dronacharya

FOR

CA INTERMEDIATE

2024

Marathon Part 2

Financial Management

Lecture - 02

CA Sunil Keswani

Topics *to be covered*

1. Investment Decision ✓
2. Dividend Decisions ✓
3. Ratio Analysis ✓

INVESTMENT DECISIONS – CONCEPTS

1. Capital Budgeting or Investment Decisions

These are related to long term investment decisions or for fixed assets.

2. Types of Decisions

(A) Mutually Exclusive – Select one and rest all gets rejected

(B) Independent – Select any number of projects

(C) Complimentary – If main even accepted then associated events will also get accepted

(D) Replacement or Modernisation – Old assets are replaced with new assets

(E) Expansion – It is done to increase production capacity

(F) Diversification – It is aimed for introduction of new product

3. Calculation of Book Profit

Particulars	Amount (₹)
Operating Revenue (e.g. sales etc.)	-
Less: Operating cash costs (VC + FC) (All Cash Cost)	-
(PBD) Profit before depreciation (or Cash flow before tax)	-
Less: Depreciation	-
Profit before tax	-
Less: Tax	-
Profit after tax	-

4. Calculation of Cash Flows

Cash flows before tax = PBD

Any (,)

In Case of Pft.

In Case of loss

Cash flows after tax = PBD – Tax + Tax saving on loss

Cash flows after tax = PAT + Depreciation + Tax saving on loss

Cash flow after tax = Cash flow before tax (1 – t) + (Depreciation × t)

Tax Shield of Depreciation

5. **Cash flows from sale of assets**

Particulars	Amount (₹)
Cost of Assets	-
Less: Accumulated depreciation	-
Book value of assets (A)	-
Sale value of assets (B)	-
Profit/(loss) on sale of assets (A – B)	-
Tax/(tax saving) on sale (C)	-
Net cash flows from sale of assets (D = B – C)	-

CF from Sale of Assets = Sale value – Tax + Tax Saving on loss

6. **Concept of Block of Assets**

Block is finished

→ No depr. in Year of Sale

→ Capital Gain = Sale value – Book value

+ve → Tax Pay

-ve → Tax Saving

→ CF from Sale of Assets = Sale value – Tax Pay + Tax Saving

Block has balance

→ No Capital Gain to be Computed

→ Deduct Sale value of assets from opening block value & Charge depreciation on balance value.

→ opening Block value (WDV) = ✓

(+) Purchase of assets (if any) = ✓

(-) Sale of assets = (✓)

✓

(-) Depreciation = ✓

closing Block value = ✓

⊛ Sale value of assets should be net of expenses if any at time of Sale.

7. **Techniques of Capital Budgeting**

(A) Traditional techniques:

(1) Accounting Rate of Return (ARR)

(2) Payback period (PBP)

} Don't Consider time value of Money

(B) Modern Techniques

(1) Discounted Payback period

(2) Net Present Value (NPV)

(3) Profitability Index (PI)

(4) Internal Rate of Return (IRR)

(5) Modified Internal Rate of Return (MIRR)

Consider Time Value of Money

8. Accounting Rate of Return or Average Rate of Return (ARR)

It is the rate of return generated on the funds invested which is based on book profits.

$$\text{ARR} = \frac{Average\ PAT}{Average\ Investment} \times 100$$

$$\text{ARR on Original investment} = \frac{Average\ PAT}{Original\ Investment} \times 100$$

Where,

$$\text{Average PAT} = \frac{PAT1+PAT2+\cdots+PATn}{n}$$

$$\text{Average investment of Project} = \frac{AI1+AI2+\cdots+AIn}{n}$$

$$\text{Average investment of a year } \boxed{(AI)} = \frac{Opening+Closing}{2}$$

working capital

Average Investment of Project = ½(Cost of Project – Scrap value) + Scrap Value + WC

Depreciable Value

(in case of SLM)

Decision Criteria

General Rule - Maximum ARR

Mutually Exclusive – Project with maximum ARR

Independent:

Project ARR > Required ARR → Accept

Project ARR < Required ARR → Reject

Project ARR = Required ARR → May or May not

9. Payback Period

It is the duration during which cost of project is recovered out of cash inflows.

Payback period (when CFs are equal) = $\frac{Cost\ of\ Project}{Annual\ Cash\ Inflow}$

Payback period (when CFs are unequal)

- Calculate cumulative cash flows
- Calculate PBP

PBP = No. of years upto which cumulative CFs are just equal to cost of project + $\frac{[\text{Cost of Project} - \text{Cumulative CFs}]}{\text{Annual CFs}}$

