = 12.5 + Surcharge @ 2.5% + Education cess @ 3%

= 12.5 + 2.5% of (12.5) + 3% of (12.5 + 0.3125) = 12.5 + 0.3125 + 0.3844

= 13.1969% or 0.1319

Therefore, kp = $k_p = \dfrac{12(1 + 0.1319) + \dfrac{120 - 104.50}{5}}{\dfrac{120 + 104.50}{2}}$

$= \dfrac{12(1.1319) + 3.1}{112.25} = 0.1486$ or 14.86%

Answer for Illustration 11:

The cost of Preference share kp will be –

$k_p = \dfrac{D}{NP}$ [as there is no dividend distribution tax]

(i) When shares are issued at par i.e. at Rs.100 per share –

D =10

NP =100

$k_p = \dfrac{10}{100} = 10$ or 10%

(ii) When shares are issued at 10% premium i.e. at Rs. 110 per share –

$$D = 10$$

$$NP = 110$$

$$k_p = \frac{10}{110} = 0.0909 = 9\%$$

(iii) When shares are issued at 10% discount i.e. at Rs. 90 per share –

$$D = 10$$

$$NP = 90$$

$$k_p = \frac{D}{NP}$$

$$k_p = \frac{10}{90} = 0.1111 \text{ or } 11.11\%$$

Answer for Illustration 12:

$$k_e = \frac{D}{p_0}$$

Where,

ke =?

D = Rs. 4

P0 = Rs. 20

$$k_e = \frac{4}{20} \times 100 = 20\%$$

Answer for Illustration 13:

Cost of equity capital = $k_e = \frac{D}{p_0}$

D= Divined per share = 100 ×12% = Rs. 12

P_0 = Current market price per share = Issue price = 100 + 100 × 10% = Rs. 110

Selling price of the share = 110 − 5% of 110 = Rs. 104.50

$$k_e = \frac{12}{104.5} = 0.1148 = 11.48\%$$

Answer for Illustration 14:

$$k_e = \frac{E}{P} \times 100$$

ke = ?

E = Rs. 40,000/ 10,000 equity shares = Rs. 4

P = Rs. 25

$$k_e = \frac{4}{25} \times 100 = 16\%$$

Answer for Illustration 15:

(a) When dividend net of tax to shareholders maintained at same level, such policy would reduce the retained earnings which in turn reduces the growth.

t = Dividend tax = 15%

D1= Dividend = (Rs. 30 × 40%) = Rs.12

Amount of tax = (Dividend 12 × 15% tax) = Rs. 1.8

Retained earnings = (Rs. 30 - Rs. 12 - Rs. 1.8) = Rs. 16.2

Growth,

$$g = b \times r = k_e = \frac{\text{NetProfit(afterdividendpaid)}}{\text{NetProfits}} \times \frac{\text{NetProfit}}{\text{Book value of capital employed}}$$

$$k_e = \frac{\text{NetProfit(afterdividendpaid)}}{\text{Book value of capital employed}} = \frac{\text{RetainedEarnings}}{\text{Price}} = \frac{16.2}{200} = 0.081\% = 8.1\%$$

Cost of Equity

$$k_e = \frac{D_1}{P} + g = \frac{12}{200} + 0.081 = 0.141 = 14.1\%$$

(b) When dividend (gross of tax) to shareholders is maintained at the same level, such policy would keep the level of retained earnings and growth same but the amount of dividend to the shareholders would reduce by the extent of dividend tax.

t = Dividend tax = 15%

Amount of tax = (Dividend Rs. 12 × 15% tax) = Rs. 1.8

D1= Dividend (net of tax) = (Rs. 12-1.8) = Rs. 10.2

Retained earnings = (Rs. 30-12) = Rs.18

$$g = b \times r = k_e = \frac{\text{NetProfit(afterdividendpaid)}}{\text{NetProfits}} \times \frac{\text{NetProfit}}{\text{Book value of capital employed}}$$

$$k_e = \frac{\text{NetProfit(afterdividendpaid)}}{\text{Book value of capital employed}} = \frac{\text{RetainedEarnings}}{\text{Price}} = \frac{18}{200} = 0.09 = 9\%$$

$$k_e = \frac{D_1}{P} + g = \frac{10.2}{200} + 0.09 = 0.141 = 14.1\%$$

Answer for Illustration 16:

(a) The cost of equity capital (ke) may be ascertained as follows:

$$k_e = \frac{D_1}{P_0} + g$$

Where,

D1 = Dividend per share at the end of the current year i.e. Rs. 2

P0 = Market price per share i.e. Rs. 20

g = Expected growth rate of dividend i.e. 5% or 0.05

Therefore,

$$k_e = \frac{2}{20} + 0.05 = 0.01$$

(b) We know, $k_e = \frac{D}{P_0} + g$

Here, D1= Rs. 2, ke = 0.15, g= 0.07

$$ke = 0.15 = \frac{2}{p_0} + 0.07$$

or, $p_0 = \frac{2}{0.15 - 0.07} = \frac{2}{0.08} = 25 \, per \, share$

Answer for Illustration 17:

For Equity Share Capital (ke) :

$$k_e = \frac{DPS_1}{MPS} + g$$

Where,

DPS1 = Dividend per share at the end of the current year i.e. Rs. 11

MPS = Market price per share i.e. Rs. 180

g = Expected growth rate of dividend i.e. 0.1643 or 16.43% which may be calculated as under –

Growth Rate in 2019 $= \frac{8-7}{7} \times 100 = 14.29\%$

Growth Rate in 2019 $= \frac{10-8}{8} \times 100 = 25\%$

Growth Rate in 2019 $= \frac{11-10}{10} \times 100 = 10\%$

Simple Average $= \frac{14.29 + 25 + 10}{3} = \frac{49.29}{3} = 16.43\% \, or \, 0.1643$

$$k_e = \frac{11}{180} + 0.1643 = 0.2254 \, or \, 22.54\%$$

Answer for Illustration 18:

In mathematical terms,

$$k_e = R_f + b(K_m - R_f)$$

=0.08+1.6(0.13-0.08)

=16%

Answer for Illustration 19:

(a) The required rate of return $k_e = R_f + b(K_m - R_f)$

$\quad\quad$ = 10% + 1.4 (15% - 10%)

$\quad\quad$ = 17 %

Equilibrium price per share (P0) $\quad = \dfrac{D_1}{k_e - g}$

$$= \dfrac{4(1.08)}{17\% - 8\%} = 48$$

(b) The share of Target Ltd. is worth buying as it is undervalued.

Answer for Illustration 20:

$k_e = R_f + b(K_m - R_f)$

= 0.10 + 1.75 (0.15-0.10)

= 0.10 + 1.75 (0.05)

= 0.1875 or 18.75 %

Answer for Illustration 21:

$k_e = R_f + \beta(R_m - R_f)$

Where, k = Expected rate of return to the investors, or cost of capital

RfRs. = Risk free rate of return i.e. 14%

Rm = Market rate of return i.e. 18%

β = Beta coefficient by which the market risk is determined

(a) When β = 1,

$\quad$ k_e = 14% + 1 (18% − 14%)

$\quad$ = 14% + 4%

$\quad$ = 18%

(b) When β = 2/3,

$\quad$ k_e = 14% + 2/3 (18% − 14%)

$\quad$ = 14% + 2.6667

$\quad$ = 16.6667%

(c) When β = 5/4,

$\quad$ k_e = 14% + 5/4 (18% − 14%)

$\quad$ = 14% + 5%

$\quad$ = 19%

Answer for Illustration 22:

We know under CAPM approach cost of equity can be calculated as;

$$k_e = R_f + \beta(R_m - R_f)$$

Where,

Rf = Risk free rate of return i.e. 12% or 0.12

β = Beta coefficient i.e. 0.70

Rm = Expected return on market portfolio, i.e.

$$= \frac{Expected\,dividend + Capital\,appreciation}{Initial\,Investment} \times 100$$

$$= \frac{`140 + `200(i.e.`1,400.`1,200)}{`1,200} \times 100$$

= 0.2833 or 28.33%

ke = 0.12+ 0.70 (0.2833 − 0.12)

= 0.23431 or 23.43%

Answer for Illustration 23:

Cost of Retained Earnings, $k_r = k_e (1 - t) (1 - b)$

Where,

k_e = rate of return available to shareholders

t = tax rate

b = brokerage cost

Therefore,

k_r = 10% (1−0.5) (1−0.02)

= 10%×0.5×0.98

= 4.9%

Answer for Illustration 24:

Computation of cost of Retained Earnings (k_r)

k_r = k(1-t_p) − Brokerage

Where,

k = Opportunity cost;

t_p = Shareholders' personal tax

k_r = 0.10(1 − 0.30) - 0.02

= 0.07-0.02 = 0.05

= 5%

Alternatively,

Cost of Retained earnings is equal to opportunity cost for benefits forgone by the shareholders.

Earning before tax (10% of Rs. 10,00,000)	1,00,000

Less: Tax (30% of Rs. 1,00,000)	30,000
After Tax Earnings	70,000
Less: Brokerage (2% of Rs. 10,00,000)	20,000
Net Earnings	50,000
Total Investment	10,00,000

$\therefore$ Effective Cost of Retained Earnings $=\left(\dfrac{50,000}{10,00,000}\times100\right)=5\%$

Answer for Illustration 25:

(i) Cost of Equity $K_e = \dfrac{D_1}{P_0} + g = \dfrac{5}{50} + 0.07 = 0.1 + 0.07 = 17\%$

(ii) Cost of Debentures $(K_d) = r(1-t) = 0.09(1 - 0.3) = 0.063$ or 6.3%

Computation of Weighted Average Cost of Capital (using market value weights)

Source of Capital	Market Value of Capital (Rs.)	Weight Proportion	Cost of Capital (%)	WACC (%)
9% Debentures	15,00,000	0.2143	6.30	1.35
12% Preference Shares	5,00,000	0.0714	12.00	0.86
Equity share Capital (Rs.50 × 1,00,000) Shares	50,00,000	0.7143	17.00	12.14
Total	70,00,000	1.00		14.35

$\therefore$ WACC is 14.35%

Answer for Illustration 26

(a) Under Book Value Method

   (i) Cost of Equity Shares (ke)

$$K_e = \frac{\text{Expected dividend per equity share}}{\text{Market price per share}}\times100+\text{Expected growth rate}$$

$$=\frac{2}{25}\times100+8\%$$

$$=16\%$$

   (ii) Cost of Preference Shares (kp)

$$K_p = \frac{\text{Preference dividend}(D)+\dfrac{(\text{Redeemable Value-Net proceeds})}{\text{No. of years}}}{\dfrac{\text{Redeemable Value}+\text{Net Proceeds}}{2}}$$

$$K_p = \frac{12+\dfrac{(100-75)}{7}}{\dfrac{(100+75)}{2}}\times100$$

=17.8%

(iii) Cost of Debentures (kd)

$$K_d = \frac{Interest(I) + \dfrac{(Redeemable\,Value - Net\,proceeds)}{No.\,of\,years}}{\dfrac{Redeemable\,Value + Net\,Proceeds}{2}} \times (1-t)$$

$$K_d = \frac{14 + \dfrac{(100 - 90)}{6}}{\dfrac{100 + 90}{2}} \times (1 - 0.5) = 8.25\%$$

(iv) Cost of Term Loan (kd)

k_d = Interest (1 – t)

= 14% (1 – 0.5) = 7%

Computation of WACC of Asianol Ltd. (Weights under Book Value)

Sources of Finance	Book- value (in Rs. lakhs)	Weights Proportion	Specific Cost	Weighted Cost (%)
Equitys share capital	100	0.250	16.00%	4.000
12% Preference share capital	10	0.025	17.80%	0.446
Retained earnings	120	0.300	16.00%	4.800
14% Debentures	70	0.175	8.25 %	1.443
14% Term Loan	100	0.250	7.00%	1.750
	400	1.000		12.439

Therefore, WACC under book value is 12.439%.

(b) Under Market Value Method

Total Market value of Equity Shares = 10,00,000 shares@ Rs. 25

= Rs. 2,50,00,000

Ratio between equity shares and retained earnings

= 100:120

= 5:6

Market value of equity = Rs. 2,50,00,000 × 5/11

= Rs. 1,13,63,637

Market value of retained earnings = Rs. 2,50,00,000 × 6/11

= Rs. 1,36,36,363

Computation of WACC of   Asianol Ltd.

(Weights under Market Value)

Sources of Finance	Market- value (Rs.)	Weights Proportion	Specific Cost	Weighted Cost (%)
Equity share capital	1,13,63,637	0.2700	16.00%	4.32
12% Pref. share capital	7,50,000	0.0178	17.80%	0.32

Retained earnings	1,36,36,363	0.3243	16.00%	5.20
14% Debentures	63,00,000	0.1498	8.25%	1.24
14% Term loan	1,00,00,000	0.2381	7.00%	1.67
Total	4,20,50,000	1.000		12.75

Therefore, WACC under market value is 12.75%.

Answer for Illustration 27:

Calculation of specific cost of capital:

(i) For Equity share capital (ke)

ke= 16% (given), For Retained

Earnings(kr) kr= ke=16%, assuming

external yield criterion

For Debentures (kd)

Calculation of Weighted Average Cost of Capital (k_0) using Book Value and Market values as weights.

Source of Capital	After-tax Cost (%).	Book Value Weights			Market Value Weights		
		Amount (Rs.)	Weights	Weighted Cost (%)	Amount (Rs.)	Weights	Weighted Cost (%)
Equity Share Capital	16.00	2,00,00,000	0.25	4.00	8,00,00,000	0.40	6.40
Retained Earnings	16.00	2,00,00,000	0.25	4.00	8,00,00,000	0.40	6.40
Debentures	7.00	4,00,00,000	0.50	3.50	4,00,00,000	0.20	1.40
Total		8,00,00,000	1.00	11.50	20,00,00,000	1.00	14.20

* The total market value of equity of Rs. 16,00,00,000 (i.e. 20,00,000 shares @ Rs. 80 per share) has been divided into equity share capital and retained earnings in the ratio of their book value i.e. 1:1.

Weighted Average Cost of Capital (k0) using:

Book value as weights = $\dfrac{11.50}{1}$ or 11.50%

Market value as weights = 14.20/1 or 14.20%

(ii) It has been observed that the calculation of weighted average cost of capital using market value is higher than that using book value. The reason being that the market value of equity shares is considerably greater than their book value. Therefore, it provides higher specific cost iof capital and given greater emphasis to this source of finance.

Answer for Illustration 28:

(i) Computation of the Weighted Average Cost of Capital (using Market Value Weights)

Source of Finance (a)	Market value of capital (Rs.)	Weight (b)	After tax cost of capital(%) (c)	WACC(%) (d)=(b)×(c)
Equity Share (working note 1) [Rs. 110 × 5,000 shares]	5,50,000	0.5238	15.09	7.9041
10% Preference Share	2,00,000	0.1905	10.00	1.9050
12% Debenture	3,00,000	0.2857	6.00	1.7142
Total	10,50,000	1.0000		11.5233

(ii) Computation of Revised Weighted Average Cost of Capital (using market value weights)

Source of Finance (a)	Market value of capital (Rs.)	Weight (b)	After tax cost of capital (%) (c)	WACC(%) (d)=(b)×(c)
Equity Share (working note 1) [Rs. 105 × 5000 shares]	5,25,000	0.3443	17.43	6.0011
10% Preference Share	2,00,000	0.1311	10.00	1.3110
12% Debenture	3,00,000	0.1967	6.00	1.1802
14% Loan	5,00,000	0.3279	7.00	2.2953
Total	15,25,000	1.0000		10.7876

Working Notes:

(1) Cost of Equity Shares (ke)

$$K_e = \frac{Dividend\,per\,share(D1)}{Market\,price\,per\,share(P0)} + Growth\,rate(g)$$

$$K_e = \frac{10}{110} + 0.06 = 0.1509 \text{ or } 15.09\%$$

$$K_e = \left(\frac{12}{105} + 0.06\right) = 17.4285 = 17.43\%$$

Answer for Illustration 29:

(i) (a) Statement showing computation of Weighted Average Cost of Capital by using Book value proportions

Source of Finance	Amount (Book Value) (Rs. in crores)	Weight (Book Value Proportion) (A)	Cost of Capital (%) (B)	Weighted Cost of Capital (%) (C)=(A)×(B)
Equity Share (Working note 1)	30.00	0.256	17.00	4.352

10% Preference Share (Working note 2)	2.00	0.017	13.33	0.227
Retained earning (Working note 1)	40.00	0.342	17.00	5.814
14 % Debenture (Working note 3)	20.00	0.171	12.07	2.064
15% Term Loan (Working note 1)	25.00	0.214	10.50	2.247
	117.00	1.0000		14.704

(b) Statement showing computation of Weighted Average Cost of Capital by using market value proportions

Source of Finance	Amount (Book Value) (Rs. in crores)	Weight (Book Value Proportion) (A)	Cost of Capital (%) (B)	Weighted Cost of Capital (%) (C)=(A)×(B)
Equity Share (Working note 1)	90.00 (3 crores × Rs. 30)	0.66	17.00	11.350
10% Preference Share (Working note 2)	1.60 (2 lakh × Rs. 80)	0.012	13.33	0.159
14 % Debenture (Working note 3)	18.00 (20 lakh × Rs. 90)	0.134	12.07	1.617
15% Term Loan (Working note 4)	25.00	0.186	10.50	1.953
	134.60	1.0000		15.085

[Note: Since retained earnings are treated as equity capital for purposes of calculation of cost of specific source of finance, the market value of the ordinary shares may be taken to represent the combined market value of equityshares and retained earnings. The separate market values of retained earnings and ordinary shares may also be worked out by allocating to each of these a %age of total market value equal to their %age share of the total based on book value.]