Payback reciprocal = $\frac{Average\ Annual\ Cash\ Inflow}{Initial\ investment}$

Decision Criteria

General Rule - Minimum PBP

Mutually Exclusive – Project with minimum PBP

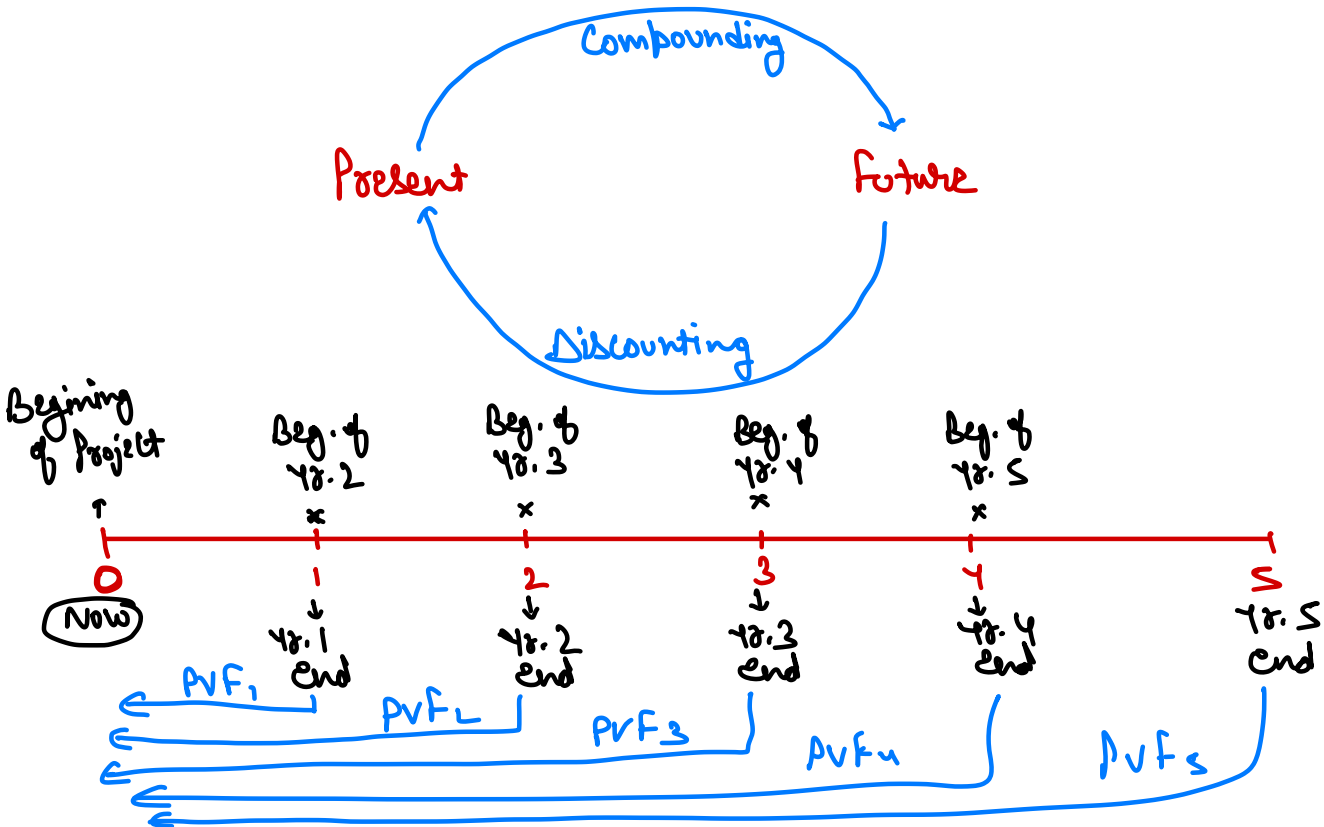
Independent:

Project PBP > Required PBP → Reject

Project PBP < Required PBP → Accept

Project PBP = Required PBP → May or May not

10. Time Value of Money



	Compounding	Discounting
Single Amt.	$CVF_{(r,n)} = (1+r)^n$ Compound Value = Amt. × $CVF_{(r,n)}$	$PVF_{(r,n)} = \frac{1}{(1+r)^n}$ Present Value = Amt. × $PVF_{(r,n)}$
Series of Same Amount (or) Annuity	$CVAF_{(r,n)} = \frac{(1+r)^n - 1}{r}$ Compound Value = Annual Amt. × $CVAF_{(r,n)}$	PVAF = Sum total of PVF Present Value = Annual Amt. × $PVAF_{(r,n)}$

11. Discounted Payback Period

It is the duration during which cost of project is recovered from present value of cash inflows of the project.

Step - 1) Calculate discounted cash inflows

Step – 2) Calculate discounted payback period

Decision Criteria

General Rule - Minimum Discounted PBP

Mutually Exclusive – Project with minimum Discounted PBP

Independent:

Project Discounted PBP > Required Discounted PBP → Reject

Project Discounted PBP < Required Discounted PBP → Accept

Project Discounted PBP = Required Discounted PBP → May & May not

12. Net Present Value (NPV)

NPV = PV of cash inflows – PV of cash outflows = PVCI – PVCO

If life of project are different then decision will be based on equivalent annual NPV or equivalent annual PVCO

Equivalent Annual NPV = $\frac{NPV}{PVAF\ for\ Life}$ → Select Max. value

Equivalent Annual PVCO = $\frac{PVCO}{PVAF\ for\ Life}$ → Select Min. value

Decision Criteria

General Rule - Maximum NPV

Mutually Exclusive – Project with maximum NPV

Independent:

NPV =
- +ve → Accept
- -ve → Reject
- 0 → May or May not

13. Points to Remember (PTRs)

Unless otherwise provided, following points are to be assumed:

(a) Cost of project will be incurred at beginning of the project

(b) Working capital investment will be incurred at beginning of the project

(c) Revenue cash inflows will be at the end of the respective year

(d) 100% of working capital will be realized at end of the project

(e) Sale of assets

Depreciable Assets

Sale value = Salvage/Scrap Value

If Scrap value not given then Sale value = 0

Non-Depreciable Assets

Sale value = Cost of Assets

14. Treatment of Costs

Relevant
↓
Changes with decision
↓
Consider for decision making
↓
Consider opportunity cost also

Irrelevant
↓
Doesn't change with decision
↓
Ignore for decision making
e.g. → Land already purchased
→ Research exp. already done

15. Profitability Index (PI)

It is the amount of cash inflow generated for every rupee of cash outflows.

$$PI = \frac{PVCI}{PVCO} \quad \text{or} \quad \frac{NPV}{PVCO}$$

Decision Criteria

General Rule - Maximum PI

Mutually Exclusive – Project with maximum PI

Independent:

$$PI = \begin{cases} >1 \Rightarrow PVCI > PVCO \Rightarrow NPV \text{ +ve} \Rightarrow \text{Accept} \\ <1 \Rightarrow PVCI < PVCO \Rightarrow NPV \text{ -ve} \Rightarrow \text{Reject} \\ =1 \Rightarrow PVCI = PVCO \Rightarrow NPV = 0 \Rightarrow \text{May or May not} \end{cases}$$

16. Capital Rationing

Divisibe Projects

Part investment is possible

(1) Calculate PI

(2) Select in order of PI starting from highest to lowest.

Indivisible Projects

Part investment is not possible

(1) Make various possible Combinations

(2) Calculate NPV for each Combination

(3) Select Combination having highest NPV/benefit

17. Internal Rate of Return (IRR)

- Calculate NPV at discount rate given in question (can start with any % given in ques.)
- If NPV is +ve, increase rate to make it -ve.
- If NPV is -ve, decrease rate to make it +ve.
- IRR = $LR + \left[\frac{LR\ NPV}{(LR\ NPV - HR\ NPV)}\right](HR - LR)$

Decision Criteria

General Rule - Maximum IRR

Mutually Exclusive – Project with maximum IRR

Independent:

IRR = $\begin{cases} > COC, & \text{Accept} \\ < COC, & \text{Reject} \\ = COC, & \text{May or May not} \end{cases}$

18. NPV vs IRR

NPV is superior to IRR due to:

(a) Reinvestment rate assumption

NPV → Reinv. @ Cost of Capital
IRR → Reinv. @ IRR

(b) Multiple IRR can be computed with same data but it is not possible with NPV

19. Modified Internal Rate of Return (MIRR)

It is based on compounding technique.