Working Notes:

1. Cost of equity capital and retained earnings (ke)

$$K_e = \frac{D_1}{P_0} + g$$

Where, ke = Cost of equity capital

D_1 = Expected dividend at the end of year 1

P_0 = Current market price of equity share

g = Growth rate of dividend

Now, it is given that D1 = Rs. 3.60, P0 = Rs. 30 and g = 5%

$$K_e = \frac{3.60}{40} + 0.05$$

$k_e = 0.12 + 0.05 = 0.17$

2. Cost of preference capital (kp)

$$\frac{PD + \frac{(RV - NP)}{N}}{\frac{RV + NP}{2}}$$

Where,

PD = Preference dividend

RV = Redeemable value of preference shares

NP = Current market price of preference shares

n = Redemption period of preference shares

Now, it is given that PD = 10%, RV = Rs. 100, NP = Rs. 80 and n = 10 years

Therefore kp = $\dfrac{10 + \dfrac{(100-80)}{10}}{\dfrac{100+80}{2}} \times 100 = \dfrac{10+2}{90} = 13.33$

3. Cost of Debt (kd)

$$K_d = \frac{I(1+t) + \frac{RV - NP}{n}}{\frac{RV + NP}{2}}$$

Where,

I = Interest Payment

NP = Current market price of debentures

RV = Redemption value of debentures

t = Tax rate applicable to the company

n = Redemption period of debentures

Now it is given that I=14, t= 30%, RV= Rs. 100, NP= Rs. 90 and n= 6 years

Therefore,

$$K_d = \frac{14(1+0.30) + \frac{100 - 90}{n}}{\frac{100 + 90}{2}} \times 100 = \frac{9.8 + 1.667}{95} \times 100$$

$$= 12.07\%$$

4. Cost of Term loans (k_t)

$k_t = r(1-t)$

Where r = Rate of interest on term loans

t = Tax rate applicable to the company

Now, r = 15% and t = 30%

Therefore, k_t = 15% (1-0.30) = 10.50%

(ii) Statement showing weighted marginal cost of capital schedule for the company, if it raises Rs. 20 crores next year, given the following information:

Source of Finance	Amount (Rs. in crores)	Weight (a)	After tax cost of capital (%) (b)	Weighted cost of capital (%) (c) = (a) × (b)
Equity shares (Working note 5)	7.00	0.35	19.4	6.79
Retained earnings	3.00	0.15	19.4	2.91
15% Debt (Working note 6)	5.00	0.25	10.5	2.625
16% Debt (Working note 6)	5.00	0.25	11.20	2.8
Total	20.00	1.00		15.125

Working Notes:

5. Cost of equity share (k_e) (including fresh issue of equity shares)

$$k_e = \frac{D_1}{P_0} + g$$

Now, D1 = Rs. 3.60, P0 = 25 and g = 0.05

Therefore,

$$K_e = \frac{3.60}{25} + 0.15$$

ke= 19.40%

6. Cost of debt (k_d) = r(1-t)

(For first Rs. 5 crores)

r = 15% and t = 30%

Therefore, kd = 15(1-0.30) = 10.50%

(For first Rs. 5 crores)

r = 16% and t = 30%

Therefore, kd = 16(1-0.30) = 11.20%

SOLUTIONS FOR CLASSROOM DISCUSSION

Answer for Illustration 1:

Answer:

Calculation of Net Cash Inflow after Taxes

Particulars	Amount (Rs.)
EBIT	2,00,000
Less: Tax (30%)	60,000
	1,40,000
Depreciation	1,00,000
Net Cash Inflow after Taxes	2,40,000

Alternatively,

Particulars	Amount (Rs.)	Amount (Rs.)
PAT		1,05,000
Add: Depreciation		1,00,000
		2,05,000
Add: Interest Net of Taxes		
Total Interest	50,000	
Less: Tax on Interest (30%)	15,000	35,000
Net Cash Inflow after Taxes		2,40,000

Answer for Illustration 2:

Table showing Relevant Costs and Revenues

Particulars	Old (Rs.)	New (Rs.)	Difference (Rs.)	Relevant or Not
Revenue (for next two years) *	11,00,000	11,00,000	NIL	Not relevant
Book Value of Old Machine at the end of three years	2,00,000	—	—	Not relevant (Sunk Cost)
Current Salvage Value	1,00,000	—	1,00,000	Relevant
Cost of the new machine	—	3,00,000	(3,00,000)	Relevant
Operating Cost (2 years)	8,00,000	8,00,000	3,40,000	Relevant

*(as the old machine with a life of 5 years is being considered for replacement after 3 years)

Answer for Illustration 3:

Payback Period of Project - 1

Year	2018 (Year 1)	2019 (Year 2)	2020 (Year 3)	2021 (Year 4)	2022 (Year 5)
Cash Flows (Rs.)	4,000	4,000	4,000	4,000	4,000
Less: Depreciation (Rs.)	2,000	2,000	2,000	2,000	2,000
Earnings before Tax (EBT) (Rs.)	2,000	2,000	2,000	2,000	2,000
Less: Tax at 50% (Rs.)	1,000	1,000	1,000	1,000	1,000
Net Income (Rs.)	1,000	1,000	1,000	1,000	1,000
Cash flows after tax (Rs.)	3,000	3,000	3,000	3,000	3,000
Cumulative cash flows (Rs.)	3,000	6,000	9,000	12,000	15,000

Payback period would be the time when initial investment is recovered in cash. The investment is Rs. 10,000. Payback period would be between 3 and 4 years.

Payback Period = $3 + \dfrac{10,000 - 9,000}{9,000}$

= 3.11 years

Payback Periods of Project - 2

Year	2017 (Year 1)	2018 (Year 2)	2019 (Year 3)	2020 (Year 4)	2021 (Year 5)
Cash Flows	6,000	3,000	2,000	5,000	5,000
Less: Depreciation	2,000	2,000	2,000	2,000	2,000
Earnings before Tax (EBT)	4,000	1,000	0	3,000	3,000
Less: Tax at (50%)	2,000	500	0	1,500	1,500
Net Income	2,000	500	0	1,500	1,500
Cash flows after tax	4,000	2,500	2,000	3,500	3,500
Cumulative cash flows	4,000	6,500	8,500	12,000	15,500

Payback period would be between 3 and 4 years.

Payback Period = $3 + \dfrac{10,000 - 8,500}{8,500}$

= 3.18 years

Answer for Illustration 4:

Payback Reciprocal = $\dfrac{`10lakh}{`50lakh} = 20\%$

Answer for Illustration 5:

ARR = (Average income/Average investment) x 100

Average income of Machines A and B = (Rs.36,875/5)

= Rs.7,375

Average investment = Salvage value + [1/2 (Cost of machine – Salvage value)]

= Rs. 3,000 + [1/2 (Rs. 56,125 – Rs. 3,000)]

= Rs. 29,562.50

ARR (for machines A and B) = (Rs. 7,375/Rs. 29563.50) × 100

= 24.9 %

Answer for Illustration 6:

Computation of PVECF (Rs.)

Period	Cash Inflows Amount (Rs.)	PVIF @ 12%	Present Value (Rs.)
Year 1 (2018)	95,000	0.893	84,835
Year 2 (2019)	80,000	0.797	63,760
Year 3 (2020)	60,000	0.712	42,720
Year 4 (2021)	55,000	0.636	34,980
PVECF (Total)			**2,26,295**

Here, Initial investment = Rs. 2,25,000.

Now, **NPV = PVECF – Initial Investment**

Where,

= Rs. (2,26,295 – 2,25,000)

= Rs. 1,295

The project seems attractive because its net present value is positive.

Answer for Illustration 7:

Computation of NPV (Under Straight Line Method of Depreciation) (Rs.)

Year	CFBT (Rs.)	Depreciation (Rs.)	Taxable Profit (Rs.)	Tax (Rs.)	CFAT (Rs.)	PVIF @10%	PV (Rs.)
(1)	(2)	(3)	(4)=(2) – (3)	(5)= (4)×30%	(6)=(4)-(5)+(3)	(7)	(8)=(6)×(7)
1	3,00,000	2,00,000 (10,00,000/5)	1,00,000	40,000	2,60,000	0.909	2,36,340
2	3,00,000	2,00,000	1,00,000	40,000	2,60,000	0.826	2,14,760
3	3,00,000	2,00,000	1,00,000	40,000	2,60,000	0.751	1,95,260

4	3,00,000	2,00,000	1,00,000	40,000	2,60,000	0.683	1,77,580
5	3,00,000	2,00,000	1,00,000	40,000	2,60,000	0.621	1,61,460
				Total PV*			9,85,400
				Less. Initial investment			10,00,000
				NPV			**(14,600)**

Note: * Alternatively, Total PV = CFAT p.a.× PVIFA (10%, 5 Years) = Rs. 2,60,000 × 3.79 = Rs. 985400.

Since the NPV is negative, the decision of buying the machine is not viable.

Computation of NPV (Under Straight Line Method of Depreciation)   (Rs.)

Year (1)	CFBT (Rs.) (2)	Depreciation (Rs.) (3)	Taxable Profit (Rs.) (4)=(2) – (3)	Tax (Rs.) (5)= (4)×30%	CFAT (Rs.) (6)=(4)-(5)+(3)	PVIF @10% (7)	PV (Rs.) (8)=(6)×(7)
1	3,00,000	3,00,000 (10,00,000 × 30%)	0	0	3,00,000	0.909	2,72,700
2	3,00,000	3,00,000	0	0	3,00,000	0.826	2,47,800
3	3,00,000	3,00,000	0	0	3,00,000	0.751	2,25,300
4	3,00,000	1,00,000 (10,00,000 × 10%)	2,00,000	80,000	2,20,000	0.683	1,50,260
5	3,00,000	0	3,00,000	1,20,000	1,80,000	0.621	1,11,780
					Total PV		10,07,840
					Less. Initial Investment		10,00,000
					NPV		**7,840**

Since the NPV is positive, the decision of buying the machine is viable.

Answer for Illustration 8:

Computation of PV of expected Cash Flows (PVECF)

Period	Cash Inflows Amount (Rs.)	PVIF @ 12%	Present Value (Rs.)
Year 1 (2018)	95,000	0.893	84,835
Year 2 (2019)	80,000	0.797	63,760
Year 3 (2020)	60,000	0.712	42,720
Year 4 (2021)	55,000	0.636	34,980
(PVECF)			**2,26,295**

Here, Initial investment i.e. PVICF = Rs. 2,25,000.

Now, **PI = PVECF ÷ PVICF**

Where,

PVECF = Present value of the expected cash inflows

PVICF = Present value of invested cash outflows

or, = (Rs. 2,26,295 ÷ Rs. 2,25,000)

 = 1.00058

The project seems attractive because its profitability index is greater than 1.

Answer for Illustration 9:

10%	Rs. 60,000
IRR = ?	Rs. 56,000
11%	Rs. 50,000

$$IRR = L + \frac{P_1 - C_0}{P_1 - P_2} \times D$$

Where, L = Lower rate of interest= 10%

P_1 = Present value at lower rate of interest = Rs. 60,000

P_2 = Present value at higher rate of interest = Rs. 50,000

C_0 = Cash outlay or initial investment = Rs. 56,000

D = Difference in rate of interest = 11% - 10% = 1%

$$= 10 + \frac{60000 - 56000}{60000 - 50000} \times 1$$

 = 10.4%

Answer for Illustration 10:

We can calculate the discounted payback period as follows:

Computation of DPBP

Period	Cash Inflows Amount (Rs.)	PVIF @ 12%	Present Value (Rs.)	Cumulative Present Value (Rs.)
Year 1 (2018)	95,000	0.893	84,835	84,835
Year 2 (2019)	80,000	0.797	63,760	1,48,595
Year 3 (2020)	**60,000**	**0.712**	**42,720**	**1,91,315**
Year 4 (2021)	55,000	0.636	34,980	2,26,295

In this case, we see that the project's payback period is 3 years.

Answer for Illustration 11:

Answer:

M Ltd. calculates the future value of the positive cash flows discounted at the cost of capital.

 Project X: Rs. 4,000 × (1 + 12%)1 + Rs. 5,000 = Rs. 9,480

Project Y: Rs. 3,000 × (1 + 15%)1 + Rs. 1,500 = Rs. 4,950

Then, it calculates the present value of the negative cash flows discounted at the financing cost.

Project X: Rs. -1,000 + Rs.(-2,000) / (1 + 14%)1 = Rs. -3,000

Project Y: Rs.– 800 + Rs.(-700 / 1 + 18%)1 = Rs. -1,500

To calculate the MIRR for each project M Ltd. uses the formula:

MIRR = (Future value of positive cash flows / present value of negative cash flows) (1/n) – 1.

Therefore,

Project X: Rs. 9,480 / (Rs. 3,000)1/3 -1 = 5.3%

Project Y: Rs. 4,950 / (Rs. 1,500)1/3 -1 = 10.0%

Given that these are mutually exclusive projects and project Y should be undertaken because it has a higher MIRR than project X.

Answer for Illustration 12:

Base case NPV = Rs. (–) 50,00,000 + Σ Rs. 10,00,000 / 1.158 = Rs. (–) 5,12,700

Equity Finance Rs. 26 lakh, Debt Finance Rs. 24 lakh.

Equity Issue Cost is assumed to be 5%.

Therefore, to get Rs. 26 lakh, total equity issue = Rs. 26 / 0.95 = Rs. 27.37 lakh

Difference of Rs. (27.37 – 26) lakh = Rs. 01.37 lakh is the cost of underwriting, brokerage, etc. for the issue.

								(Rs. in lakh)
Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outstanding Debt at the beginning	24	21	18	15	12	09	06	03
Interest	3.36	2.94	2.52	2.10	1.68	1.26	0.84	0.42
Tax Shield	1.344	1.176	1.008	0.840	0.672	0.504	0.336	0.168
PV of Tax Shield	1.179	0.9049	0.6804	0. 497	0.349	0.230	0.134	0.059

(Discounting at 14%, cost of debt)   Total PV of Tax Shield: 4.0333

Adjusted NPV = Base case NPV – Issue Cost + Present Value of Tax Shield

= Rs. (– 5,12,700 – 1,37,000 + 4,03,333) = Rs. (–) 2,46,367

Illustration 13:

Answer:

Particulars	Project I (Rs.)	Project II (Rs.)
NPV (Rs.)	73,226	62,628
IRR (appx.)	22%	25%

According to NPV, Project I is better but according to IRR, Project II is better. So, there is conflicting results.The primary reason for such conflict is the difference in timing of cash inflows. In case of

Project II, more cashinflows occur in the initial years while in case of Project I more cash flows occur towards the end of the project.Such conflict may be resolved using Modified version of NPV or IRR (Modified NPV or Modified IRR) as follows.

Using reinvestment rate of 14%,

$TV_I =$

$62,000(1+.14)^3 + 80,000(1+.14)^2 + 1,00,000(1+.14)^1 + 1,40,000(1+.14)^0$
$= 4,49,822$

$TV_{II} =$

$1,42,000(1+.14)^3 + 80,000(1+.14)^2 + 82,000(1+.14)^1 + 40,000(1+.14)^0$
$= 4,47,822$

$NPV*_I = \{4,49,822 \div (1+.10)^4\} - 2,20,000 = 87,228$

$NPV*_{II} = \{4,47,822 \div (1+.10)^4\} - 2,20,000 = 85,862$

$IRR*_I = (4,49,822 \div 2,20,000)^{1/4} - 1 = 19.57\%$

$IRR*_{II} = (4,47,822 \div 2,20,000)^{1/4} - 1 = 19.32\%$

Both the MIRR and MNPV methods show that Project I should be accepted.

Answer for Illustration 14:

Particulars	Project (B-A) (Rs.)
Differential Cash outflows	25,00,000
Differential Cash inflows	29,00,000

We know that IRR is the discount rate at which Present Value of Cash Inflows are equal to the Present Value of Cash Outflows.

So, 25,00,000 = 29,00,000 / (1+ r)1

Or, 1 + r = 29,00,000 / 25,00,000

Or, r = 1.16 – 1 = 0.16 = 16%

The two methods i.e., NPV and IRR rank the projects differently.

Project A has a higher IRR (0.25) than project B (0.22) but the NPV of project B (Rs. 8,17,350) is more than that of A (Rs. 6,81,250).

The important question is which method, in such a situation, gives better results?

The answer should be related to the effect of the decision on the maximization of the shareholders' wealth. The IRR method is not compatible with the goal of wealth maximization as it is concerned with the rate of return on investment or yield rather than the total yield on the investment.

Here, 10% to be the required rate of return, the firm would be left with Rs. 7,50,000 [Rs. 62,50,000 – (Rs. 50,00,000+ 0.10 × Rs. 50,00,000)] after one year in case project A is accepted and Rs. 9,00,000 [Rs. 91,50,000 – (Rs. 75,00,000) + 0.10 × Rs. 75,00,000] in case of Project B is accepted.

The NPV method suggests that project B is better. This recommendation is consistent with the goal of the firm of maximising shareholders' wealth.

As IRR (r) of the differential cash flows = 16%, which is greater than Cost of Capital (k). Therefore, Project with higher non-discounted cash inflows, i.e., Project B would be selected.

Answer for Illustration 15:

Answer:

Project A

Year	Cash flows (Rs.)	PV factor	Present Value (Rs.)
0	(10,00,000)	1.000	(10,00,000)
1	8,00,000	0.909	7,27,200
2	7,00,000	0.826	5,78,200
3	(10,00,000)**	0.826	(8,26,000)
3	8,00,000	0.751	6,00,800
4	7,00,000	0.683	4,78,100
NPV			5,58,300

** Machine replaced at the end of year two.

Project B

Year	Cash flows (Rs.)	PV factor	Present Value (Rs.)
0	(20,00,000)	1.000	(10,00,000)
1	8,00,000	0.909	7,27,200
2	9,00,000	0.826	7,43,400
3	7,00,000	0.751	5,25,700
4	6,00,000	0.683	4,09,800
NPV			4,06,100

** Machine replaced at the end of year two.

Decision: Project A should be preferred to project B because of its higher NPV. If we compare the two projects without incorporating the consequences of replacing the machine at the end of year 2, the decision would have been the reverse, because the net present value of project A then would be Rs. 3,05,400 [Rs. 7,27,200 + Rs. 5,78,200 – Rs. 10,00,000].