It assumes reinvestment of intermediate cash flows at cost of capital only.

Step – 1) Calculate total compound value of intermediate cash flows at end of project

Step – 2) Initial outflow × $(1 + r)^n$ = Total compound value

From above equation find r which is equal to MIRR

Or MIRR = $\sqrt[n]{\frac{Total\ Compound\ Value}{Initial\ outflow}} - 1$

Decision Criteria

General Rule - Maximum MIRR

Mutually Exclusive – Project with maximum MIRR

Independent:

MIRR =
> COC ⇒ Accept
< COC ⇒ Reject
= COC = May or May not

20. Replacement Decisions

(a) Calculate Initial cash outflows

Particulars	Amount
Cost of new assets	-
(-) Sale value of old assets	-
(-) Tax saving on loss on sale of old assets	-

(+) Tax payment on profit on sale of old assets	-
(+) Increase in working capital	-
(-) Decrease in working capital	-
Cash Outflows	-

(b) Calculate Incremental Revenue CFs

Particulars	Amount
Increase in sales	-
(+) Savings in costs	-
(-) Increase in costs	-
Incremental PBD	A -
(-) Increase in Depreciation (New – Old)	-
Incremental PBT	-
(-) Tax	B -
Incremental CFs	(A-B) -

(c) Calculate incremental sale of assets at end and working capital realization

(d) Calculate NPV or IRR and take decision

INVESTMENT DECISIONS – QUESTIONS

CF = PBD – Tax = PBD – 0 = PBD

Question – 1

CK Ltd. is planning to buy a new machine. Details of which are as follows:

Cost of the Machine at the commencement	₹ 2,50,000
Economic Life of the Machine	8 years
Residual Value	Nil
Annual Production Capacity of the machine	1,00,000 units
Estimated Selling Price per unit	₹ 6
Estimated annual fixed cost (excluding depreciation)	₹ 1,00,000
Estimated variable cost per unit (excluding depreciation)	₹ 3
Advertisement expenses in 1st year in addition of annual fixed cost	₹ 20,000
Maintenance expenses in 5th year in addition of annual fixed cost	₹ 30,000
Cost of capital	12%

Ignore tax

Analyze the above mentioned proposal using the Net Present Value Method and advice.

PV Factor at 12% are as under:

Year	1	2	3	4	5	6	7	8
PV Factor	0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404

Solution

Statement of Present Value of Cash Flows

Particulars	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**
Units	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Contribution per unit (6 – 3)	3	3	3	3	3	3	3	3
Total Contribution	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
(-) Fixed Cost	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
(-) Advert.	20,000	-	-	-	-	-	-	-
(-) Maint.	-	-	-	-	30,000	-	-	-
Profit Before Dep. or CF	1,80,000	2,00,000	2,00,000	2,00,000	1,70,000	2,00,000	2,00,000	2,00,000
PVF @ 12%	0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404
Present Value	1,60,740	1,59,400	1,42,400	1,27,200	96,390	1,01,400	90,400	80,800

Total Present value of cash inflows = 9,58,730 (from above table)

NPV = PVCI – PVCO = 9,58,730 – 2,50,000 = ₹ 7,08,730

It is recommended to accept the proposal as it has positive NPV.

Question – 2

You are a financial analyst of B limited. The director of finance has asked you to analyze two capital investments proposals, Projects X and Y. Each project has a cost of ₹ 10,000 and the cost of capital for each project is 12%. The project's expected net cash flows are as follows:

Year	Expected net cash flows	
	Project X (₹)	Project Y (₹)
0	(10,000)	(10,000)
1	6,500	3,500
2	3,000	3,500
3	3,000	3,500
4	1,000	3,500

(a) CALCULATE each project's payback period, net present value (NPV) and internal rate of return (IRR).

(b) DETERMINE, which project or projects should be accepted if they are independent?

Solution

(a) **Computation of Payback Period**

Year	Project X		Project Y	
	CF	Cumulative	CF	Cumulative
1	6,500	6,500	3,500	3,500
2	3,000	9,500	3,500	7,000
3	3,000	12,500	3,500	10,500
4	1,000	13,500	3,500	14,000

Payback period of Project X = $2 + \frac{(10,000-9,500)}{3,000}$ = 2.17 years

Payback period of Project B = $2 + \frac{(10,000-7,000)}{3,500}$ = 2.86 years

Statement of NPV

Year	PVF @12%	Project X		Project Y	
		CF	PV	CF	PV
0	1	(10,000)	(10,000)	(10,000)	(10,000)
1	0.893	6,500	5,805	3,500	3,126
2	0.797	3,000	2,391	3,500	2,790
3	0.712	3,000	2,136	3,500	2,492
4	0.636	1,000	636	3,500	2,226
NPV			**968**		**634**

Statement of NPV

Year	PVF @20%	Project X		Project Y	
		CF	PV	CF	PV
0	1	(10,000)	(10,000)	(10,000)	(10,000)
1	0.833	6,500	5,415	3,500	2,916

2	0.694	3,000	2,082	3,500	2,429
3	0.579	3,000	1,737	3,500	2,067
4	0.482	1,000	482	3,500	1,687
NPV			**(284)**		**(901)**

IRR of Project X = $12 + \left[\frac{968}{968-(-284)}\right](20-12) = 18.19\%$

IRR of Project Y = $12 + \left[\frac{634}{634-(-901)}\right](20-12) = 15.27\%$

(b) **Conclusion:**

Particulars	**Project that rank higher**
Payback period	Project X
NPV	Project X
IRR	Project X

Question – 3

GG Pathology Lab Ltd. is using 2D sonography machine which has reached the end of its useful life. The lab is intending to upgrade along with the technology by investing in 3D sonography machine as per the choices preferred by the patients. Following new 3D sonography machine of two different brands with same features is available in the market:

Brand	**Cost of machine (₹)**	**Life of machine (₹)**	**Maintenance cost (₹)**			**SLM Depreciation rate (%)**
			Year 1-5	**Year 6-10**	**Year 11-15**	
X	15,00,000	15	50,000	70,000	98,000	6
Y	10,00,000	10	70,000	1,15,000	-	6

Residual value of machines shall be dropped by 10% and 40% of purchase price for Brand X and Y respectively in the first year and thereafter shall be depreciated at the rate mentioned above on the original cost.