Answer for Illustration 16:

If the projects are divisible

Projects are ranked according to PI and arranged in descending order.

Proposal Rank NPV (Rs.)	Investments (Rs.)	PV of Inflows (NPV+I)	PI	Rank	NPV (Rs.)
A	70,00,000	1,00,00,000	100/70 = 1.43	(4)	30,00,000
B	25,00,000	41,00,000	41/25 = 1.64	(2)	16,00,000
C	50,00,000	70,00,000	70/50 = 1.4	(5)	20,00,000

D	20,00,000	30,00,000	30/20 = 1.5	(3)	10,00,000
E	55,00,000	1,00,00,000	100/55 = 1.8	(1)	45,00,000
F	75,00,000	50,00,000	50/75 = 0.67		-25,00,000

Proposal	Investments (Rs.)	Cum. Inv. (Rs.)	NPV (Rs.)	Cum. NPV
E	55,00,000	55,00,000	45,00,000	45,00,000
B	25,00,000	80,00,000	16,00,000	61,00,000
D	20,00,000	100,00,000	10,00,000	71,00,000
A*	70,00,000	170,00,000	30,00,000	92,42,857*
C	50,00,000	220,00,000	20,00,000	

*Only Rs. 50,00,000 can be invested in Project A, i.e., 5/7th of the total investment can be made.

Proportionate NPV is 5/7 × Rs. 30,00,000 = Rs. 21,42,857

So selected projects are E, B, D and 5/7th part of A

If the projects are indivisible

Feasible Sets	Investments (Rs.)	NPV (Rs.)
EBDC	1,50,00,000	91,00,000
EBA	1,50,00,000	91,00,000
BAC	1,45,00,000	66,00,000
DAC	1,40,00,000	60,00,000
EBC	1,30,00,000	81,00,000

Either EBDC or EBA, which provides the maximum NPV, may be undertaken.

Answer for Illustration 17:

Working Notes:

Year	Profit before tax (Rs.)	Profit after tax @ 50% (Rs.)	Cash inflows after tax [PAT + Dep] (Rs.)	Cumulative cash inflows (Rs.)	Discounting factor @ 10%	Present Value (Rs.)	Discounting factor @ 20%	Present value @20% (Rs.)	Discounting factor @ 30%	Present Value @30% (Rs.)	Discounting factor @ 32%	Present value @32% (Rs.)
1	1,00,000	50,000	90,000	90,000	0.9091	81,819	0.8333	74,997	0.7692	69,228	0.7576	68,184
2	1,00,000	50,000	90,000	1,80,000	0.8264	74,376	0.6944	62,496	0.5917	53,253	0.5739	51,651
3	80,000	40,000	80,000	2,60,000	0.7513	60,104	0.5787	46,296	0.4552	36,416	0.4348	34,784
4	80,000	40,000	80,000	3,40,000	0.6830	54,640	0.4823	38,584	0.3501	28,008	0.3294	26,352
5	40,000	20,000	60,000	4,00,000	0.6209	37,254	0.4019	24,114	0.2693	16,158	0.2495	14,970
						308193		**246487**		**203063**		**195941**

(a) Payback Period Method

Payback period = 2 + Rs. 20,000/Rs. 80,000

= 2.25 years (or) 2 years 3 months

(b) Rate of Return on Original Investment Method

ARR = (Average Profit after Tax / Investment) × 100

    = (Rs. 40,000 / Rs. 2,00,000) × 100

    = 20%

(c) Rate of Return on Average Investment Method

    ARR = (Average Profit after Tax / Average Investment) × 100

    = Rs.40,000 / (Rs.2,00,000 + 0/2) × 100

    = 40%

(d) Discounted Cash Flow Method taking Cost of Capital as 10%

Present value of cash inflows after tax (Rs.)	3,08,193
Less: Outflow (Rs.)	2,00,000
Net Present Value (Rs.)	1,08,193

(e) Profitability Index

Profitability Index = P.V of Cash Inflows / Cash Outflow

= Rs. 3,08,193 / Rs. 2,00,000

= 1.54

Since PI is more than 1 the company can accept the project

(f) Internal Rate of Return Method

IRR = L + [P1 − I / P1 − P2] × d

= 30 + (2,03,063 − 2,00,000) / (2,03,063 − 1,95,941) × 2

= 30 + 0.8602

= 30.8602%

(g) Modified Internal Rate of Return (MIRR)

	1	2	3	4	5	Total
Cash inflow after tax (Rs.)	90,000	90,000	80,000	80,000	60,000	--
Re-investment period	4	3	2	1	0	
Re-investment at	10%	10%	10%	10%	10%	
Future value factor	$(1.1)^4$	$(1.1)^3$	$(1.1)^2$	(1.1)	1	
Future value (Rs.)	1,31,769	1,19,790	96,800	88,000	60,000	4,96,359

At MIRR = 2,00,000 $[1 + MIRR]^5$ = Rs. 4,96,359 = $[1 + MIRR]^5$ = Rs. 4,96,359 /Rs. 2,00,000 = 2.48

MIRR = 20% (Please see Annuity Tables)

Answer for Illustration 18:

(A) Appraisal of Replacement Decision under NPV method

Step 1:

	(Rs.)
Calculation of Present value of net cash outflow or net investment required.	
Cost of super model	1,50,000

Less: Sale proceeds of Model A	50,000	
(-) Cost of removal	10,000	40,000
Net investment required		1,10,000

Step 2:

Calculation of present value of incremental operating cashflows:

Particulars		Model A	Super Model	Incremental
Sales p.a. (units)		1,00,000	1,00,000	
Sales p.a. [Rs.] [1,00,000 × 5]	[a]	5,00,000	5,00,000	
Less: Expenses (Rs.)				
Operating cost (Rs.)		50,000	30,000	
Fixed cost (Rs.)		4,00,000	4,00,000	
Total Cost (Rs.) **[b]**		**4,50,000**	**4,30,000**	
Cash Inflows(Rs.) **[a − b]**		**50,000**	**70,000**	**20,000**

Step 3:

Present value of terminal cash inflow [Salvage value] – NIL

Step 4:

Calculation of NPV		(Rs.)
Present value of total cash inflows	=	68,660
(Recurring + Salvage)		
Less: Outflow	=	1,10,000
Net Present Value	=	(41,340)

Comment:

   As net present value is negative, the replacement decision is not financially feasible.

Working Notes:

   * 1. Total incremental cash inflows   = Rs. 20,000

   Present value of incremental recurring cash inflows for 5 years

                     = Rs. 20,000 × PVAF 5 years 14%

                     = Rs. 20,000 × 3.433

   P.V of cash flows   = Rs. 68,660

(B)Appraisal of Mutually Exclusive Decision under NPV method Alternative I – Model A

   Calculation of NPV under

   Alternative

   Step 1:

   Calculation of Present value of cash outflow

   Cost of machine = Rs. 1,00,000

Step 2:

Calculation of present value of recurring cash inflows or operating cash inflows Cash inflows after tax (as above) – Rs. 50,000

PV of operating cash inflows for 5 years = Rs. 50,000 × PVAF 5 years 14%

= Rs. 50,000 × 3.433

= Rs. 1,71,650

Step 3:

Calculation of PV of terminal cash inflows = Nil

Step 4:

Calculation of NPV		(Rs.)
PV of total cash inflows	=	1,71,650
Less: Outflow	=	1,00,000
Net Present Value (under alternative I)	=	**71,650**

Alternative II : Super Model

Calculation of NPV under AlternativeII

Step 1:

Calculation of Present value of cash outflow Cost of Machine = Rs. 1,50,000

Step 2:

Calculation of operating cash inflows or PV of recurring cash inflows

PV of operating cash inflows for 5 years = Rs. 70,000 × PVAF 5 years 14%

= Rs. 70,000 × 3.433

= Rs. 2,40,310

Step 3:

Calculation of PV of terminal cash inflow – NIL

Step 4:

Calculation of NPV		(Rs.)
PV of total cash inflow	=	2,40,310
[Rs. 2,40,310 + 0]		
Less: Cash Outflow	=	1,50,000
Net Present Value (under alternative II)	**=**	**90,310**

Comment:

As NPV of Super Model is more [Rs. 90,310] than that of Model A [Rs. 71,650], it is advised to select Super Model.

Answer for Illustration 19:

Appraisal of Replacement Decision under NPV method

Step 1:

Calculation of present value of net investment required:	(Rs.)	(Rs.)
Cost of new asset		65,000
Add: Installation cost		10,000
		75,000
Add: Additional WC		10,000
		85,000
Less: Sale proceeds of old machine	30,000	
Less: Tax	5,000	
[8,000 × 55/100 + 2000 × 30/100]		25,000
Net Investment required		60,000

Step 2:

Calculation of Present Value of Incremental Operating cash inflows for 5 years.

Year	CIAT (PAT + Dep) (Rs.)	New (Rs.)	Incremental (Rs.)	PV factor at 15%	Present Value (Rs.)
1	2,04,000	2,30,000	26,000	0.8696	22,609
2	1,54,000	1,64,000	10,000	0.7561	7,561
3	1,84,000	2,14,000	30,000	0.6575	19,725
4	2,14,000	2,54,000	40,000	0.5718	22,872
5	2,24,000	2,44,000	20,000	0.4972	9,944
	PV of cash inflows for 5 years				**82,711**

Step 3:

Calculation of PV of terminal cash inflow	(Rs.)
Salvage value of asset	5,000
[No tax because book value and salvage value are equal]	
Working capital recovered [100% recovered]	10,000
Terminal cash inflows	15,000
Its PV at the end of 5th year = Rs. 15,000 × 0.4972 =	7,458

Step 4:

Calculation of NPV (Rs.)

PV of total cash inflows	=	90,169

[Rs. 82,711 + Rs. 7,458]

(–) Outflow		=	60,000
NPV		**=**	**30,169**

Comment:

As NPV is positive, it is advised to replace.

Note 1:

Depreciation for old Machine = Rs. 28,000 / 7 = Rs. 4,000

Depreciation for new Machine =65000 +10000-5000/5 =14,000

Answer for Illustration 20:

Answer:

Payback value = $\dfrac{5,60,000}{80,000}$

=7,000

The factors closet to Rs. 7,000 are 7.191 at 11% rate of discount and 6.811 at 12% rate of discount against 15 years.The actual IRR would be between 11 and 12%.

Using interpolation, the IRR would be 0.11 + 0.005 (0.19 ÷0.38 = 11.5%.

Answer for Illustration 21:

Cash outflows

Cost of production equipment (Rs.)	1,00,000
Additional working capital requirement (Rs.)	50,000
Cash outflows (Rs.)	1,50,000

Determination of CFAT and NPV

	Years				
Particulars	**1 (Rs.)**	**2 (Rs.)**	**3 (Rs.)**	**4 (Rs.)**	**5 (Rs.)**
Sales revenue (75,000 × Rs. 4)	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
Less: Costs					
Variable costs (75,000 × 2)	1,50,000	1,50,000	1,50,000	1,50,000	1,50,000
Additional fixed costs	25,000	25,000	25,000	25,000	25,000
Depreciation (D)	20,000	16,000	12,800	10,240	Nil *
Earnings before taxes	1,05,000	1,09,000	1,12,200	1,14,760	1,25,000
Less: Taxes	36,750	38,150	39,270	40,166	43,750
Earnings after taxes (EAT)	68,250	70,850	72,930	74,594	81,250
CFAT (EAT + D)	88,250	86,850	85,730	84,834	81,250

Add: Recovery of Working Capital					50,000
Add: Salvage value (SV)					10,000
Add: Tax benefit on short term capital loss **					10,836
					1,52,086
Multiplied by PV factor @ 0.20	0.833	0.694	0.579	0.482	0.402
PV (CFAT × PV factor)	73,512	60,274	49,638	40,890	61,139
Total PV (t = 1 – 5)					2,85,453
Less: Cash outflows					1,50,000
NPV					1,35,453

* As the block consists of single asset, no depreciation is to be charged in the terminating year as the asset has been sold in the year.

** (Rs. 1,00,000 – Rs. 59,040 accumulated depreciation – Rs. 10,000, SV) × 0.35 = Rs. 10,836.

Recommendation: The company is advised to buy the proposed equipment.

Answer for Illustration 22:

Assessment of Financial Viability of proposal	(Rs. in lakh)
Incremental cash outflows	
Cost of new computer system	35
Less: Sale proceeds from drawing office equipment and furniture	9
	26
Incremental CFAT and NPV:	
(a) Cost savings (years 1–6)	
Reduction in design and draftsmanship costs	12
Less: Operation and maintenance costs	7
Cost savings (earnings) before taxes	5
Less: Taxes (0.35)	**1.75**
Earnings after taxes (CFAT)	3.25
(×) PV factor of annuity for 6 years (0.12)	× 4.111
Total PV of cost savings	13.36
(b) Tax savings on account of depreciation	
Cost of new computer system (Rs. 35 lakhs × 0.35)	12.25
(×) PV factor for year 1	× 0.892
Total PV	9.93

(c) Terminal salvage value at the end of year 6 (Rs. **1 lakh × 0.507)**		**0.507**
(d) Gross PV of CFAT [(a) + (b) + (c)]		**24.797**
Less: Cash outflows		**26.000**
NPV		**(1.203)**

Recommendation: Since NPV is negative, the proposal is not financially viable.

Answer for Illustration 23:

Answer:

i. Payback period (PB) for Proposal X

> = Rs. 5,00,000/Rs. 1,45,000 = 3.448 year

The appropriate risk adjusted rate of return for payback period of 3.448 years is 0.10.

ii. Payback period for proposal Y

Year	Cash flows (Rs. **in thousand)**	Cumulative cash flows (Rs. **in thousand)**
1	100	100
2	110	210
3	130	340
4	150	490
5	160	650
6	150	800

The payback period for Proposal Y is 5 years and 4 months and the appropriate risk adjusted rate of return is 0.12.

iii. Net present value of proposal X

Years	CFAT		Total PV
1-6	Rs. 1,45,000	4.355	Rs. 6,31,475
Less: Cash outflows			5,00,000
NPV			1,31,475

iv. Net present value of proposal Y

Year	CFAT (Rs. thousand)	PV factor (at 0.12)	Total PV (Rs.)
1	100	0.893	89,300

2	110	0.797	87,670
3	130	0.712	92,560
4	150	0.636	95,400
5	160	0.567	90,720
6	150	0.507	76,050
7	120	0.452	54,240
8	120	0.404	48,480
9	110	0.361	39,710
10	100	0.322	32,200
Total PV			7,06,330
Less: Cash outflows			7,00,000
NPV			6,330

Proposal X should be acceptable to the company as its NPV is higher than that of Proposal Y.

Answer for Illustration 24:

Answer:

Payback Periods of Project - 1 (Rs. in '000)

Year	1	2	3	4	5
Cash Flows	4,000	4,000	4,000	4,000	4,000
Less: Depreciation	2,000	2,000	2,000	2,000	2,000
EBT	2,000	2,000	2,000	2,000	2,000
Less: Tax at 50%	1,000	1,000	1,000	1,000	1,000
Net Income	1,000	1,000	1,000	1,000	1,000
Cash flows after tax	3,000	3,000	3,000	3,000	3,000
Cumulative cash flows	3,000	6,000	9,000	12,000	15,000

Payback period would be the time when initial investment is recovered in cash. The investment is Rs. 10000. Payback period would be between 3 and 4 year.

$$\text{Payback Period} = 3 + \frac{(1,00,00,000 - 90,00,000)}{90,00,000}$$

= 3.11 Years

Payback Periods of Project – 2 (Rs. in '000)

Year	1	2	3	4	5
Cash Flows	6,000	3,000	2,000	5,000	5,000
Less: Depreciation	2,000	2,000	2,000	2,000	2,000
EBT	4,000	1,000	0	3,000	3,000

Less: Tax at 50%	2,000	500	0	1,500	1,500
Net Income	2,000	500	0	1,500	1,500
Cash flows after tax	4,000	2,500	2,000	3,500	3,500
Cumulative cash flows	4,000	6,500	8,500	1,200	15,500

Payback period would be between 3 and 4 year

Payback Period $= 3 + \dfrac{(1,00,00,000 - 85,00,000)}{85,00,000}$

$= 3.43$ Years

Answer for Illustration 25:

Net Present Value (NPV)

Particulars	Amount (Rs.)
1. Profit after Tax (PAT)	10,00,000
2. Add: Depreciation (Rs. 1,00,00,000 ÷ 10 years)	10,00,000
3. CFAT (1 + 2) for years 1-10	20,00,000
4. PV factor (annuity) for 10 years (at 0.12) = 5.650	
5. Total PV (3 × 4)	1,13,00,000
6. (a) CFAT in year 10 = Rs. 10,00,000	
(b) Relevant PV factor = 0.322	
(c) Additional PV in year 10 (a × b)	3,22,000
7. Total PV (5 + 6)	1,16,22,000
8. Project cost (t = 0)	1,10,00,000
9. NPV (7 − 8)	6,22,000

Answer for Illustration 26:

Machine EM -12 Year's Life

Particulars	Year	Cost (Rs.)	Discount Factor	Present Value (Rs.)
Purchase price	0	20,00,000	1.000	20,00,000
Overhauling cost	8	4,00,000	0.3506	1,40,240
Annual repairing expenses	1-12	2,00,000	5.6600	11,32,000
Scrap value	12	3,00,000	0.2076	(62,280)
Total NPV outflow				32,09,960

Machine LM -6 Year's Life

Particulars	Year	Cost (Rs.)	Discount Factor	Present Value (Rs.)
Purchase price	0	14,00,000	1.000	14,00,000

Overhauling cost	4	2,00,000	0.5921	1,18,420
Annual repairing expenses	6	2,80,000	3.8890	10,88,920
Scrap value	12	3,00,000	0.4556	(1,36,680)
Total NPV outflow				24,70,660

Equated annual values: EM = Rs. 32,09,960/5.6600 = Rs.5,67,130 LM = Rs. 24,70,660/3.889 = Rs. 6,35,647

Decision: Since, annualized value of EM is less, it is suggested to replace existing machine with Machine EM.