Alternatively, the machine of Brand Y can also be taken on rent to be returned back to the owner after use on the following terms and conditions:

- Annual rent shall be paid in the beginning of each year and for first year it shall be ₹ 2,24,000. Annual rent for the subsequent 4 years shall be ₹ 2,25,000.
- Annual rent for the final 5 years shall be ₹ 2,70,000.
- The rent agreement can be terminated by GG Labs by making a payment of ₹ 2,20,000 as penalty. This penalty would be reduced by ₹ 22,000 each year of the period of rental agreement.

You are required to:

(i) Advise which brand of 3D sonography machine should be acquired assuming that the used of machine shall be continued for a period of 20 years.

(ii) State which of the option is most economical if machine is likely to be used for a period of 5 years?

The cost of capital of GG Labs is 12%.

The present value factor of ₹ 1 @12% for different years is given as under:

Year	PVF	Year	PVF
1	0.893	9	0.361
2	0.797	10	0.322
3	0.712	11	0.287
4	0.636	12	0.257
5	0.567	13	0.229
6	0.507	14	0.205
7	0.452	15	0.183
8	0.404	16	0.163

Solution

(i) Statement of Equivalent Annual Cost if Brand X is purchased

Period	Cash Outflows	PVF @ 12%	PV (₹)
0	15,00,000	1.000	15,00,000
1-5	50,000	3.605	1,80,250
6-10	70,000	2.046	1,43,220
11-15	98,000	1.161	1,13,778
15	(90,000)*	0.183	(16,470)
		Total PVCO (A)	**19,20,778**
		PVAF (1-15 year) (B)	6.812
		Equivalent Annual PVCO (A÷B)	2,81,969.76

*Residual value = [15,00,000 × (1-0.10)] – (15,00,000 × 0.06 × 14) = ₹ 90,000

Statement of Equivalent Annual Cost if Brand Y is purchased

Period	Cash Outflows	PVF @ 12%	PV (₹)
0	10,00,000	1.000	10,00,000
1-5	70,000	3.605	2,52,350
6-10	1,15,000	2.046	2,35,290
10	(60,000)*	0.322	(19,320)
		Total PVCO (A)	**14,68,320**
		PVAF (1-10 year) (B)	5.651
		Equivalent Annual PVCO (A÷B)	2,59,833.66

*Residual value = [10,00,000 × (1-0.40)] – (10,00,000 × 0.06 × 9) = ₹ 60,000

Statement of Equivalent Annual Cost if Brand Y is taken on rent

Period	Cash Outflows	PVF @ 12%	PV (₹)
0	2,24,000	1.000	2,24,000
1-4	2,25,000	3.038	6,83,550
5-9	2,70,000	2.291	6,18,570
		Total PVCO (A)	**15,26,120**
		PVAF (1-10 year) (B)	5.651
		Equivalent Annual PVCO (A÷B)	2,70,061.94

Since equivalent annual cash outflow is lease in case of purchase of machine of brand Y the same should be purchased.

(ii) If machine is used for 5 years.

Statement of Equivalent Annual Cost if Brand X is purchased

Period	Cash Outflows	PVF @ 12%	PV (₹)
0	15,00,000	1.000	15,00,000
1-5	50,000	3.605	1,80,250
5	(9,90,000)*	0.567	(5,61,330)
		Total PVCO (A)	**11,18,920**

*Residual value = [15,00,000 × (1-0.10)] – (15,00,000 × 0.06 × 4) = ₹ 9,90,000

Statement of Equivalent Annual Cost if Brand Y is purchased

Period	Cash Outflows	PVF @ 12%	PV (₹)
0	10,00,000	1.000	10,00,000
1-5	70,000	3.605	2,52,350
5	(3,60,000)*	0.567	(2,04,120)
		Total PVCO (A)	**10,48,230**

*Residual value = [10,00,000 × (1-0.40)] – (10,00,000 × 0.06 × 4) = ₹ 3,60,000

Statement of Equivalent Annual Cost if Brand Y is taken on rent

Period	Cash Outflows	PVF @ 12%	PV (₹)
0	2,24,000	1.000	2,24,000
1-4	2,25,000	3.038	6,83,550
5	1,10,000*	0.567	62,370
		Total PVCO (A)	**9,69,920**

*Cash flow = 2,20,000 – (22,000 × 5) = ₹ 1,10,000

Since equivalent annual cash outflow is lease in case of rent of machine of brand Y the same should be taken on rent.

Question – 4

A chemical company is presently paying an outside firm ₹ 1 per gallon to dispose off the waste material resulting from its manufacturing operations. At normal operating capacity, the waste is about 50,000 gallons per year.

Int.

After spending ₹ 60,000 on research, the company discovered that the waste could be sold for ₹ 10 per gallon if it was processed further. Additional processing would however, require an investment of ₹ 6,00,000 in new equipment, which would have an estimated life of 10 years with no salvage value. Depreciation would be calculated by straight line method.

Except for the costs incurred in advertising ₹ 20,000 per year, no change in the present selling and administration expenses is expected, if the new product is sold. The details of additional processing costs are as follows:

Variable – ₹ 5 per gallon of waste put into process

Fixed (excluding depreciation) – ₹ 30,000 per year

In costing the new product, general administrative overheads will be allocated at the rate of ₹ 2 per gallon. There will be no losses in processing and it is assumed that the total waste processed in a given year will be sold in that year. Estimates indicate that 40,000 gallons, of the product could be sold each year. The management when confronted with the choice of disposing off the waste or processing it further and selling it, seeks your advice. Which alternative would you recommend? Assume that the firm's cost of capital is 15% and it pays on an average 35% tax on its income.

Note: Present value of annuity of ₹ 1 at 15% rate of discount for 10 years is 5.019.

Solution

Statement of NPV

Particulars	Amount
Sales (40,000 × 10)	4,00,000
(-) Variable cost (40,000 × 5)	(2,00,000)
(-) Fixed cost	(30,000)
(-) Advertisement cost	(20,000)
(+) Saving in disposal cost (50,000 – 10,000)	40,000
Profit before depreciation (A)	1,90,000
(-) Depreciation (6,00,000 ÷ 10)	60,000
Profit before tax	1,30,000
(-) Tax @ 35%	45,500
Profit after tax	84,500
(+) Depreciation	60,000
Cash inflows	1,44,500
PVAF(15%, 10 years)	5.019
PVCI	7,25,246
Initial Investment – PVCO	6,00,000
NPV	**1,25,246**

Question – 5

A large profit making company is considering the installation of a machine to process the waste produced by one of its existing manufacturing process to be converted into a marketable product. At present the waste is removed by a contractor for disposal on payment by the company of ₹ 150 lakhs

per annum for the next four years. The compensation of ₹ 90 lakhs to contractor will be paid before the processing operations starts. This compensation is not allowed as deduction for tax purposes.