Answer for Illustration 27:

A. Calculation of Incremental Cash outflows

Cost of new machine Rs. 30,00,000

Less: Sale value of existing machine Rs. 12,00,000

Rs. **18,00,000**

B. Determination of Cash Flows after Taxes (CFAT) (Operating) (Rs.)

Year (1)	Incremental cash profits before taxes (2)	Incremental depreciation (3)	Taxable income (4) = [2-3]	Taxes @ 40% (5)	Earnings after Tax (EAT) (6) = [4-5]	Cash Flows After Taxes (CFAT) (7) = [6+3]
1	5,00,000	3,60,000	1,40,000	56,000	84,000	4,44,000
2	5,00,000	2,88,000	2,12,000	84,800	1,27,200	4,15,200
3	6,00,000	2,30,400	3,69,600	1,47,840	2,21,760	4,52,160
4	6,00,000	1,84,320	4,15,680	1,66,272	2,49,408	4,33,728
5	6,00,000	1,47,456	4,52,544	1,81,018	2,71,526	4,18,982

C. Determination of Net Present Value (NPV)

Year	Cash Flows After Taxes (Rs.)	PV Factor (0.10)	Total PV (Rs.)
1	4,44,000	0.909	4,03,596
2	4,15,200	0.826	3,42,955
3	4,52,160	0.751	3,39,572
4	4,33,728	0.683	2,96,236
5	4,18,982	0.620	2,59,769
6	9,00,000 (Net Salvage Value)	0.620	5,58,000
Total Present Value			**2,200,129**
Less: Incremental Cash Outflows			1,800,000
NPV			4,00,129

Working Notes

(i) WDV of existing machine in the beginning of year 5

	(Rs.)
Initial cost of machine	20,00,000
Less: Depreciation @ 20% in year 1	4,00,000
WDV at beginning of year 2	16,00,000
Less: Depreciation @20% in year 2	320,000
WDV at beginning of year 3	1,280,000
Less: Depreciation @20% in year 3	256,000
WDV at beginning of year 4	1,024,000

(ii) Depreciation base of new machine

	(Rs.)
WDV of existing machine	1,024,000
Add: Cost of new machine	3,000,000
	4,024,000
Less: Sale proceeds of existing machine	1,200,000
	2,824,000

(iii) Base of incremental depreciation

	(Rs.)
Depreciation base of new machine	2,824,000
Less: Depreciation base of existing machine	1,024,000
	1,800,000

(iv) Incremental Depreciation

Year	Incremental asset cost base (Rs.)	Depreciation @20% (Rs.)
1	1,800,000	360,000
2	1,440,000	288,000
3	1,152,000	230,400
4	921,600	184,320
5	737,280	147,456

(v) Incremental cash profit before taxes (in terms of decrease in operating costs and increase in revenues) owing to the new machine

Year	Saving in Operating cost (Rs.)	Increase in Revenue (Rs.)	Incremental cash profit before taxes (Rs.)
1	200,000	300,000	500,000
2	200,000	300,000	500,000
3	300,000*	300,000	600,000
4	300,000	300,000	600,000
5	300,000	300,000	600,000

*Maintenance expenses of existing machine are expected to increase by Rs. 1,00,000 from sixth year of installation.

Answer for Illustration 28

There are three possibilities, coming out fdrom the analysis:

(i) Retain the existing machine

(ii) Upgrade the existing machine

(iii) Replace the old with machine

The incremental approach would be adopted for 2nd and 3rd options. In case the NPV of this incremental approach

of both options turn negative, then reject both options and accept the 1st option, else choose a better option.

Cash outflows

(i) In case of machine is upgraded: Upgradation cost: Rs.20,00,000

(ii) In case of new machine installed	(Rs.)
Cost	40,00,000
Add: Installation Cost	1,00,000
Total Cost	41,00,000
Less: Disposal of old machine	
(100,000 – 40% Tax)	60,000
Total cash outflow	**40,40,000**

Depreciation

Depreciation in case of machine is upgraded

Rs. 20,00,000/5 = Rs. 400,000

Depreciation in case of new machine is installed

Rs. 41,00,000/5 = Rs. 820,000

Old existing machine – Book Value is zero hence no depreciation

Incremental Cash Inflows after Taxes (CFAT) of Upgraded Old Machine

	Old Machine	Upgraded Machine			
Year	PAT/CFAT (Rs.)	PAT (Rs.)	Depreciation (Rs.)	CFAT (Rs.)	Incremental CFAT=5-2 (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)
1	10,00,000	11,00,000	4,00,000	15,00,000	5,00,000
2	10,80,000	11,80,000	4,00,000	15,80,000	5,00,000
3	11,60,000	12,20,000	4,00,000	16,20,000	4,60,000
4	12,40,000	13,00,000	4,00,000	17,00.000	4,60,000
5	13,20,000	14,00,000	4,00,000	18,00,000	4,80,000
Total	58,00,000				

	Incremental Cash Inflows after Taxes (CFAT) of New over Old Machine				
	Old Machine	Upgraded Machine			
Year	PAT/CFAT (Rs.)	PAT (Rs.)	Depreciation (Rs.)	CFAT (Rs.)	Incremental CFAT=5-2 (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)
1	10,00,000	12,00,000	8,20,000	20,20,000	10,20,000
2	10,80,000	12,80,000	8,20,000	21,00,000	10,20,000
3	11,60,000	13,80,000	8,20,000	22,00,000	10,40,000
4	12,40,000	14,80,000	8,20,000	23,00,000	10,60,000
5	13,20,000	16,00,000	8,20,000	24,20,000	11,00,000
Total	58,00,000				

Calculation of NPV of both options

Year	Upgraded Machine			New Machine		
	Incremental CFAT (Rs.)	PVF	Total PV (Rs.)	Incremental CFAT (Rs.)	PVF	Total PV (Rs.)
1	5,00,000	0.870	4,35,000	10,20,000	0.870	8,87,400
2	5,00,000	0.756	3,78,000	10,20,000	0.756	7,71,120
3	4,60,000	0.658	3,02,680	10,40,000	0.658	6,84,320
4	4,60,000	0.572	2,63,120	10,60,000	0.572	6,06,320
5	4,80,000	0.497	2,38,560	11,00,000	0.497	5,46,700
			16,17,360			34,95,860
Less: Cash Outflows			20,00,000			40,40,000
NPV			-3,82,640			-5,54,140

Decision: As the NPV in both the alternatives are negative, the company should continue with the existing old machine.

Answer for Illustration 29:

Calcualtion of NPV of the Projects

Project	Investment (Rs.)	Cash flow (Rs.)	Annuity	PV (Cash flow × annuity) (Rs.)	NPV (PV – invest.) (Rs.)
M	1,00,000	36,000	6.145	2,21,220	1,21,220
N	2,00,000	1,00,000	3.170	3,17,000	1,17,000
O	2,40,000	60,000	5.335	3,20,100	80,100
P	3,00,000	80,000	7.824	6,25,920	3,25,920
Q	4,00,000	60,000	9.077	5,44,620	1,44,620

Life of project is not relevant in determination of NPV.

Statement of feasible combination

Combination Rank		Investment (Rs.)	NPV
M, N & P	6,00,000	5,64,140	1
M, N & O	5,40,000	3,18,320	4
O & P	5,40,000	4,06,020	3
M & Q	5,00,000	2,65,840	5
N & P	5,00,000	4,42,920	2

Answer for Illustration 30:

(i) Calculation of NPV and IRR

NPV of Project M

Year	Cash Flows (Rs.)	Discount factor (10%)	Discount Values (Rs.)	Discount Factor (20%)	Discounted Value (Rs.)
0	(4,00,000)	1.000	(4,00,000)	1000	(4,00,000)
1	70,000	0.909	63,630	0.833	58,310
2	1,60,000	0.826	1,32,160	0.694	1,11,040
3	1,80,000	0.751	1,35,180	0.579	1,04,220
4	1,50,000	0.683	1,02,450	0.482	72,300
5	40,000	0.621	24,840	0.402	16,080
NPV			58,260		(38,050)

IRR of Project M:

At 20% NPV is (-) Rs. 38050 and at 10% NPV is Rs. 58,260

So, IRR $= 10 + \dfrac{58260}{58260 + 38050} \times 10 = 16.05\%$

NPV of Project N

Year	Cash Flows (Rs.)	Discount factor (10%)	Discount Values (Rs.)	Discount Factor (20%)	Discounted Value (Rs.)
0	(4,00,000)	1000	(4,00,000)	1000	(4,00,000)
1	4,36,000	0.909	3,96,324	0.833	3,63,188
2	20,000	0.826	16,520	0.694	13,880
3	20,000	0.751	15,020	0.579	11,580
4	8,000	0.683	5,464	0.482	3,856
5	6,000	0.621	3,726	0.402	2,412
NPV			37,054		(5,084)

IRR of Project M:

At 20% NPV is (-) Rs. 5084 and at 10% NPV is Rs. 37054

So, IRR $= 10 + \dfrac{37054}{37054 + 5084} \times 10$

$\qquad = 18.79\%$

(ii) Since, both the projects are generating the positive NPV at the company's cost of capital at 10% hence, they are acceptable. IF company follows NPV method, then the company will have to select Project M because it has higher NPV.If the company follows IRR method, then Project N should be selected because of higher Internal Rate of Return (IRR), but when NPV and IRR give contradictory results. A project with higher NPV is generally preferred because of higher return in absolute terms. Hence, Project M should be selected.

(iii) Because of the difference in the pattern of the cash flows the inconsistency in the ranking of the projects arises. Project M's major cash flow occur mainly in the middle three years whereas project N generated the major cash flow in the first year itself.

Answer for Illustration 31:

(Rs. **in '000**)

Year	PV factor @ 10%	Cash flows of Project A	Present Value of Project A	Cumulative PV of Project A	Cash flows of Project B	Present value of Project B	Cumulative PV of Project B
0	1.00	(535)	(535)	-	(540)	(540)	-
1	0.909	50	45.45	45.45	282	256.338	256.338
2	0.826	300	247.80	293.25	250	206.50	462.838
3	0.751	360	270.36	563.61	180	135.18	598.018
4	0.683	208	142.06	705.67	-	-	598.018

(i) Net Present Value of Project A	=	PV of inflows – PV of outflows	
	=	705.67 – 535	
	=	170.67	(Rs. in '000)
Net Present Value of Project B	=	PV of inflows – PV of outflows	
	=	598.018 - 540	
	=	58.018	(Rs. in '000)

Project A is better, since, it has higher NPV.

(ii) Discounted payback period Project B $= 2 + \dfrac{241.75}{270.36} = 2.89 \text{Years}$

Payback period $= 2 + \dfrac{77.162}{135.18} = 2.57$ Years

Project B is better. Since, it has lower payback period

Profitability Index Project A $= \dfrac{\text{Present value of inflow}}{\text{Present value of outflow}}$

Profitability Index Project B $= \dfrac{705.67}{534.60} = 1.32$ (Rs. in '000)

Profitability Index $= \dfrac{598.018}{534} = 1.12$ (Rs. in '000)

Comment: Project A is better, since, it has lower Profitability Index.

Answer for Illustration 32:

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Calculation of Present Value (Rs.)

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Year	Profit before tax	Profit after tax	Cash Inflows (PAT +Dep)	Cumulative Cash Inflows	Discounting factors @ 12%	Present Value	Cumulative Present value
1	3,50,000	2,45,000	5,45,000	5,45,000	0.893	4,86,685	4,86,685
2	3,72,000	2,60,000	5,60,400	11,05,400	0.797	4,46,639	9,33,324
3	3,10,000	2,17,000	5,17,000	16,22,400	0.712	3,68,104	13,01,428
4	1,75,000	1,22,500	42,2,500	20,44,900	0.636	2,68,710	15,70,138
5	1,10,000	77,000	3,77,000	24,21,900	0.567	2,13,759	17,83,897

(a) Payback Period $= 2 + 3,94,600/5,17,000$ $= 2.76$ Years

(b) Discounted Payback Period $= 3 + 1,98,572 / 2,68,710 = 3.74$ Years

(c) Net Present Value = Present value of cash inflows – Present value of cash outflows

           $=$ Rs.17,83,897 – Rs.15,00,000 $=$ Rs. 2,83,897

(d) Profitability Index   = Present value of cash inflows / Present value of cash outflows

           $=$ Rs.17,83,897 / Rs.15,00,000 $= 1.19$

Note:

Depreciation $= \dfrac{\text{Cost - Scrap Value}}{\text{Life}} = \dfrac{`15,00,000 - 0}{5} = 3,00,000$

Answer for Illustration 33:

	Proposal X (Rs.)	Proposal Y (Rs.)
Earnings before Interest and Taxes	13,00,000	24,50,000
Less: Tax @ 30%	3,90,000	7,35,000
Earnings after Tax	9,10,000	17,15,000
Add: Depreciation	22,20,000	35,70,000

Cash inflow (a)	31,30,000	52,85,000
Present value annuity factor @ 10% (b)	3.1698	3.7907
Present Value of cash inflow (a) × (b)	99,21,474	2,00,33,850
Add: Present value of salvage value:		
Proposal X: Rs. 1,20,000 × 0.683	81,960	-
Proposal Y: Rs. 1,50,000 × 0.6209	-	93,135
Total Present Value	1,00,03,434	2,01,26,985
Less: Initial Outflow	90,00,000	1,80,00,000
Net Present Value	10,03,434	21,26,985

Working Note:

	X	Y
Depreciation		
Cost (Rs.)	90,00,000	1,80,00,000
Less: Salvage Value (Rs.)	1,20,000	1,50,000
	88,80,000	1,78,50,000
Working Life	4 Year	5 Year
Depreciation per annum (Rs.)	22,20,000	35,70,000

Advice – Annualized Net Present Value is more in case of Project Y hence, we should accept project Y.

Answer for Illustration 34:

Ranking of Proposals:

Year	Cash Inflow (Rs.)		PV Factor	Total PV (Rs.)	
	M	N	(10% p.a.)	M	N
1	70,000	1,00,000	0.909	63,630	90,900
2	60,000	90,000	0.826	49,560	74,340
3	60,000	80,000	0.751	45,060	60,080
4	50,000	40,000	0.683	34,150	27,320
5	90,000	-	0.621	55,890	-
				2,48,290	2,52,640
Less: Cash Outflow				2,00,000	2,00,000
Net PV				48,290	52,640

$$Average Rate of Return = \frac{Average Profit}{Average Investment} \times 100$$

Note: [For evaluation of ARR the average investment has been taken at half of the initial cost for all the two machines]

M = Rs. 70,000 + Rs. 60,000 + Rs. 60,000 + Rs. 50,000 + Rs. 90,000= Rs. 3,30,000 ÷ 5 = Rs. 66,000

N = Rs. 1,00,000 + Rs. 90,000 + Rs. 80,000 + Rs. 40,000= Rs. 3,10,000 ÷ 4 = Rs. 77,500

M

$$Average\,Rate\,of\,Return= \frac{AV\,Profit}{AV\,Investment} \times 100$$

$$= \frac{Average\,Cash\,Inflow - Depreciation}{Average\,Investment} \times 100$$

$$= \frac{66000 - 40000}{100000} \times 100$$

$$= 26\%$$

N

$$= \frac{77500 - 50000}{100000} \times 100$$

$$= 27.5\%$$

Rank: Machine 'N' to be selected under both the methods as it generates higher NPV and average rate of return.

Answer for llustration 35:

NPV = PV of Inflow – PV of Outflow

Project 1's NPV = Rs. [5,00,000 (0.943 + 0.889 + 0.839 + 0.792 + 0.747) – 20,00,000]

= Rs. 1,05,000

Project 2's NPV = Rs. [6,00,000 (0.917 + 0.841 + 0.772 + 0.708 + 0.649) – 20,00,000]

= Rs. 3,32,200

Project 3's NPV = Rs. 20,31,900 – 20,00,000 = Rs. 31,900.

Project 2 should be accepted as its NPV is maximum.

Answer for Illustration 36:

Cash outflow = Rs. 15,00,000

Life of the Project = 5 Years

1. **Calculation of NPV of Project A**

   NPV = PV of Cash Inflow (CI) – PV of cash outflow

   PV of CI = CI × PV of Annuity factor for 5 years @ 4%

   = Rs. 3,50,000 × 4.452

   = Rs. 15,58,200

   NPV = Rs. 15,58,200 – Rs. 15,00,000

   = Rs. 58,200

2. **Calculation of NPV of Project B**

   PV of CI = CI × PV of Annuity factor for 5 years @ 8%

= Rs. 4,00,000 × 3.993

= Rs. 15,97,200

NPV = Rs. 15,97,200 – Rs. 15,00,000

= Rs. 97200

3. Calculation of NPV of Project C

PV of CI = CI × PV of Annuity factor for 5 years @ 10%

= Rs. 5,00,000 × 3.791

= Rs. 18,95,500

NPV = Rs. 18,95,500 – Rs. 15,00,000

= Rs. 3,95,500

Recommendation: The management of P Ltd. may be advised to select Project C as its NPV is more than NPV of Project A & B.

Answer for Illustration 37:

Determination of cash flows after taxes (CFAT)

Year	CFBT Rs.	Depreciation (Rs. 50,000/5)	Profits before tax (Col.2 – Col.3)	Taxes (0.35)	EAT (Col.4 – Col.5)	CFAT (Col.6+Col.3)
1	2	3	4	5	6	7
1	10,000	10,000	Nil	Nil	Nil	Rs. 10,000
2	10,692	10,000	Rs. 692	Rs. 242	Rs. 450	10,450
3	12,769	10,000	2,769	969	1,800	11,800
4	13,462	10,000	3,462	1,212	2,250	12,250
5	20,385	10,000	10,385	3,635	6,750	16,750
					11,250	61,250

(i) Payback (PB) period

Year	CFAT (Rs.)	Cumulative CFAT (Rs.)
1	10,000	Rs. 10000
2	10,450	20,450
3	11,800	32,250
4	12,250	44,500
5	16,750	61,250

The recovery of the investment falls between the fourth and fifth years. Therefore, the PB is 4 years plus a fraction of the fifth year. The fractional value = Rs. 5,500 ÷ Rs. 16,750 = 0.328.

Thus, the PB is 4.328 years.

(ii) Average rate of return (ARR) $= \dfrac{\text{Average income}}{\text{Average Investment}} \times 100$

$$= \dfrac{`2250(`11250 \div 5)}{25000(`50000 \div 2)} \times 100$$

$$= 9\%$$

(iii) Internal rate of return (IRR) Rs. **50000** $= \dfrac{10,000}{(1+r)^1} + \dfrac{10,450}{(1+r)^2} + \dfrac{11,800}{(1+r)^3} + \dfrac{12,250}{(1+r)^4} + \dfrac{16,750}{(1+r)^5}$

The fake payback period = 4.0816 (Rs. 50,000 / Rs. 12,250). The value closest to the fake payback period of 4.0816 against 5 years is 4.100 against 7%. Since the actual cash flow stream is the initial years are slightly below the average cash flow stream, the IRR is likely to be lower than 7%. Let us try with 6%.

Year	CFAT	PV factor (0.06)	(0.07)	Total PV (0.06) (Rs.)	(0.07)
1	Rs. 10,000	0.943	0.935	Rs. 9,430	9350
2	10,450	0.890	0.873	9,300	9,123
3	11,800	0.840	0.816	9,912	9,629
4	12,250	0.792	0.763	9,702	9,347
5	16,750	0.747	0.713	12,512	11,942
Total PV				50,856	49,391
Less: Initial outlay				50,000	50,000
NPV				856	(609)

The IRR is between 6% and 7%. By interpolation, IRR = 6.6%.

(iv) Net present value (NPV)

Year	CFAT (Rs.)	PV factor (0.10)	Total PV (Rs.)
1	10,000	0.909	9,090
2	10,450	0.826	8,632
3	11,800	0.751	8,862
4	12,250	0.683	8,367
5	16,750	0.621	10,401
Total PV			45,352
Less: Initial outlay			50,000
NPV			(4,648)

(v) Profitability Index (PI) $= \dfrac{\text{PV of cash inflows}}{\text{PV of cash outflows}} = \dfrac{`45,352}{`50,000} = 0.907$

Answer for Illustration 38:

Relevant cash flows	(Rs.)	(Rs.)
a. Incremental cashinflows Sales		
b. Incremental cash outflows		1,00,000
Manufacturing cost of sales		
Selling and administrative expenses	30,000	
Decrease in contribution of other products	20,000	
Income taxes associated with product income	2,000	
Net cash inflows (CFAT) for one year		
b. Cash outflows due to additional working capital requirement in the beginning of the year	6,000	58,000
		42,000
Increase in accounts receivable		
Plus increase in inventories		
Less increase in current liabilities	7,000	
Net increase in working capital	10,000	
	15,000	2,000
		2,000

6. WORKING CAPITAL MANAGEMENT

SOLUTIONS FOR CLASSROOM DISCUSSION

Answer for Illustration 1:

Statement showing estimate of Working Capital

Particulars	(Rs.)	(Rs.)
Current Assets		
Stock of Raw material (60,000 units × Rs.115 × 1/12)		5,75,000
Work-in-progress:		
Raw materials (60,000 units × Rs.115 × 1/12 × 1/2)	2,87,500	
Direct labour (60,000 units × Rs.80 × 1/12 × 1/2 ×1/2)	1,00,000	
Overheads (60,000 units × Rs.37 × 1/12 × 1/2 × 1/2)	46,250	4,33,750
Stock of finished goods (60,000 units × Rs.232 × 1/2)		11,60,000
Debtors (60,000 units × Rs.232 × 3/4 × 2/12)		17,40,000
Cash balance		1,65,000
Total (A)		40,73,750
Current Liabilities:		
Creditors for raw material (60,000 units × Rs.115 × 1/12)		5,75,000
Creditors for wages (60,000 units × Rs.80×1/12 × 1/2)		2,00,000
Creditors for overheads (60,000 units × Rs.37 × 1/12)		1,85,000
Total (B)		9,60,000
Net Working Capital (A) – (B)		31,13,750

Answer for Illustration 2:

Statement to determine Net Working Capital for AB Ltd.

Particulars	Amount (Rs.)
(a) Current assets:	
(i) Stocks of finished product	6,000
(ii) Stock of stores and materials	7,000
(iii) Debtors:	
Inland sales (Rs. 3,12,000 × 6/52)	36,000
Export sales (78,000 × 3/104)	2,250
(iv) Advance payment of sundry expenses (8,000 × 1/4)	2,000
Total investment in current assets	53,250
(b) Current liabilities:	
(i) Wages (Rs.2,60,000 × 3/104)	7,500
(ii) Stock and materials (Rs. 52,000 × 3/24)	6,500
(iii) Rent and royalties (Rs. 12,000 × 6/12)	6,000

(iv) Clerical staff (Rs. 62,400 × 1/24)		2,600
(v) Manager (Rs. 4,800 × 1/24)		200
(vi) Miscellaneous expenses (Rs. 52,000 × 3/24)		6,500
Total estimate of current liabilities		29,300
(c) Net working capital		
(i) Current assets - Current liabilities (a - b)		23,950
(ii) Add: 12% contingency allowance		2,874
Average amount of working capital required		26,824

Assumptions:

(i) A time period of 52 weeks / 12 months has been assumed in year.

(ii) Undrawn profit has been ignored in the working capital computation for the following reasons:

(a) For the purpose of determining working capital provided by net profit, it is necessary to adjust the net profit for income tax and dividends / drawings, and so on.

(b) Profit need not always be a source of financing working capital. It may be used for other purposes like purchase of fixed assets, payment of long-term loans, and so on. Since the firm does not seem to have such uses, Rs. 10,000 may be treated as source of working capital. But the net working capital will not change.

(iii) Actual working capital requirement would be more than what is estimated here as the cash component of current assets is not known.

Answer for Illustration 3:

Unit Selling Price and Cost	(Rs.)
Selling price (Rs. 46,80,000 ÷ 78,000)	60
Cost:	
Raw materials (60% of Rs. 46,80,000 ÷ 78,000)	36
Labour	6
Variable overheads	1
Fixed overheads (excluding depreciation)	5
Total cost per unit	**48**

<div align="center">

Statement showing Working Capital Requirement

</div>

Current Assets		(Rs.)
Raw materials	(78,000 units × Rs. 36 × 3/52)	1,62,000
Work-in-progress	(78,000 units × Rs. 42 × 1/52)	63,000
Finished goods	(78,000 units × Rs. 48 × 2/52)	1,44,000
Debtors	(78,000 units × Rs. 60 × 75/100 × 4/52)	2,70,000
Cash in hand		50,000
Total (A)		**6,89,000**

Current Liabilities

Creditors	(78,000 units × Rs. 36 × 4/52)	2,16,000
Lag in wages	(78,000 units × Rs. 6 × 2/52)	18,000
Lag in payment of overheads	(78,000 units × Rs. 6 × 2/52)	18,000
	Total (B)	**2,52,000**
Net working capital required	(A) – (B)	4,37,000

Note:

1. Total sales for 4 weeks is 6,000 units. Excluding 25% cash sales, credit sales amounts to 4,500 units.

2. One year is assumed to be of 52 weeks.

Answer for Illustration 4:

Selling Price and Cost per unit	(Rs.)
Raw materials (Rs. 600 × 30/100)	180
Packing materials (Rs. 600 × 10/100)	60
Direct labour (Rs. 600 × 15/100)	90
Direct expenses (Rs. 600 × 5/100)	30
Fixed overheads [Rs. 4,32,000 / (400 × 12)]	90
Total cost	450
Profit	150
Selling Price per unit	600

Forecast of Working Capital Requirement:		(Rs.)
Current Assets		
Raw materials stock	(Rs. 4800 × 180 × 30/300)	86,400
Packing materials stock	(Rs. 4800 × 60 × 15/300)	14,400
Working in progress	(Rs. 4800 × 285 × 7/300)	31,920
Finished goods stock	(Rs. 450 × 200 units)	90,000
Debtors	(Rs. 4800 × 80/100 × Rs. 600 × 30/300)	2,30,400
Total (A)		**4,53,120**
Current Liabilities:		
Creditors for raw material suppliers	(Rs. 4800 × 180 × 21/300)	60,480
Creditors for packing material	(Rs. 4800 × 60 × 21/300)	20,160
Creditors for expenses and overheads	(Rs. 4800 × 120 × 15/300)	28,800
Total (B)		**1,09,440**
Net Working Capital (A) – (B)		3,43,680
Add: Cash required (12% of net working capital)		41,242
Total Working Capital Required		3,84,922

Note:

(a) Work-in-progress is valued with raw material cost at 100% and 50% of wages, overheads and expenses.

(b) Debtors are valued at selling price.

Answer for Illustration 5:

(a) Computation of requirement of Working Capital

Annual production 60,000 units

Monthly production 5,000 units

<div align="center">Unit Cost Sheet</div>

Particulars		(Rs.)
Selling price		5.00
Cost of Raw Material 60% of Rs. 5 =	Rs. 3.00	
Wages 10% of Rs. 5 =	Rs. 0.50	
Overheads 20% of Rs. 5 =	Rs. 1.00	
Total cost per unit		4.50
Profit per unit		0.50

Current Assets:		(Rs.)	(Rs.)
Stock of Raw material	3×60,000×2/12		30,000
Work in Progress:			
Raw Materials	3×60,000×1/12	15,000	
Wages and Overheads	1.50×60,0000×1/12×1/2	3,750	18,750
Stock of Finished Goods	4.50×60,000×3/12		67,500
Debtors (on sales)	5.00×60,000×3/12		75,000
Cash			20,000
Total Current Assets	(A)		2,11,250

Current Liabilities:		(Rs.)
Creditors	3 × 60,000 ×2/12	30,000
Outstanding wages	0.5×60,000×1/12	2,500
Outstanding overheads	1 × 60,000 ×1/12	5,000
Total Current Liabilities (B)		37,500

Working Capital: (A-B) = 2,11,250 – 37,500 = Rs. 1,73,750

(a) Effects of Double shift working:

The following assumptions are made before estimating the working capital requirement for double shift working:

1. Production will be 10,000 units per month or 1,20,000 units per year.

2. Materials may not be required at double rate. Due to inventory control measures it may be taken as 2/3.

3. WIP will be the same at 5,000 units. This will not increase as WIP of first shift will be handed over to second shift.

4. 50% of overheads are assumed as fixed. This will not increase due to double shift working.

On the basis of above assumptions, the following capital requirement is estimated as follows:

Current Assets:			(Rs.)
Stock of Raw material	30,000+(30,000×2/3)		50,000
Work in Progress:			
Raw materials	3×60,000×1/12	15,000	
Wages and Overheads	**1.25×60,000×1/12	3,125	18,125
Stock of finished Goods	4.25×1,20,000×3/12		1,27,500
Debtors (on sales)	5.00×1,20,000×3/12		1,50,000
Cash (double)			40,000
Total Current Assets	**(A)**		**3,85,625**

Current liabilities:		(Rs.)
Creditors	3 × 1,20,000 × 2/12	60,000
Outstanding wages	0.5 × 1,20,000 ×1/12	5,000
Outstanding overheads (Fixed Overheads remain same)		2,500
(Variable Overheads double as before)		5,000
Total Current Liabilities	**(B)**	**72,500**

Working Capital required for two shifts: (A-B) = Rs. 3,85,625 – Rs. 72,500 = Rs. 3,13,125

Therefore, additional working capital required for second shift

= Rs. 3,13,125 – Rs. 1,73,750 = Rs. 1,39,375

** Calculation of Cost per unit

	Single shift (Rs.)	**Double shift (Rs.)**
Raw material Cost	3.00	3.00
Wages	0.50	0.50
Overhead expenses:		
Fixed	0.50	0.25
Variable	0.50	0.50
Cost per unit	4.50	4.25

Answer for Illustration 6:

Statement showing determination of Working Capital (Amount in Rs. lakhs)

Current Assets	(Rs.)	Computation
Cash	20.00	
Raw Materials	37.50	(450 lakh / 12)
Finished Goods	122.50	(1,470 lakh / 12)
Debtors-Domestic market	100.00	(1,200 / 12)
Export Market	135.00	(540 × 3 / 12)
Sales Promotion Expense	15.00	3 (60 lakh × 3 / 12)
Total Current Assets (A)	**430.00**	

Current Liabilities		(Rs.)
Raw Materials (450 × 2 / 12)		75.00
Wages (360 / 24)		15.00
Manufacturing Expenses (540 /12)		45.00
Administration Expenses (120/12)		10.00
Total Current Liabilities (B)		**145.00**
Net Current Assets (A-B)		**285.00**
Add: Safety Margin @ 15%		42.75
Working Capital Requirement		**327.75**

Working notes:

1. Cost of Production

	Rs. in lakhs
Material used	450
Wages paid	360
Manufacturing exp	540
Administration exp	120
Total	1470

Tax aspect is ignored as it is to be paid out ofprofits.

Answer for Illustration 7:

Determination of Net Working Capital of Camelia Industries Ltd.

Current Assets	(Rs.)	(Rs.)
Minimum desired cash balance	10,00,000	
Raw Materials:		
Pig iron	13,00,000	[1,20,000 × 65 × (2 / 12)]
Ferry alloys	1,50,000	[1,20,000 × 15 × (1 / 12)]

Cast iron borings	1,00,000	[1,20,000 × 10 × (1 / 12)]
Work-in-Progress	6,62,500	[1,20,000 × 132.5 (1/24)]
Finished goods	18,00,000	[1,20,000 × 180 × (1/ 12)]
Debtors	60,00,000	[1,20,000 × 300 × (2/12)]
Total Current Assets: (A)	1,00,12,500	

Current liabilities	**(Rs.)**	**(Rs.)**
Creditors:		
Pig iron	13,00,000	[1,20,000 × 65 × (2/12)]
Ferry alloys	75,000	[1,20,000 × 15 × (1 / 24)]
Cast iron borings	1,00,000	[1,20,000 × 10 × (1 / 12)]
Outstanding Wages	2,50,000	[1,20,000 × 50 × (1 / 24)]
Outstanding Total Overheads	7,00,000	[1,20,000 × 70 × (1 / 12)]
Total Current Liabilities (B)	24,25,000	

Working Capital (A) - (B) = Rs.1,00,12,500 – Rs.24,25,000 = Rs.75,87,500

Working Notes: (Rs. in Lakh)

Particlars	Amount (Rs.)	Amount (Rs.)
*Determination of Work in Process		
Pig iron		65.00
Ferry alloys		15.00
Cast iron borings (0.5 × 10)		5.00
Other costs		
Cast iron borings	2.50	
Direct Labour (0.5 × 50)	25.00	
Manufacturing and administration Overheads (0.5 × 40)	20.00	47.50
		132.50

Answer for Illustration 8:

A. Statement showing the Evaluation of Debtors Policies (Total Approach)

Particulars	Present Policy 30 days (Rs.)	Proposed Policy A 40 days (Rs.)	Proposed Policy B 50 days (Rs.)	Proposed Policy C 60 days (Rs.)	Proposed Policy D 75 days (Rs.)
A. Expected Profit					
(a) Credit Sales	6,00,000	6,30,000	6,48,000	6,75,000	6,90,000
(b) Total Cost other than Bad Debts					
(i) Variable Costs [Sales × Rs. 2/ Rs. 3]	4,00,000	4,20,000	4,32,000	4,50,000	4,60,000

	Present Policy	Policy A	Policy B	Policy C	Policy D
(ii) Fixed Costs	50,000	50,000	50,000	50,000	50,000
	4,50,000	4,70,000	4,82,000	5,00,000	5,10,000
(c) Bad Debts	6,000	9,450	12,960	20,250	27,600
(d) Expected Profit [(a) - (b)-(c)]	1,44,000	1,50,550	1,53,040	1,54,750	1,52,400
B. Opportunity Cost of Investments in Receivables	7,500	10,444	13,389	16,667	21,250
C. Net Benefits (A-B)	1,36,500	1,40,106	1,39,651	1,38,083	1,31,150

Recommendation: The Proposed Policy A (i.e., increase in collection period by 10 days or total 40 days) should be adopted since the net benefits under this policy are higher as compared to other policies.