The machine required for carrying out the processing will cost ₹ 600 lakhs to be financed by a loan repayable in 4 equal installments commencing from the end to the year. The interest rate is 14% per annum. At the end of the 4th year, the machine can be sold for ₹ 60 lakhs and the cost of dismantling and removal will be ₹ 45 lakhs.

Sales and direct costs of the produce emerging from waste processing for 4 years are estimated as under:

(₹ in lakhs)

Year	**1**	**2**	**3**	**4**
Sales	966	966	1,254	1,254
Material Consumption	90	120	255	255
Wages	225	225	255	300
Other expenses	120	135	162	210
Factory Overheads	165	180	330	435
Depreciation (as per income tax rules)	150	114	84	63

Initial stock of material required before commencement of the processing operation ₹ 60 lakhs at the start of year 1. The stock levels of material to be maintained at the end of year 1, 2 and 3 will be ₹ 165 lakhs. And the stocks at the end of year 4 will be nil. The storage of materials will utilize space which would otherwise have been rented out for ₹ 30 lakhs per annum. Labour costs include wages of 40 workers, whose transfer to this process will reduce idle time payments of ₹ 45 lakhs in year 1 and ₹ 30 lakhs in year 2. Factory overheads include apportionment of general factory overheads except to the extent of insurance charges of ₹ 90 lakhs per annum payable on this venture. The company's tax rate is 30%. Present value factors for four years are as under:-

Year	1	2	3	4
PV Factor @14%	0.877	0.769	0.674	0.592

Advice the management on the desirability of installing the machine for processing the waste. All calculation should form part of the answer.

Solution

Statement of NPV **(₹ in lakhs)**

Particulars	**Time**	**PVF**	**Amount**	**Present Value**
Compensation to contractor	0	1	90.00	90.00
Principal payment of loan	1 – 4	2.912	150.00	436.80
Working capital	0	1	60.00	60.00
			PVCO	**586.80**
Cash inflows	1	0.877	305.40	267.84
	2	0.769	372.30	286.30

	3	0.674	424.20	285.91
	4	0.592	532.50	315.24
Cash flow from sale of assets	4	0.592	15.00	8.88
			PVCI	**1,164.17**
NPV (PVCI – PVCO)				**577.37**

Since the project has positive NPV, therefore it should be accepted.

Working Note -1 **Statement of Cash Flows** **(₹ in lakhs)**

Particulars	Year 1	Year 2	Year 3	Year 4
Sales	966	966	1,254	1,254
(-) Material consumed	(90)	(120)	(255)	(255)
(-) Wages	(180)	(195)	(255)	(300)
(-) Other expenses	(120)	(135)	(162)	(210)
(+) Saving in disposal cost	150	150	150	150
(-) Interest @14%	600×14% = (84)	450×14% = (63)	(42)	(21)
(-) Opportunity cost of rent	(30)	(30)	(30)	(30)
(-) Insurance	(90)	(90)	(90)	(90)
Profit before depreciation (A)	522	483	570	498
(-) Depreciation	(150)	(114)	(84)	(63)
Profit before tax	372	369	486	435
Tax @ 30% (B)	111.60	110.70	145.80	130.50
Cash Flow (A – B)	410.40	372.30	424.20	367.50
(+) Material consumed	90	120	255	255
(-) Material purchased	(195)	(120)	(255)	(90)
Net Cash Flow	305.40	372.30	424.20	532.50

Working Note- 2 **Statement of Calculation of Material Purchased** **(₹ in lakhs)**

Particulars	Year 1	Year 2	Year 3	Year 4
Material Consumed	90	120	255	255
(+) Closing stock of material	(Given) 165	165	165	Given -
(-) Opening stock of material	(60)	(165)	(165)	(165)
Material Purchased	195	120	255	90

Question – 6

A company has ₹ 1,00,000 available for investment and has identified the following four investments in which to invest.

PVCO ⊕ PVCI - PVCO

Project	Investment (₹)	NPV (₹)
C	40,000	20,000
D	1,00,000	35,000

NPV ÷ Inv.

0.50 I

0.35 II

E	50,000	24,000
F	60,000	18,000

You are required to optimize the returns from a package of projects within the capital spending limit if:

(a) The projects are independent of each other and are divisible

(b) The projects are not divisible

Solution

(a) **Computation of NPV per ₹ 1 of investment and Ranking of Projects**

Project	Investment (₹)	NPV (₹)	NPV per ₹ 1 invested (₹)	Ranking
C	40,000	20,000	0.50	1
D	1,00,000	35,000	0.35	3
E	50,000	24,000	0.48	2
F	60,000	18,000	0.30	4

Calculation of Package of Projects

Project	Investment (₹)	NPV (₹)
C	40,000	20,000
E	50,000	24,000
D (1/10th of Project)	10,000	3,500
Total	1,00,000	47,500

The company would be well advised to invest in Project C, E and D (1/10th) and reject Project F to optimize return within the amount of ₹ 1,00,000 available for investment.

(b) **Calculation of Package of Projects**

Package of Project	Investment (₹)	NPV (₹)
C and E	90 000 (40,000 + 50,000)	44,000 (20,000 + 24,000)
C and F	1,00,000 (40,000 + 60,000)	38,000 (20,000 + 18,000)
Only D	1,00,000	35,000

The company would be well advised to invest in Projects C and E to optimize return within the amount of ₹ 1,00,000 available for investment.