Working Notes:

(i) Fixed Cost = [Average Cost per unit - Variable Cost per unit] × No. of units sold

= [Rs. 2.25 – Rs. 2.00] × (Rs. 6,00,000/3)

= Rs. 0.25 × 2,00,000 = Rs. 50,000

(ii) Opportunity Cost of Average Investments

$$\text{Total Cost of Credit Sales} \times \frac{\text{Collection period (Days)}}{365 \,(\text{or } 360)} \times \frac{\text{Required Rate of Return}}{100}$$

Present Policy = (4,50,000 × 30 / 360) × (20 / 100) = Rs. 7,500

Policy A = (4,70,000 × 40 / 360) × (20 / 100) = Rs. 10,444

Policy B = (4,82,000 × 50 / 360) × (20 / 100) = Rs. 13,389

Policy C = (5,00,000 × 60 / 360) × (20 / 100) = Rs. 16,667

Policy D = (5,10,000 × 75 / 360) × (20 / 100) = Rs. 21,250

(B) Another method of solving the problem is Incremental Approach. Here we assume that sales are all credit sales.

Particulars	Present Policy 30 day (Rs.)	Proposed Policy A 40 days (Rs.)	Proposed Policy B 50 days (Rs.)	Proposed Policy C 60 days (Rs.)	Proposed Policy D 75 days (Rs.)
A. Incremental Expected Profit					
(a) Incremental Credit Sales		30,000	48,000	75,000	90,000
(b) Incremental Costs					
(i) Variable Costs	4,00,000	20,000	32,000	50,000	60,000
(ii) Fixed Costs	50,000	-	-	-	-
(c) Incremental Bad Debt Losses	6,000	3,450	6,960	14,250	21,600
(d) Incremental Expected Profit (a – b -c)]		6,550	9,040	10,750	8,400

B. Required Return on Incremental Investments					
(a) Cost of Credit Sales	4,50,000	4,70,000	4,82,000	5,00,000	5,10,000
(b) Collection period	30	40	50	60	75
(c) Investment in Receivable (a × b/360)	37,500	52,222	66,944	83,333	1,06,250
(d) Incremental Investment in Receivables	-	14,722	29,444	45,833	68,750
(e) Required Rate of Return (in %)		20	20	20	20
(f) Required Return on Incremental Investments (d × e)		2,944	5,889	9,167	13,750
C. Net Benefits (A - B)	-	3,606	3,151	1,583	5,350

Recommendation: The Proposed Policy 'A' should be adopted since the net benefits under this policy are higher than those under other policies.

(B) Another method of solving the problem is by computing the Expected Rate of Return.

$$Expected\,Rate\,of\,return = \frac{Incremental\,Expected\,Profit}{Incremental\,Investment\,in\,Receivables} \times 100$$

For Policy A	=Rs. 6,550 / 14,722 × 100	=	44.49%
For Policy B	=Rs. 9,040 / 29,444 × 100	=	30.70%
For Policy C	=Rs. 10,750 / 45,833 × 100	=	23.45%
For Policy D	=Rs. 8,400 / 68,750 × 100	=	12.22%

Recommendation: The Proposed Policy 'A' should be adopted since the Expected Rate of Return (44.49%) is more than the Required Rate of Return (20%) and is the highest among the given policies compared.

Answer for Illustration 9:

Statement showing the Evaluation of Debtors Policies

Particulars	Present Policy (Rs.)	Proposed Policy I (Rs.)	Proposed Policy II (Rs.)
A . Expected Profit			
(a) Credit Sales	50,00,000	60,00,000	67,50,000
(b) Total Cost other than Bad Debts:			
(i) Variable Costs	35,00,000	42,00,000	47,25,000
(c) Bad Debts	1,50,000	3,00,000	4,50,000
(d) Expected Profit [(a) - (b) - (c)]	13,50,000	15,00,000	15,75,000

B . Opportunity Cost of Investments in Receivables	2,18,750	3,50,000	4,92,188
C Net Benefits (A - B)	11,31,250	11,50,000	10,82,812

Recommendation: The Proposed Policy 'I' should be adopted since the net benefits under this policy is higher as compared to other policies.

Workings Notes: Calculation of Opportunity Cost of Average Investments Opportunity Cost = Total Cost × Collection period / 12 × Rate of Return / 100

Present Policy	=	Rs. 35,00,000 × 3/12 × 25%	=	Rs.2,18,750
Proposed Policy I	=	Rs. 42,00,000 × 4/12 × 25%	=	Rs.3,50,000
Proposed Policy II	=	Rs. 47,25,000 × 5/12 × 25%	=	Rs.4,92,188

Answer for Illustration 10:

Evaluation of Credit Policies Category (a) 10% Risk of Non-payment

Particulars		(Rs.)
Incremental sales		40,000
Less: Bad debts @ 10%		4,000
Sales realized		36,000
Less: Cost of production and selling cost (40,000 × 60%)	24,000	
Less: Collection cost (40,000 × 5%)	2,000	26,000
Incremental profit		10,000

Category (b)   30% risk of non-payment

		(Rs.)
Incremental sales		50,000
Less: Bad debts @ 30% (50,000 × 30%)		15,000
Sales realized		35,000
Less: Cost of production and selling cost (50,000 × 60%)	30,000	
Less: Collection cost (50,000 × 10%)	5,000	35,000
Incremental profit		Nil

Comment: Advise to extend credit facility to category (a) customers alone.

Answer for Illustration 11:

Cost of credit can be calculated by using the following formula:

$$\frac{d}{(100-d)} \times \left(\frac{365 days}{t}\right)$$

Where,

d = Size of discount or discount percentage (%)

t = Allowed payment days – discount days

$$= \frac{2}{(100-2)} \times \left(\frac{365 \text{days}}{40-15} \right)$$

= 0.0204 × 14.4

= 0.29376

i.e., 29.4%

Answer for Illustration 12:

Economic Ordering Quantity = $\sqrt{\dfrac{2AO}{C}}$

Where,

A = Annual demand

O = Ordering Cost

C = Carrying Cost

EOQ = $\sqrt{\dfrac{2 \times 10,000 \times 50}{\dfrac{2 \times 8}{100}}}$

EOQ = 2,500 Kg

No. of orders to be placed in a year = $\dfrac{\text{Total consumption of material per annum}}{\text{EOQ}}$

$$= \frac{10,000 \text{kg}}{2,500 \text{kg}}$$

= 4 Orders per year

Answer for Illustration 13:

Economic Ordering Quantity = $\sqrt{\dfrac{2AO}{C}}$

Where,

A = Annual demand

O = Ordering Cost

C = Carrying Cost

EOQ = $\sqrt{\dfrac{2 \times 18,250 \text{units} \times \text{Rs.} 50}{\text{Rs.} 36.50 \times 20\%}}$

EOQ = 500 Units

Answer for Illustration 14:

Particulars	A	B
(a) Reorder Level (ROL)	2,700 units	1,800 units
[Max. Consumption × Max. Re-order Period]	(450 × 6)	(450 × 4)

(b)	Minimum Level		
	[ROL – (Normal Consumption × Normal Re-order period)]	1,200 units [2,700 – (300×5)]	900 units [1,800 – (300 × 3)]
(c)	Maximum Level		
	[ROL + ROQ – (Min. Consumption × Min. Re-order Period)]	4,500 units [2,700 + 2400 – (150×4)]	5,100 units [1,800 + 3,600 – (150 × 2)]
(d)	Average Stock Level [Min. Level + Max. Level] / 2	2,850 units [4,500 + 1,200 / 2]	3,000 units [5,100 + 900 / 2]
	Or	(or)	(or)
	[Min. Level + ½ Re-order Quantity]	2,400 units 1,200 + ½ (2,400)	2,700 units 900 + ½ (3,600)

Answer for Illustration 15:

$$\text{Inventory Turnover Ratio} = \frac{\text{Value of material consumed during the period}}{\text{Value of average stock held during the period}}$$

$$\text{Average Stock} = \frac{\text{Opening Stock} + \text{Closing Stock}}{2}$$

$$\text{Average Stock} = \frac{`1,00,000 + `1,60,000}{2}$$

= Rs. 1,30,000

$$\therefore \text{Inventory Turnover Ratio} = \frac{`7,80,000}{`1,30,000} = 6$$

Answer for Illustration 16:

Particulars		A	B
(a)	Reorder Level [Max. Consumption × Max. Re-order Period]	450 units (75 × 6)	300 units (75 × 4)
(b)	Minimum Level [ROL – (Normal Consumption × Normal Re-order period)]	200 units [450 – (50 × 5)]	150 units [300 – (50 × 3)]
(c)	Maximum Level [ROL + ROQ – (Min. Consumption × Min Re-order period)]	650 units [450 + 300 – (25 × 4)]	750 units [300 + 500 – (25 × 2)]
(d)	Average Stock Level [Min. Level + Max. Level] / 2	425 units [200 + 650 / 2] (or)	450 units [150 + 750 / 2] (or)
	or	or	or
	[Min. Level + ½ × ROQ]	350 units 200 + ½ (300)	400 units 150 + ½ (500)

Answer for Illustration 17:

Economic Ordering Quantity = $\sqrt{\dfrac{2AO}{C}}$

Where,

A = Annual demand

O = Ordering Cost

C = Carrying Cost

$EOQ = \sqrt{\dfrac{2\times36,000\times25}{1\times20\%}}$

$EOQ = \sqrt{\dfrac{18,00,000}{1\times20\%}}$

EOQ = 3,000 Units

Particulars	Existing Policy (Rs.)		EOQ (Rs.)	
(i) Purchase Cost	(36,000 × 1)	36,000	(36,000 × 1)	36,000
(ii) Ordering Cost	[36,000 / 6,000 × 25]	150	[36,000 / 3,000 × 25]	300
(iii) Carrying Cost	[1/2 × 6,000 × 1 × 20%]	600	[1/2 × 3,000 × 1 × 20%]	300
		36,750		36,600

Saving by using EOQ = Rs. 36,750 – Rs. 36,600 = Rs. 150

Answer for Illustration 18:

(a) Economic Ordering Quantity = $\sqrt{\dfrac{2AO}{c}}$

$= \sqrt{\dfrac{2\times3,200\times1.50}{6\times25\%}}$

$= \sqrt{\dfrac{9,60,000}{1.5}}$

= 800 units

(b) No. of orders per year = A / EOQ = 3200 / 800 = 4 orders

(c) Time between two consecutive orders = No. of months in years / No. of orders

= 12/4 = 3 Months

Answer for Illustration 19:

(a) Calculation of Economic Order Quantity

Economic Ordering Quantity = $\sqrt{\dfrac{2AO}{C}}$

$= \sqrt{\dfrac{2\times8,000\times200}{400\times20\%}}$

EOQ = 200 units

(a) Evaluation of profitability of different options of order quantity

    (i) When EOQ is ordered (Rs.)

Purchase Cost	(8,000 units × Rs. 400)	32,00,000
Ordering Cost Carrying Cost	[(8,000 units / 200 units) × Rs. 200]	8,000
	(200 units × Rs. 400 × ½ × 20/100	8,000
Total Cost		**32,16,000**

    (ii) When quantity discount is accepted (Rs.)

Purchase Cost	(8,000 units × Rs. 384)	30,72,000
Ordering Cost Carrying Cost	[(8,000 units / 4,000 units) × Rs. 200]	400
	(4,000 units Rs. 384 × ½ × 20/100)	1,53,600
Total Cost		**32,26,000**

Advise: The total cost of inventory is lower if EOQ is adopted. Hence, the company is advised not to accept the quantity discount.

Answer for Illustration 20:

According to Baumol, the optimum amount to be transferred each time is ascertained as follows:

$$c = \sqrt{\frac{2AF}{O}}$$

Where, C = Optimum transaction size

A = Estimate cash outgoings per annum i.e., Rs. 5,00,000

F = Fixed Cost per transaction i.e., Rs. 150

O = Opportunity cost of one rupee per annum = Interest rate on fixed deposit i.e. 12% p.a.

$$C = \sqrt{\frac{2 \times 150 \times 5,00,000}{0.12}} = \text{Rs. } 35,355 \text{ say Rs. } 35,000$$

Number of transaction p.a. = Rs. 5,00,000/ Rs. 35,000 = 14 transactions

Average balance in the short notice account = Rs. 35,000/2 = Rs. 17,500

Aggregate of Fixed cost = 14 transactions × Rs. 150 = Rs. 2,100

Answer for Illustration 21:

The optimum transaction size will be calculated as under:

$$c = \sqrt{\frac{2AF}{O}}$$

Where, A = Estimate monthly cash payment i.e., Rs. 8,00,000

F = Cost per transaction i.e., Rs. 250

O = Interest per annum i.e., 12%p.a. (For one month, the rate of interest is 1% or 0.01)

$$\text{Optimum Cash Balance} = \sqrt{\frac{2 \times 250 \times 8,00,000}{0.01}}$$

Optimum transaction size = Rs. 2,00,000

Average Cash Balance = Rs. 2,00,000/2 = Rs. 1,00,000

Number of Transactions = Rs. 8,00,000 / Rs. 2,00,000 = 4 Transactions

Answer for Illustration 22:

The optimal point of cash balance (Z) is determined by using the formula:

$$Z=Z=\left(\frac{3}{4}\times\frac{c\sigma^2}{k}\right)^{\frac{1}{3}}$$

Where,

Z = Target cash balance (Optimal cash balance)

c = Transaction cost

k = Interest rate

σ = Standard deviation of net cash flows.

$$z=\left(\frac{3}{4}\times\frac{150\times2,00,000}{0.14/365}\right)^{\frac{1}{3}}=2,22,227$$

The upper control limit = Lower Limit +3Z

= Rs.5,00,000 + (3×Rs.222,227)

= Rs.1,181,680

Return Point = Lower Limit + Z

= Rs.500,000 + Rs.222,227

= Rs.727,227

Average cash balance= Lower Limit + 4/3Z

= Rs.500,000 + 4/3(Rs.222,227)

= Rs.802,969.

Answer for Illustration 23:

(a) Optimal size $=\sqrt{\frac{2AF}{O}}$

(b) Average cash balance = Rs.25,000

(c) No of transactions per year = Rs.37,50,000/50,000 = 75

(d) Total annual cost

Transaction cost = 75 × Rs.40= Rs.3,000

Opportunity cost = Rs.50,000 × 1/2 × 12% = 3,000

= Rs.6,000

Answer for Illustration 24:

The optimal point of cash balance (Z) is determined by using the formula:

$$Z=Z=\left(\frac{3}{4}\times\frac{c\sigma^2}{k}\right)^{\frac{1}{3}}$$

Where,

Z = Target cash balance (Optimal cash balance)

c = Transaction cost =Rs.1,000

k = Interest rate = 6%/365 (daily)

σ = Standard deviation of net cash flows= Rs.1,000

$$z = \left(\frac{3}{4} \times \frac{1,000 \times 1,000^2}{0.06/365} \right)^{\frac{1}{3}} = `3,573$$

The upper control limit = Lower Limit +3Z = Rs.10,000 + (3 × Rs.3,573)

$$= Rs.10,000 + Rs.10,719$$

$$= Rs.20,719$$

Return Point = Lower Limit + Z = Rs.10,000 + Rs.3,573

$$= Rs.13,573$$

Average cash balance = Lower Limit + 4/3Z = Rs.10,000 + 4/3 × (Rs.3,573)

= Rs.10,000+Rs.4,764

= Rs.14,764

Answer for Illustration 25:

As per Tandon Committee norms - Method 1

Under Method 1 the proprietor should contribute 25% of Working Capital Gap from their long-term source of finance and the balance is the Maximum Permissible Bank Borrowings.

In the given problem -

Working Capital Gap

Working Capital Gap = Current Assets - Current Liabilities (except bank borrowings)

Particulars	Rs. in lakh
Total Current Assets	740
Less: Current liabilities excluding bank borrowings	300
Working Capital Gap	440
Less: Contribution from long term source of finance (25%)	110
Maximum Permissible Bank Borrowings	330

Comment: Maximum Permissible Bank Borrowings under method 1 is Rs..330 lakhs. But existing bank borrowing is Rs. 400 lakhs. Therefore, the excess bank borrowings of Rs. 70 lakhs convert into term loan.

Method 2

Under Method- 2 the proprietor should contribute 25% of Current Assets from their long-term source of finance and the balance is the Maximum Permissible Bank Borrowings. In the given problem -

Particulars	Rs. in lakh
Total Current Assets	740

Less: Current liabilities excluding bank borrowings	300
Working Capital Gap	440
Less: Contribution from long term source of finance (25% of 740)	185
Maximum Permissible Bank Borrowings	255

Comment: Maximum Permissible Bank Borrowings under method 2 is Rs. 255 lakhs. But existing bank borrowing is Rs. 400 lakhs.

Therefore, the excess bank borrowings of Rs. 145 lakhs convert into term loan.

Method 3

Under Method 3 the proprietor should contribute the entire investment in Core Current Assets and 25% of remaining current assets from their long-term source of finance and the balance is the Maximum Permissible Bank Borrowings.

In the given problem -

Particulars	Rs. in lakh
Total Current Assets	740
Less: Current liabilities excluding bank borrowings	300
Working Capital Gap	440
Less: Contribution from long term source of finance (190+ 25% of (740-190))	328
Maximum permissible bank borrowings	112

Comment: Maximum permissible bank borrowings under method 3 is Rs. 112 lakh. But existing bank borrowing is Rs. 400 lakh.

Therefore, the excess bank borrowings of Rs. 288 lakhs convert into term loan.

Answer for Illustration 26:

Interest yield for investor of commercial paper

$$\frac{Face\,Value - Net\,amount\,realised}{Net\,amount\,realised} \times \frac{360}{Maturity\,period}$$

$$0.1125 = \frac{100 - Net\,amount\,realised}{Net\,amount\,realised} \times \frac{360}{90}\,days$$

Or, Net amount realised = Rs. 9.73 crore

Thus, the company issues a commercial paper worth Rs.10 crore and company receive Rs.9.73 crore

SOLUTIONS FOR CLASSROOM DISCUSSION

Answer for Illustration 1:

Calculation of value of firm and overall cost of capital under Net Income Approach

Value of firm = MV of Equity + MV of Debt	
EBIT	Rs. 50,000
Less: Interest (Rs.2,00,000 × 10%)	Rs. 20,000
Equity Earnings to equity shareholders (NI)	Rs. 30,000
Equity Capitalisation Rate (ke)	12.5%

Therefore,

Market Value of Equity (S) = $\dfrac{NI}{K_e}$ = 30,000/12.5% = 2,40,000

Market Value of Debt (given) (D) = Rs. 2,00,000

Value of Firm (V) = (S + D) = Rs. 4,40,000

Overall cost of capital (k_0) = $\dfrac{EBIT}{V}$% = 11.36%

Alternatively,

k_0 = 0.10 (Rs.2,00,000 / Rs.4,40,000) + 0.125 (Rs.2,40,000 / Rs.4,40,000)

k_e = 11.36%

Answer for Illustration 2:

Calculation of valuation of each firm under Net Income Approach

Value of firm = Value of equity + Value of debt

FIRM	X	Y	Z	W
	(Rs.)	(Rs.)	(Rs.)	(Rs.)
EBIT	2,00,000	3,00,000	5,00,000	6,00,000
Less: Interest	20,000	60,000	2,00,000	2,40,000
Equity Earnings	1,80,000	2,40,000	3,00,000	3,60,000
Cost of Equity (ke)	12%	16%	15%	18%
Capitalized Value of Equity	15,00,000	15,00,000	20,00,000	20,00,000
Add: MV of Debt	2,00,000	6,00,000	20,00,000	24,00,000
Value of Firm	17,00,000	21,00,000	40,00,000	44,00,000
WACC(ko)	11.76%	14.19%	12.50%	13.64%

Note 1: Value of debt = Interest / kd

Note 2: ko = EBIT / Value of firm

Answer for Illustration 3:

Evaluation of various financial alternatives

	Plan I (Equity) (Rs.)	Plan II (Preference Shares) (Rs.)	Plan III (Debentures) (Rs.)
1. EBIT	15,00,000	15,00,000	15,00,000
2. Interest:			
Existing	1,75,000	1,75,000	1,75,000
Additional	-	-	2,00,000
Total Interest	1,75,000	1,75,000	3,75,000
3. PBT (1-2)	13,25,000	13,25,000	11,25,000
4. TAX (50%)	6,62,500	6,62,500	5,62,500
5. PAT (3-4)	6,62,500	6,62,500	5,62,500
6. Preference dividend			
Existing	2,25,000	2,25,000	2,25,000
Additional	-	2,50,000	-
Total Preference Dividend	2,25,000	4,75,000	2,25,000
7. Equity Earnings (5-6)	4,37,500	1,87,500	3,37,500
8. No. of Equity Shares	*60,000	40,000	40,000
9. EPS (7/8)	7.29	4.69	8.44
10. P/E Ratio (Given)	20	17	16
11. Market Price per Share	145.80	79.73	135.04

* Note 1: No. of shares under Plan I

Existing shares	40,000
Additional shares	20,000
Total shares	60,000

Answer for Illustration 4:

Computation of existing capital and return on capital employed:

	(Rs.)	(Rs.)
Equity Share Capital	(40,000 × 10)	4,00,000
12% Debentures	(60,000 / 12%)	5,00,000
Undistributed Reserves		6,00,000
Existing Capital		15,00,000
Return on Capital Employed	(2,60,000/15,00,000) × 100	=17.33%

Calculation of Debt Equity Ratio

	Plan I (Debt Plan)	Plan II (Equity Plan)
Existing equity (Capital +Reserve) (Rs.)	10,00,000	10,00,000

Additional equity (Rs.)	-	2,00,000
Total equity(A) (Rs.)	10,00,000	12,00,000
Existing debt (Rs.)	5,00,000	5,00,000
Additional debt (Rs.)	2,00,000	-
Total debt(B) (Rs.)	7,00,000	5,00,000
Debt Equity Ratio = (Debt /Debt + Equity)	(7,00,000/15,00,000) × 100 = 41.18%	(5,00,000/ 5,00,000 + 12,00,000) = 29.41%
Applicable P/E Ratio	8	10

Computation of Probable Market price of Share after Expansion

	Plan-I (Debt)	Plan-II (Equity)
1. EBIT (17,00,000 × 17.33%) (Rs.)	2,94,610	2,94,610
2. Interest (Existing + Additional) (Rs.)	88,000	60,000
3. PBT (1 - 2) (Rs.)	2,06,610	2,34,610
4. Tax@ 50% (Rs.)	1,03,305	1,17,305
5. PAT (3 - 4) (Rs.)	1,03,305	1,17,305
6. Preference Dividend	-	-
7. Equity Earnings (5 - 6)	1,03,305	1,17,305
8. No. of Equity Shares (Existing + Additional)	40,000	*48,000
9. EPS (= 7 ÷ 8)	2.58	2.44
10. P/E Ratio	8	10
11. Market Price [= EPS × P/E Ratio]	20.64	24.40

The Market price is higher for Plan II. So, the company has to adopt Plan II i.e. raising additional funds by issuing equity shares is preferable.

*Note: Additional equity issued at prevailing market price i.e. Rs. 25.

Answer for Illustration 5:

Calculation of value of each firm under Modigliani–Miller Approach:

Value of firm = EBIT / ko

Firm	X (Rs.)	Y (Rs.)	Z (Rs.)
1. EBIT (Rs.)	13,00,000	13,00,000	13,00,000
2. ROI = ko	12%	12%	12%
3. Value of Firm; (1/2) (Rs.)	1,08,33,333	1,08,33,333	1,08,33,333

Calculation of value of each equity share for each firm

Firm	X (Rs.)	Y (Rs.)	Z (Rs.)
1. Value of Firm (Rs.)	1,08,33,333	1,08,33,333	1,08,33,333
2. Debt (Rs.)	-	9,00,000	10,00,000

3. Value of equity(1-2) (Rs.)	1,08,33,333	99,33,333	98,33,333
4. No. of equity shares	3,00,000	2,50,000	2,00,000
5. Market price; (3/4) (Rs.)	36.11	39.73	49.17

Answer for Illustration 6:

Capital Structure: (given) = 30% Debt and 70% Equity

Calculation of overall cost of capital at different investment outlays

Project Cost	kd(1-t)	ke	ko = Wdkd + keWe
Up to Rs.5 lakh	9% (1- 0.5) = 4.5%	13%	(0.3 × 4.5) + (0.7 × 13) = 10.450%
Rs.5 lakh to 20 lakh	10% (1- 0.5) = 5%	14%	(0.3 × 5) + (0.7 × 14) = 11.300%
Rs.20 lakh to 40 lakh	11% (1- 0.5) = 5.5%	15%	(0.3 × 5.5) + (0.7 × 15) = 12.150%
Rs.40 lakh to 1 crore	12% (1- 0.5) = 6%	15.55%	(0.3 × 6) + (0.7 × 15.55) =12.685%

<div align="center">Evaluation of given projects:</div>

Project	Investment	ko	Project Return	Result
A	8 lakh	11.3%	11%	Return< ko
B	22 lakh	12.15%	11%	Return< ko

Comment: Both the projects, A and B, are not acceptable as the cost of capital is more than the expected yield of the project. In order to accept the project, the Expected return should always greater than the cost of capital.

Answer for Illustration 7:

(i) Computation of Value of Firms X and Y using NI Approach:

NI approach assumes no taxes. Since, the tax rate is given in the problem, we have to work out of NI approach.

Value of Firm = MV of Equity + MV of Debt

	X (Rs.)	Y (Rs.)
EBIT	3,00,000	3,00,000
Less: Interest	90,000	-
PBT	2,10,000	3,00,000
Less: Tax @ 50%	1,05,000	1,50,000
PAT (Earnings for equity holders	1,05,000	1,50,000
Ke	15%	15%
Capitalized value of equity	7,00,000	10,00,000
Market Value of Debt	9,00,000	-
Market Value of Firm	16,00,000	10,00,000

(ii) Computation of value of firms X and Y using NOI approach:

Net Operating Income approach assumes no taxes. Since the tax rate is given in the problem, we have to work out using MM approach, which is an extension of NOI approach.

Value of unlevered firm (Y)= $\dfrac{EBIT(1-t)}{k_e}$

= Rs. 3,00,000 (1 - 0.05) / 0.15

= Rs. 10,00,000

Value of Levered Firm (X) = Value of Unlevered Firm + Debt (Tax rate)

= Value of Y Ltd. + Debt (Tax rate)

= Rs.10,00,000 + (Rs.9,00,000 × 50%)

= Rs. 14,50,000

(iii) Computation of Overall Cost of Capital (ko) using NOI approach:

For Y Ltd –

ko = ke = 15% (as there is no debt)

For Firm X –

Value of firm (Rs.)	14,50,000
Less: Value of debt (Rs.)	9,00,000
Market value of equity (Rs.)	5,50,000

$K_e = \dfrac{Equity\,Earnings}{Market\,Value\,of\,Equity} \times 100$

$= \dfrac{`1,05,000}{`5,50,000} \times 100 = 19\%$

kd= 0.10 × (1.0 – 0.50) = 5%

ko= $19 \times \dfrac{`5,50,000}{`14,50,000} + 5 \times \dfrac{`9,00,000}{`14,50,000} = 10.31\%$

(iv) Out of two firms, Firm Y seems to have optimum capital structure as it has lower cost of capital higher value of firm.

Answer for Illustration 8:

(i) Calculation of value of firm under Traditional Approach:

Value of firm = Value of Debt + Value of equity

Particulars	Amount (Rs.)
1. EBIT	4,00,000
2. Interest (Rs.10,00,000 × 10%)	1,00,000
3. Equity Earnings (1-2)	3,00,000
4. Equity Capitalisation rate (%)	15%
5. Value of Equity	20,00,000
6. Value of Debt	10,00,000
7. Value of Firm (5+6)	30,00,000

(ii) Calculation overall capitalization rate and leverage ratios

Overall Capital Rate (ko) = $\dfrac{\text{EBIT}}{\text{Value of firm}} \times 100$

$= \dfrac{`4,00,000}{`3,00,000} \times 100$

$= 13.33\%$

Leverage Ratios

(a) B/S Ratio = Borrowing/ Shareholders funds = $\dfrac{10,00,000}{20,00,000} = 0.5$

(b) B/V Ratio = Borrowing/Value of firm = $\dfrac{10,00,000}{30,00,000} = 0.33$

Answer for Illustration 9:

	Firms			
	A (Rs.)	**B (Rs.)**	**C (Rs.)**	**D (Rs.)**
Sales (Units)	5,000	5,000	5,000	5,000
Sales revenue (Units × Price)	1,00,000	1,60,000	2,50,000	3,50,000
Less: Variable cost (Units × VC per unit)	30,000	80,000	1,00,000	2,50,000
Less: Fixed Operating Costs	80,000	40,000	2,00,000	Nil
EBIT	(10,000)	40,000	(50,000)	1,00,000

$DOL = \dfrac{\text{Current Sales (S) - Variable Costs (VC)}}{\text{Current EBIT}}$

$DOL_{(A)} = \dfrac{`1,00,000 - `30,000}{`10,000}$

$= 7$

$DOL_{(B)} = \dfrac{1,60,000. `80,000}{`40,000}$

$= 2$

$DOL_{(c)} = \dfrac{`2,50,000 - `1,00,000}{`50,000}$

$= 3$

$DOL_{(D)} = \dfrac{`3,50,000 - `2,50,000}{`1,00,000}$

$= 1$

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, 20% increase in sales has resulted in a 20% 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% change in sales results in 7% change in EBIT level in the direction of the change of sales level of firm A.

Answer for Illustration 10:

Here, DFL = (EBIT) / (EBT) = Rs.206,000 / Rs.172,000 = 1.2

The companyRs.s degree of financial leverage is 1.2, indicating a lower level of fluctuation in its earnings, which means it could likely take on substantial additional debt.

Answer for Illustration 11:

(a) DOL $= \dfrac{3,40,000 - 60,000}{2,20,000} = 1.27$

(b) DFL $= \dfrac{2,20,000}{1,60,000} = 1.37$

DCL = DOL × DFL = 1.27 × 1.37 = 1.75

(b) Earnings per share at the new sales level

Particulars	Amount (Rs.)	Amount (Rs.)
Sales level (Volume)	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
Less: Interest	60,000	60,000
Earnings before taxes	2,16,000	1,04,000
Less: Taxes	75,600	36,400
Earnings after taxes (EAT)	1,40,400	67,600
Number of equity shares (N)	80,000	80,000
EPS	1.75	0.84

Working Notes

(i) Variable costs = Rs. 60,000 (total cost – depreciation).

(ii) Variable costs = (a) at sales level, Rs. 4,08,000 = Rs. 72,000, (b) at the sales level, Rs. 2,72,000 = Rs. 48,000

Answer for Illustration 12:

(a) ROI =EBIT/Investment

EBIT= Sales – VC – FC

= Rs. 75 lakh – Rs. 42 lakh – Rs. 6 lakh

= Rs. 27 lakh

ROI= Rs. 27 lakh/Rs. 100 lakh

= 27 %

(b) Yes, the firm has favourable financial leverage as its ROI is higher than the interest on debt.

(c) Asset turnover = Sales/Total Assets or Total Investments = Rs. 75 lakh/Rs. 100 lakh = 0.75. It is

lower than the industry average.

(d) Operating Leverage $= \dfrac{\text{Sales - Variable costs}}{\text{EBIT}} = \dfrac{75 \text{lakh} - 42 \text{lakh}}{27 \text{lakh}} = 1.22$

Financial Leverage $= \dfrac{\text{EBIT}}{\text{EBIT - Interest}} = \dfrac{27 \text{lakh}}{27 \text{lakh} - 4.05 \text{lakh}} = 1.18$

Combined Leverage $= \dfrac{\text{Sales - VC}}{\text{EBIT - Interest}} = \dfrac{33 \text{lakh}}{22,95,000} = 1.44$

Alternatively, = OL × FL = 1.22 × 1.18 = 1.44

(e) EBIT at sales level of Rs. 50 lakh

Particulars	Amount (Rs.)
Sales revenue	50 Lakh
Less: Variable costs (Rs. 50 lakh × 0.56) Less: Fixed costs	28 Lakh
	6 Lakh
EBIT	16 Lakh

(f) Zero EBT implies Break-Even Sales (BESR) = FC/CV ratio, CV ratio = Rs. 33 lakh/Rs. 75 lakh = 44%.

BESR = (Rs. 6 lakh + Rs. 4.05 lakh)/0.44 = Rs. 22,84,091.

Confirmation Table

Particulars	Amount (Rs.)
Sales revenue	22,84,091
Less: VC (0.56)	12,79,091
Less: FC (operating)	6,00,000
Less: Interest (additional fixed cost)	4,05,000
EBT	ZERO

Answer for Illustration 13:

(i) Determination of EPS under plans A, B and C

Particulars	Amount (Rs.)	Amount (Rs.)	Amount (Rs.)
EBIT	80,000	80,000	80,000
Less: Interest	--	8,000	-
EBT	80,000	72,000	80,000
Less: Taxes (0.35)	28,000	25,200	28,000
EAT	52,000	46,800	52,000
Less: Dividend on preference shares	-	-	8,000
Earnings for equity-holders ÷ number of	52,000	46,800	44,000
shares	10,000	5,000	5,000
EPS	5.20	9.36	8.80

Financial BEP for plans, A, B and C

Plan A	Zero
Plan B	Rs. 80,00 (Rs. 1,00,000 × 0.08)
Plan C = $\dfrac{DP}{(1-t)} = \dfrac{Rs.\ 8,000}{0.65}$	Rs. 12,308

(i) Indifference point among financial plans –

(a) A and B:

$$\frac{x(1-t)}{N1} = \frac{(x-1)(1-t)}{N2}$$

$$\frac{0.65x}{10,000} = \frac{(x-8,000)0.65}{5,000}$$

X= Rs. 10,400/0.65

= Rs. 16,000

(b) B and C:

$$\frac{(x-t)(1-t)}{N1} = \frac{x(1-t)-D_p}{N2}$$

or, 0.65X – Rs. 5,200 = 0.65X – Rs. 8,000

or, 0.65X – 0.65X = Rs. 5,200 – Rs. 8,000

Thus, indifference point between plans B and C is indeterminate.

(c) A and C:

$$\frac{x(1-t)}{N1} = \frac{x(1-t)-D_p}{N2}$$

$$\frac{0.65}{10,000} - \frac{0.65x-8,000}{5,000}$$

or, 0.65X = 13X – Rs. 16,000 or, X = Rs. 16,000/0.65

i.e.,Rs. 24,615

Domination of plan: Plan B dominates plan C as the financial BEP of plan B is lower.

Answer for Illustration 14:

(a) Income statement of companies A, B and C for the current year, ended March 31, 2021

Particulars	A (Rs.)	B (Rs.)	C (Rs.)
Sales	4,500	9,600	24,000
Less: Variable costs	3,000	7,200	12,000
Less: Fixed costs (Sales – VC – EBIT)	1,200	2,000	10,000
EBIT	300	400	2,000
Less: Interest	200	300	1,000

Earnings before taxes (EBT)	100	100	1,000
Less: Taxes	35	35	350
EAT (Net income)	65	65	650

Working Notes

(a) The preparation of the income statement requires data for (i) sales revenue, (ii) variable costs and (iii) fixed costs.

DFL = 3, DFL= $\dfrac{EBIT}{EBIT-1}$

Company A:

$3 = \dfrac{EBIT}{EBIT-200}$

or, EBIT =Rs. 300

DOL= $\dfrac{Sales-VariableCost\,(V)}{EBIT}$

$5 = \dfrac{S-0.667S}{`200}$

Where,

S = Sales = Rs. 4,500

VC= 0.667 × Rs. 4,500

= Rs. 3,000

Company B:

$4 = \dfrac{EBIT}{EBIT-300}$

EBIT = 400

$6 = \dfrac{s-0.75s}{400}$

=24,000

VC=0.50 ×24,000

=12,000

(b) The financial position of company C can be regarded better than other companies:

(i) It has the least financial risk as it has minimum degree of financial leverage. It is true that there will be a more magnified impact on EPS of A and B due to change in EBIT, but, their EBIT level due to low sales is very low.