Question – 7

Given below are the data on a capital project 'S':

Annual cost saving	₹ 60,000
Useful life	4 years
Internal rate of return	15%
Profitability index	1.064
Salvage value	0

You are required to calculate for this project S:

(a) Cost of project

(b) Payback period

(c) Cost of capital

(d) Net Present Value

Given the following table of discount factors:

Discounting Factor	15%	14%	13%	12%
1 year	0.869	0.877	0.885	0.893
2 year	0.756	0.769	0.783	0.797
3 year	0.658	0.675	0.693	0.712
4 year	0.572	0.592	0.613	0.636
Total →	2.855	2.913	2.974	3.038

Solution

(a) **Cost of Project S:**

At 15% IRR,

PV of cash inflows = PV of cash outflows

Annual cash inflow × $PVAF_{(15\%, 4)}$ = PV of cash outflows

60,000 × 2.855 = PV of cash outflows

PV of cash outflows = ₹ 1,71,300

∴ Cost of project = ₹ 1,71,300

(b) Payback period = $\frac{Cost\ of\ project}{Annual\ cash\ inflow} = \frac{1,71,300}{60,000}$ = 2.855 years

(c) **Cost of capital of Project S:**

Profitability index = $\frac{PV\ of\ cash\ inflows}{PV\ of\ cash\ outflows}$

1.064 = $\frac{Annual\ cash\ inflows \times PVAF}{1,17,300}$

Annual cash inflows × PVAF = 1,82,263.20

60,000 × PVAF = 1,82,263.20

PVAF = $\frac{1,82,263.20}{60,000}$ = 3.038

Considering the data provided in questions, the PVAF are at a discount rate of 12%.

∴Cost of capital = 12%

(d) NPV of project S = PV of cash inflows – PV of cash outflows

= (60,000 × $PVAF_{(12\%,4)}$) – 1,17,300 = (60,000 × 3.038) – 1,17,300

= ₹ 10,963.20

Question – 8

Calculate MIRR from the following data, if cost of capital is 9%:

Year	Cash Flows (₹)	CVF @ 9%	CV
0	1,50,000		
1	40,000	$(1.09)^4 =$	
2	70,000	$(1.09)^3 =$	
3	90,000	$(1.09)^2 =$	
4	30,000	$(1.09)^1 =$	
5	50,000	$(1.09)^0 = 1$	

Solution

Statement of Compound Value

Year	Cash Flows (₹)	CVF @ 9%	CV
1	40,000	$(1.09)^4 =$ 1.412	56,480
2	70,000	$(1.09)^3 =$ 1.295	90,650
3	90,000	$(1.09)^2 =$ 1.188	1,69,290
4	30,000	$(1.09)^1 =$ 1.090	32,700
5	50,000	$(1.09)^0 =$ 1.000	50,000
		Total	3,99,120

$$\text{MIRR} = \sqrt[5]{\frac{3,99,120}{1,50,000}} - 1 = 21.62\%$$

1. Sol $(1+r)^5 = 399.120$

$\hookrightarrow r = 21.62\%$

Question – 9

Shiv Limited is thinking of replacing its existing machine by a new machine which would cost ₹ 60 lakhs. The company's current production is 80,000 units, and is expected to increase to 1,00,000 units, if the new machine is bought. The selling price of the product would remain unchanged at ₹ 200 per unit. The following is the cost of producing one unit of product using both the existing and new machine:

	Existing Machine (80,000 units)	New Machine (1,00,000 units)	Unit Cost (₹) Difference
Materials	75.0	63.75	(11.25)
Wages & Salaries	51.25	37.5	(13.75)
Supervision	20.0	25.0	5.0
Repairs & Maintenance	11.25	7.5	(3.75)
Power & Fuel	15.5	14.25	(1.25)
Depreciation (Ign. ∵ fully Dep.)	0.25	5.0	4.75
Allocated Corporate Overheads (Ign.)	10.0	12.5	2.5
	183.25	165.5	(17.75)

The existing machine has an account book value of ₹ 1,00,000, and it has been fully depreciated for tax purpose. It is estimated that machine will be useful for 5 years. The supplier of the new machine has offered to accept the old machine for ₹ 2,50,000. However, the market price of old machine today is ₹ 1,50,000 and it is expected to be ₹ 35,000 after 5 years. The new machine has a life of 5 years and a salvage value of ₹ 2,50,000 at the end of its economic life. Assume corporate income tax rate of 40% and depreciation is charged on straight line basis for income tax purposes. Further assume that book

profit is treated as ordinary income for tax purpose. The opportunity cost of capital of the company is 15%. Required:

(a) Estimate net present value of the replacement decision

(b) Estimate the internal rate of return of the replacement decision

(c) Should company go ahead with the replacement decision? Suggest.

Year	1	2	3	4	5
$PVIF_{0.15,t}$	0.8696	0.7561	0.6575	0.5718	0.4972
$PVIF_{0.20,t}$	0.8333	0.6944	0.5787	0.4823	0.4019
$PVIF_{0.25,t}$	0.8000	0.6400	0.5120	0.4096	0.3277
$PVIF_{0.30,t}$	0.7692	0.5917	0.4552	0.3501	0.2693
$PVIF_{0.35,t}$	0.7407	0.5487	0.4064	0.3011	0.2230

Solution

(a) **Statement of NPV**

Particulars	Time	PVF	Amount	Present Value
Cost of new machine	0	1	60,00,000	60,00,000
(-) Cash flow from sale of old assets	0	1	(1,50,000)	(1,50,000)
			PVCO	**58,50,000**
Incremental Cash flows (w.n.-1)	1-5	3.3522	22,84,000	76,56,425
Incremental cash flow from sale of asset	5	0.4972	2,29,000	1,13,859
			PVCI	**77,70,284**
NPV (PVCI – PVCO)				**19,20,284**

Working Note – 1: Calculation of cash flow from sale of old assets

Book value of assets	- [∵ fully Dep. for tax]
Less: Sale value of assets (A)	2,50,000
Profit on sale	2,50,000
Tax @ 40% (B)	1,00,000
Cash from sale of old machine (A – B)	1,50,000

Working Note – 2: Calculation of cash flow from operations

Increase in sales [(1,00,000 – 80,000) × 200]	40,00,000
Less: Increase in cost	(9,60,000)
[{(63.75 + 37.5 + 25 + 7.5 + 14.25)×1,00,000} + {(75 + 51.25 + 20 + 11.25 + 15.5)×80,000}]	
Incremental PBD (A)	30,40,000
Less: Incremental Depreciation $\left[\left(\frac{60,00,000-2,50,000}{5}\right) - 0\right]$	11,50,000
Incremental PBT	18,90,000
Tax @ 40% (B)	7,56,000
Incremental cash flow from operations (A – B)	22,84,000

∵ fully Dep. Exist. Mach.

Working Note – 3: Incremental cash flow from sale of assets

	New	Existing
Cost of assets	60,00,000	-
Accumulated Depreciation	57,50,000	-
Book Value	2,50,000	-
Sale Value (A)	2,50,000	35,000
Profit	-	35,000
Tax @ 40% (B)	-	14,000
Cash flow from sale of assets (A – B)	2,50,000	21,000

Incremental cash flow from sale of assets = 2,50,000 – 21,000 = ₹ 2,29,000

(b) **Statement of NPV**

Particulars	Time	Amount	PVF@20%	PV	PVF@30%	PV
Cost of new machine	0	60,00,000	1	60,00,000	1	60,00,000
(-) CF from old assets	0	(1,50,000)	1	(1,50,000)	1	(1,50,000)
		PVCO		**58,50,000**		**58,50,000**
Incremental CF	1-5	22,84,000	2.9906	68,30,530	2.4355	55,62,682
Incremental CF from asset	5	2,29,000	0.4019	92,035	0.2693	61,670
		PVCI		**69,22,565**		**56,24,352**
NPV (PVCI – PVCO)				**10,72,565**		**(2,25,648)**

IRR = 20% + $\left[\frac{10,72,565}{10,72,565-(-2,25,648)}\right](30-20)$ = 28.26%

(c) The company should go ahead with replacement project since it has positive NPV.

Question – 10

A company wants to invest in a machinery that would cost ₹ 50,000 at the beginning of year 1. It is estimated that the net cash inflows from operation will be ₹ 18,000 per annum for 3 years, if the company opts to service a part of the machine at the end of year 1 at ₹ 10,000 and the scrap value at the end of year 3 will be ₹ 12,500. However, of the company decides not to services the part, it will have to be replaced at the end of year 2 at ₹ 15,400. But in this case, the machine will work for the 4th year also and get operational cash inflow of ₹ 18,000 for the 4th year. It will have to be scrapped at the end of the year 4 at ₹ 9,000. Assuming cost of capital at 10% and ignoring taxes, will you recommend the purchase of this machine based on the net present value of its cash flows? If the supplier gives a discount of ₹ 5,000 for purchase, what would be your decision? (The present value factors at the end of years 0, 1, 2, 3, 4, 5 and 6 are respectively 1, 0.9091, 0.8264, 0.7513, 0.6830, 0.6290 and 0.5644).

Solution

Statement showing evaluation of mutually exclusive proposals

Particulars	Time	P. V. Factor	Service Part		Replace Part	
Cash Outflows:			**Amount**	**P. V.**	**Amount**	**P. V.**
Cost of Machinery	0	1	50,000	50,000	50,000	50,000
Service Cost	1	0.9091	10,000	9,091	----	----
(+) Replace Part	2	0.8264	----	----	15,400	12,727
P. V. of Cash Outflow (A)				59,091		62,727
Cash Inflows						
Cash Inflow from Operation	1-3	2.4869	18,000	44,764	---	---
	1-4	3.1699	----	-----	18,000	57,058
	3	0.7513	12,500	9,391	----	----
Scrap Value of Machine	4	0.6830	-----	------	9,000	6,147
P. V. of Cash Inflows (B)				54,155		63,205
NPV [(B) – (A)]				(4,936)		478

Advise:- Purchase machine & Replace the part at end of second year.

(ii) If the supplier gives a discount of ₹ 5,000 on purchase of machine

Proposals	Service Part	Replace Part
NVP	64	5,478
Cumulative	2.4869	3,1699
Equivalent Annual NPV	25.73	1,728

Advise: Purchase machine & Replace the part at end of second year.

Question – 11

Alpha limited is a manufacturer of computers. It wants to introduce artificial intelligence while making computers. The estimated annual saving from introduction of the artificial intelligence (AI) is as follows:

- Reduction of five employees with annual salaries of ₹ 3,00,000 each.
- Reduction of ₹ 3,00,000 in production delays caused by inventory problem
- Reduction in lost sales ₹ 2,50,000 and
- Gain due to timely billing ₹ 2,00,000

The purchase price of the system for installation of artificial intelligence is ₹ 20,00,000 and installation cost is ₹ 1,00,000. 80% of the purchase price will be paid in the year of purchase and remaining will be paid in next year. The estimated life of the system is 5 years and it will be depreciated on a straight-line basis.

However, the operation of the new system requires two computer specialists with annual salaries of ₹ 5,00,000 per person.

In addition to above, annual maintenance and operating cost for five years are as below:

(Amount in ₹)

Year	**1**	**2**	**3**	**4**	**5**
Maintenance & Operating cost	2,00,000	1,80,000	1,60,000	1,40,000	1,20,000

Maintenance and operating cost are payable in advance.

The company's tax rate is 30% and its required rate of return is 15%.

Year	**1**	**2**	**3**	**4**	**5**
$PVIF_{0.10,t}$	0.909	0.826	0.751	0.683	0.621
$PVIF_{0.12,t}$	0.893	0.797	0.712	0.636	0.567
$PVIF_{0.15,t}$	0.870	0.756	0.658	0.572	0.497

Evaluate the project by using Net Present Value and Profitability Index.

Solution

Calculation of Cash Flows

Particulars	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Saving in Salaries		15,00,000	15,00,000	15,00,000	15,00,000	15,00,000
Reduction in production delays		3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
Reduction in lost sales		2,50,000	2,50,000	2,50,000	2,50,000	2,50,000
Gain due to Timely Billing		2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
Salary to computer specialist		(10,00,000)	(10,00,000)	(10,00,000)	(10,00,000)	(10,00,000)
Maintenance & Operating cost		(2,00,000)	(1,80,000)	(1,60,000)	(1,40,000)	(1,20,000)
Depreciation		(4,20,000)	(4,20,000)	(4,20,000)	(4,20,000)	(4,20,000)
Profit before tax		6,30,000	6,50,000	6,70,000	6,90,000	7,10,000
Less: Tax @ 30%		(1,89,000)	(1,95,000)	(2,01,000)	(2,07,000)	(2,13,000)
Add: Depreciation		4,20,000	4,20,000	4,20,000	4,20,000	4,20,000
Add: Maintenance & Operating cost		2,00,000	1,80,000	1,60,000	1,40,000	1,20,000
Less: Maintenance & Operating cost	(2,00,000)	(1,80,000)	(1,60,000)	(1,40,000)	(1,20,000)	-

Net CF	(2,00,000)	8,81,000	8,95,000	9,09,000	9,23,000	10,37,000

Statement of NPV

Particulars	Time	PVF	Amount	Present Value
Initial Investment (20L × 80%)	0	1	16,00,000	16,00,000
Installation expenses	0	1	1,00,000	1,00,000
Instalment of Purchase Price (20L × 20%)	1	0.870	4,00,000	3,48,000
			PVCO	**20,48,000**
Cash flows	0	1	(2,00,000)	(2,00,000)
	1	0.870	8,81,000	7,66,470
	2	0.756	8,95,000	6,67,620
	3	0.658	9,09,000	5,98,122
	4	0.572	9,23,000	5,27,956
	5	0.497	10,37,000	5,15,389
			PVCI	**28,84,557**
NPV (PVCI – PVCO)				**8,36,557**
Profitability Index (PVCI□PVCO)				**1.41**

Since, NPV is positive and Profitability index is greater than one, thus it is recommended to introduce the system.