(ii) From the point of view of DCL, company C is better placed. The degree of combined leverage is maximum in company B (24); for company A (15) and for company C it is 4. The total risk (business plus financial) of company C is the lowest.

(iii) The ability of the company C to meet interest liability is better. The EBIT/interest ratios for the three companies are:

C, 2.0 (Rs. 2,000 ÷ Rs. 1,000)

B, 1.5 (Rs. 300 ÷ Rs. 200)

A, 1.33 (Rs. 400 ÷ Rs. 300)

Answer for Illustration 15:

(a) Determination of operating leverage

Particulars	Situation I (Rs.)	Situation II (Rs.)
Sales	9,00,000	9,00,000
Less: Variable costs	4,50,000	4,50,000
Contribution	4,50,000	4,50,000
Less: Fixed Cost	1,50,000	2,00,000
EBIT	3,00,000	2,50,000
Operating Leverage (Contribution/EBIT)	1.5	1.8

(b) Determination of financial leverage

Particulars	Situation I (Rs.)		Situation II (Rs.)	
	Plan A	Plan B	Plan A	Plan B
EBIT	3,00,000	3,00,000	2,50,000	2,50,000
Less: Interest on debt	20,000	10,000	20,000	10,000
EBT	2,80,000	2,90,000	2,30,000	2,40,000
Financial Leverage (EBIT/EBT)	1.07	1.03	1.09	1.04

(c)   Determination of combined leverage

Particulars	Plan A	Plan B
Situation -I	1.5 × 1.07 = 1.61	1.5 × 1.03 = 1.54
Situation -II	1.8 × 1.09 = 1.96	1.5 × 1.04 = 1.87

Answer for Illustration 16:

Determination of operating leverage

Particulars	Situations		
	A	B	C
Sales level (units)	800	800	800
Sales revenue	Rs. 12,000	Rs. 12,000	Rs. 12,000
Less: Variable costs	8,000	8,000	8,000
Less: Fixed cost	1,000	2,000	3,000
Operating Profits (EBIT)	3,000	2,000	1,000
DOL =	1.33	2	4

Determination of financial leverage

Particulars	Financial plan		
	1	2	3
Situation A:			
EBIT (Rs.)	3,000	3,000	3,000
Less: Interest (Rs.)	600	300	900
Earnings after interest (Rs.)	2,400	2,700	2,100
Financial leverage (EBIT/EBIT − I)	1.25	1.11	1.43
Situation B:			
EBIT (Rs.)	2,000	2,000	2,000
Less: Interest (Rs.)	600	300	900
Earnings after interest (Rs.)	1,400	1,700	1,100
Financial leverage	1.43	1.18	1.82
Situation C:			
EBIT (Rs.)	1,000	1,000	1,000
Less: Interest (Rs.)	600	300	900
Earnings after interest (Rs.)	400	700	100
Financial leverage	2.5	1.43	10

Determination of the highest and the lowest value of combined leverage
(Combined leverage = DOL × DFL)

Particulars	Financial plan		
	1	2	3
A	1.66	1.48	1.90
B	2.86	2.36	3.64
C	10.00	5.72	40.00

The above calculations suggest that the highest value is in situation C financed by plan 3 and the lowest value is in situation A financed by plan 2.

Answer for Illustration 17:

(a) and (b)

Determination of EPS and MPS under alternative financial plans

	Sales levels							
	Rs. 20 lakh		Rs. 40 lakh		Rs. 80 lakh		Rs. 100 lakh	
	Debt (Rs.)	Equity (Rs.)	Debt (Rs.)	Equity (Rs.)	Debt (Rs.)	Equity (Rs.)	Debt (Rs.)	Equity (Rs.)
EBIT	2,00,000	2,00,000	4,00,000	4,00,000	8,00,000	8,00,000	10,00,000	10,00,000

Less: Interest	80,000	20,000	80,000	20,000	80,000	20,000	80,000	20,000
Earnings before taxes	1,20,000	1,80,000	3,20,000	3,80,000	7,20,000	7,80,000	9,20,000	9,80,000
Less: Taxes (0.35)	42,000	63,000	1,12,000	1,33,000	2,52,000	2,73,000	3,22,000	3,43,000
EAT	78,000	1,17,000	2,08,000	2,47,000	4,68,000	5,07,000	5,98,000	6,37,000
Number of equity shares	1,00,000	1,30,000	1,00,000	1,30,000	1,00,000	1,30,000	1,00,000	1,30,000
EPS	0.78	0.90	2.08	1.90	4.68	3.90	5.98	4.90
P/E ratio	10	12	10	12	10	12	10	12
Market price of a share	7.8	10.80	20.80	22.80	46.80	46.80	59.80	58.80

Working Note:

In debt financing, the number of equity shares outstanding = 1,00,000 (Rs. 10,00,000 ÷ Rs. 10 per share). In the case of equity financing, the total number of outstanding shares = 30,000 additional shares (total = 1,30,000 shares).

(c) The answer will depend on the expected level of sales. If the sales level is at Rs. 40 lakh, equity form of financing should be employed. At the sales level of Rs. 80 lakh, the company is indifferent. If the sales level is likely to be at Rs. 100 lakh, the debt form of financing should be employed.

Answer for Illustration 18:

As per Walter Model = $p = \dfrac{\left(D + \dfrac{r}{k}(E-D)\right)}{K}$

Where,

P = The prevailing market price of a share

D = Dividend per share = 0.3 × Rs.6 = Rs.1.80

E = Earnings per share = Rs. 6

r = The internal rate of return on the investments = 20%

k = Cost of capital = 10%

Putting the given value, we get P = Rs. 102

However, this is not the optimum payout as per WalterRs.s Model, because for r > k, optimum payout should be zero. Therefore, substituting D = 0, we get P = Rs. 120

Answer for Illustration 19:

Statement showing for valuation of each equity share according to WalterRs.s Model

Value of each Equity share P = $\dfrac{\left(D + \dfrac{r}{k}(E-D)\right)}{K}$

Where, D = Dividend per share, E = Earnings per share, r = Internal rate of return, k = Cost of Capital and

D/P Ratio = Dividend payout ratio.

Value of each Equity share P = $\dfrac{\left(D + \dfrac{r}{k}(E - D)\right)}{K}$

Where, D = Dividend per share, E = Earnings per share, r = Internal rate of return, k = Cost of Capital and D/P Ratio = Dividend payout ratio.

D/P Ratio	X Ltd. [Where, r > k]	Y Ltd. [Where, r < k]	Z Ltd. [Where, r = k]
	E = Rs. 10	E = Rs. 10	E = Rs. 10
	r = 15% or, 0.15	r = 5% or, 0.05	r = 10% or, 0.10
	k = 10% or, 0.10	k = 10% or, 0.10	k = 10% or, 0.10
	So, r/k = $\dfrac{0.15}{0.10}$ or, 1.5	So, r/k = 0.05/0.10 or, 0.5	So, r/k = 0.10/0.10 or, 1.

When D/P Ratio is Nil

X Ltd.
D = E × D/P Ratio = 10 × Nil = Nil
Thus,
$$P = \frac{Nil + (10 - Nil) \times 1.5}{0.10} = \text{Rs. } 150$$

Y Ltd.
D = E × D/P Ratio = 10 × Nil = Nil
Thus,
$$P = \frac{Nil + (10 - Nil) \times 1.5}{0.10} = \text{Rs. } 50$$

Z Ltd.
D = E × D/P Ratio = 10 × Nil = Nil
Thus,
$$P = \frac{Nil + (10 - Nil) \times 1}{0.10} = \text{Rs. } 100$$

When D/P Ratio is 25%

X Ltd.
D = E × D/P Ratio = 10 × 25% = Rs. 2.50
Thus,
$$P = \frac{2.50 + (10 - 2.50) \times 1.5}{0.10} = \text{Rs. } 137.5$$

Y Ltd.
D = E × D/P Ratio = 10 × 25% = Rs. 2.50
Thus,
$$P = \frac{2.50 + (10 - 2.50) \times 0.5}{0.10} = \text{Rs. } 62.50$$

Z Ltd.
D = E × D/P Ratio = 10 × 25% = Rs. 2.50
Thus,
$$P = \frac{2.50 + (10 - 2.50) \times 1}{0.10} = \text{Rs. } 100$$

When D/P Ratio is 50%

X Ltd.
D = E × D/P Ratio = 10 × 50% = Rs. 5
Thus,
$$P = \frac{5 + (10 - 5) \times 1.5}{0.10} = \text{Rs. } 125$$

Y Ltd.
D = E × D/P Ratio = 10 × 50% = Rs. 5
Thus,
$$P = \frac{5 + (10 - 5) \times 0.5}{0.10} = \text{Rs. } 75$$

Z Ltd.
D = E × D/P Ratio = 10 × 50% = Rs. 5
Thus,
$$P = \frac{5 + (10 - 5) \times 1}{0.10} = \text{Rs. } 100$$

When D/P Ratio is 75%

X Ltd.
D = E × D/P Ratio = 10 × 75% = Rs. 7.5
Thus,
$$P = \frac{7.5 + (10 - 7.5) \times 1.5}{0.10} = \text{Rs. } 112.50$$

Y Ltd.
D = E × D/P Ratio = 10 × 75% = Rs. 7.5
Thus,
$$P = \frac{7.5 + (10 - 7.5) \times 0.5}{0.10} = \text{Rs. } 87.50$$

Z Ltd.
D = E × D/P Ratio = 10 × 75% = Rs. 7.5
Thus,
$$P = \frac{7.5 + (10 - 7.5) \times 1}{0.10} = \text{Rs. } 100$$

When D/P Ratio is 100%	D = E × D/P Ratio = 10 × 100% = Rs. 10 Thus, $$P=\frac{10+(10-10)\times1.5}{0.10}$$ = Rs. 100	D = E × D/P Ratio = 10 × 100% = Rs. 10 Thus, $$P=\frac{10+(10-10)\times0.5}{0.10}$$ = Rs. 100	D = E × D/P Ratio = 10 × 100% = Rs. 10 Thus, $$P=\frac{10+(10-10)\times1}{0.10}$$ = Rs. 100

Comment: In case of X Ltd., the internal rate of return (r) is more than the cost of capital (k). In this case, the value of share is increasing alongwiththe decrease in the dividend payout ratio. In this way, it is seen that when the dividend payout ratio is zero, the value of each share is maximum i.e., Rs. 150. So, in this case, the firm should retain the whole earnings in hand without paying dividend so that the value of share is increases. Again, as r > k, X Ltd. is a **Growth firm.**

In case of Y Ltd., the internal rate of return (r) is less than the cost of capital (k) i.e., r < k. In this case, the value of share is increasing alongwith the increase in the dividend payout ratio. In this way, it is seen that when the dividend payout ratio is maximum (100%, the value of share is maximum (Rs. 100). So, in this case, the firm should distribute its entire earnings without retaining any earnings so that the value of the share increases. Again, as r < K, Y Ltd. is a **Declining firm.**

In case of Z Ltd., the internal rate of return (r) is equivalent to the cost of capital (K) i.e., r = K. In this case,

whatever may be the dividend payout ratio, the value of share always remains constant (Rs. 100). That is, the dividend payout ratio never affects the value of the share. Again, as r = K, Z Ltd. is a **Normal Firm.**

Answer for Illustration 20:

Statement showing for valuation of each equity share according to GordonRs.s Model

Value of each Equity share (P)

Where, k = Cost of Capital, r = Internal rate of return, (1-b) = Dividend payout ratio and b = Retention ratio.

Dividend Payout Ratio = (1-b) Where (1-b) = 25% or, b = 75%	X Ltd. [Where, r > k] E = Rs. 12. k = 10% or, 0.10 r = 12% or, 0.12 b = 75% or, 0.75 br = 0.75 × 0.12 = 0.09 $$P=\frac{12(1-0.75)}{0.10-0.09}$$ = Rs. 300	Y Ltd. [Where, r < k] E = Rs. 12. k = 10% or, 0.10 r = 8% or, 0.08 b = 75% or, 0.75 br = 0.75 × 0.08 = 0.06 $$P=\frac{12(1-0.75)}{0.10-0.06}$$ = Rs. 75	Z Ltd. [Where, r = k] E = Rs. 12. k = 10% or, 0.10 r = 10% or, 0.10 b = 75% or, 0.75 br = 0.75 × 0.10 = 0.075 $$P=\frac{12(1-0.75)}{0.10-0.075}$$ = Rs. 120
Where (1-b) = 50% or,	b = 50% or, 0.50 br = 0.50 × 0.12 = 0.06	b = 50% or, 0.50 br = 0.50 × 0.08 = 0.04	b = 50% or, 0.50 br = 0.50 × 0.10 = 0.05

b = 0.50	$P = \dfrac{12(1-0.50)}{0.10-0.06}$	$P = \dfrac{12(1-0.50)}{0.10-0.04}$	$P = \dfrac{12(1-0.50)}{0.10-0.05}$
	= Rs. 150	=100	=120
Where	b = 0	b = 0	b = 0
(1-b) = 100%	br = 0 × 0.12 = 0	br = 0 × 0.08 = 0	br = 0 × 0.10 = 0
or,	$P = \dfrac{12(1-0)}{0.10-0}$	$P = \dfrac{12(1-0)}{0.10-0}$	$P = \dfrac{12(1-0)}{0.10-0}$
b = 0			
	=120	=120	=120

Comment: In case of X Ltd., the internal rate of return is more than the cost of capital i.e. r > k. In this case, the value of share is increasing along with the decrease in the dividend payout ratio. So, the company should retain comparatively large amount of retained earnings in hand by reducing the dividend payout ratio so that the value of share increases. Again, as r > k, X Ltd. is a **Growth Firm**.

In case of Y Ltd., the internal rate of return is less than the cost of capital i.e. r < k. In this case, the value of share is increasing along with the increase in the dividend payout ratio. So, the firm should distribute its entire earnings, without keeping any retained earnings in hand so that the value of the share is maximum. Again, since r < k, Y Ltd. is a **Declining Firm.**

In case of Z Ltd., the internal rate of return (r) is equal to the cost of capital (k) i.e. r = k, in this case, whatever may be the dividend payout ratio, the value of share remains constant. That is, the dividend payout ratio does never affect the value of the share. Again, since r = k, Z Ltd. is a **Normal Firm.**

Answer for Illustration 21:

P0 = Opening price of each share = Rs.100

P1 = Market price of each share at the end of the year.

D1 = Dividend per share to be paid at the end of the year = Rs. 8

k = Cost of capital = 0.10.

n = No. of Outstanding share at the beginning of the year = 2,000 shares.

Δn = No. of additional shares to be issued.

E = Earning of the company = Rs. 20,000.

I = Total amount required for investment = Rs. 24,000.

Valuation of the firm when dividends are paid:

(i) $P = \dfrac{(P_1 + D_1)}{1+K}$

or, $100 = \dfrac{8 + P_1}{1 + 0.10}$

or, 8 + P1 = Rs.100 ×1.10

or, P1 = Rs.110 − 8

or, P1 =   Rs.102

(ii) Amount required to be raised from the issue of new share

$(\Delta nP_1) = I - (E - nD_1)$

or, $\Delta nP_1 = Rs.24{,}000 - (Rs.20{,}000 - 8 \times Rs.2{,}000)$

or, $\Delta nP_1 = Rs.24{,}000 - Rs.4{,}000$

or, $\Delta nP_1 = Rs.20{,}000$

(iii) $\Delta nP_1 = Rs.20{,}000$

$\Delta n(102) = 20{,}000 \ (P_1 = 102)$

or, $\Delta n = \dfrac{20{,}000}{102}$

(iv) Value of the firm (np_0) = $\dfrac{P_1(n + \Delta n) - 1 + E}{1 + K}$

Or, $np_0 = \dfrac{102\left(2{,}000 + \dfrac{20{,}000}{102}\right) - 24{,}000 + 20{,}000}{1 + 0.10}$

Or, $np_0 = \dfrac{2{,}24{,}000 - 24{,}000 + 20{,}000}{1 + 0.10}$

Or, $np_0 = $ Rs. 2,00,000

Hence, total value of the firm is Rs. 2,00,000.

Valuation of the firm when dividends are not paid:

$P_0 = \dfrac{(P_1 + D_1)}{1 + K}$

$100 = \dfrac{0 + P_1}{1 + 0.10}$

or, $P_1 = 100 \times 1.10$

or, $P_1 = Rs.110.$

(i) Amount required to be raised from the issue of new share

(ΔnP_1) = $I - (E - nD_1)$

or, ΔnP_1 = $Rs.24{,}000 - (20{,}000 - 2{,}000 \times 0)$

or, ΔnP_1 = $Rs.24{,}000 - (20{,}000 - 0)$

or, ΔnP_1 =   4,000

(ii) ΔnP_1 =   4,000

$\Delta n(110)$ = $Rs.4000 \ (P_1 = 110)$

Δn = $\dfrac{4000}{110}$

(iii) Value of the firm (np_0) = $\dfrac{P_1(n + \Delta n) - 1 + E}{1 + K}$

Or, $np_0 = \dfrac{110\left(2,000 + \dfrac{4,000}{110}\right) - 24,000 + 20,000}{1 + 0.10}$

Or, $np_0 = \dfrac{224000 - 24000 + 20000}{1 + 0.10}$

Or, $np_0 = $ Rs. 2,00,000

Hence, total value of the firm is Rs. 2,00,000.

Thus, it is clear that the total value of the firm remains unchanged whether dividends are paid or not i.e., the payment of dividend does not affect the value of the firm.

THE END