Question – 12

An existing company has a machine which has been in operation for two years, its estimated remaining useful life is 4 years with no residual value in the end. Its current market value is ₹ 3 lakhs. The management is considering a proposal to purchase an improved model of a machine gives increase output. The details are as under:

Particulars	Existing Machine	New Machine
Purchase Price	₹ 6,00,000	₹ 10,00,000
Estimated Life	6 years / 4 yrs.	4 years
Residual Value	0	0
Annual Operating days	300 1800	300 1800
Operating hours per day	6	6
Selling price per unit	₹ 10	₹ 10
Material cost per unit	₹ 2	₹ 2
Output per hour in units	20	40
Labour cost per hour	₹ 20	₹ 30
Fixed overhead per annum excluding depreciation	₹ 1,00,000	₹ 60,000
Working Capital	₹ 1,00,000	₹ 2,00,000
Income-tax rate	30%	30%

Assuming that - cost of capital is 10% and the company uses written down value of depreciation @ 20% and it has several machines in 20% block.

Advice the management on the Replacement of Machine as per the NPV method. The discounting factors table given below:

Discounting Factors	Year 1	Year 2	Year 3	Year 4
10%	0.909	0.826	0.751	0.683

Solution

Statement of NPV

Particulars	Time	PVF	Amount	Present Value
Cost of new machine	0	1	10,00,000	10,00,000
(+) Add. working cap. (2,00,000 – 1,00,000)	0	1	1,00,000	1,00,000
(-) Cash flow from sale of old assets	0	1	(3,00,000)	(3,00,000)
			PVCO	**8,00,000**
Incremental Cash flows (w.n.-1)	1	0.909	2,59,000	2,35,431
	2	0.826	2,50,600	2,06,996
	3	0.751	2,43,880	1,83,154
	4	0.683	2,38,504	1,62,898
Incremental working capital realization	4	0.683	1,00,000	68,300
			PVCI	**8,56,779**
NPV (PVCI – PVCO)				**56,779**

Since the incremental NPV is positive, thus existing machine should be replaced.

Working Note – 1: Calculation of profit before depreciation (PBD)

Particulars	Existing Machine	New Machine
Annual output	300 × 6 × 20 = 36,000	300 × 6 × 40 = 72,000
Sales @ ₹ 10 per unit	3,60,000	7,20,000
Less: Cost of operation		
Material @₹ 2 per unit	72,000	1,44,000
Labour	1800 × 20 = 36,000	1800 × 30 = 54,000
Fixed OHs	1,00,000	60,000
Profit before Depreciation	1,52,000	4,62,000

Thus, Annual Incremental Profit Before Depreciation = 4,62,000 – 1,52,000 = ₹ 3,10,000

Working Note – 2: Calculation of basis of depreciation

Particulars	Existing	After Replacement
Purchase price of existing	6,00,000	6,00,000
Less: Depreciation of Yr. 1	1,20,000	1,20,000
Less: Depreciation of Yr. 2	96,000	96,000
WDV of existing machine	3,84,000	3,84,000
Add: Purchase of new	-	10,00,000
Less: Sale of existing	-	3,00,000
Basis for Depreciation	3,84,000	10,84,000

Working Note – 3: Incremental cash flow from sale of assets

Particulars	Year 1	Year 2	Year 3	Year 4
Incremental PBD (A)	3,10,000	3,10,000	3,10,000	3,10,000
New Depreciation	2,16,800	1,73,440	1,38,752	1,11,002
Less: Existing Depreciation	(76,800)	(61,440)	(49,152)	(39,322)
Incremental Depreciation (B)	1,40,000	1,12,000	89,600	71,680
Incremental PBT (A – B)	1,70,000	1,98,000	2,20,400	2,38,320
Tax @ 30% (C)	51,000	59,400	66,120	71,496
Incremental CFs (A – C)	2,59,000	2,50,600	2,43,880	2,38,504

PBD – Tax

Investment Decision

MCQs

Q(1). A capital budgeting technique which does not require the computation of cost of capital for decision making purposes is:
A. Net present value method
B. Internal rate of return
C. Modified internal rate of return
D. Payback period method

Q(2). If two alternative proposals are such that the acceptance of one shall exclude the possibility of the acceptance of another then such decision making will lead to:
A. Mutually exclusive decisions
B. Accept reject decisions
C. Contingent decisions
D. None of the above

Q(3). In case a company considers a discounting factor higher than the cost of capital for arriving at present values, the present values of cash inflows will be:
A. Less than those computed on the basis of cost of capital
B. More than those computed on the basis of cost of capital
C. Equal to those computed on the basis of the cost of capital
D. None of the above

Q(4). If the cut off rate of a project is greater than IRR, we may:
A. Accept the proposal
B. Reject the proposal
C. Be neutral about it
D. Wait for the IRR to increase and match the cut off rate

Q(5). While evaluating capital investment proposals, time value of money is used in which of the following techniques:
A. Payback period method
B. Accounting rate of return
C. Net present value
D. None of the above

Q(6). IRR would favour project proposals which have:
A. Heavy cash inflows in the early stages of the project
B. Evenly distributed cash inflows throughout the project
C. Heavy cash inflows at the later stages of the project
D. None of the above

Q(7). The re-investment assumption in the case of the IRR technique assumes that:
A. Cash flows can be re-invested at the projects IRR
B. Cash flows can be re-invested at the weighted cost of capital
C. Cash flows can be re-invested at the marginal cost of capital
D. None of the above

Q(8). Multiple IRRs are obtained when:
A. Cash flows in the early stages of the project exceed cash flows during the later stages
B. Cash flows reverse their signs during the project
C. Cash flows are uneven
D. None of the above

Q(9). Depreciation is included as a cost in which of the following techniques:
A. Accounting rate of return
B. Net present value
C. Internal rate of return
D. None of the above

Q(10). Management is considering a ₹ 1,00,000 investment in a project with a 5 year life and no residual value. If the total income from the project is expected to be ₹ 60,000 and recognition is given to the effect of straight line depreciation on the investment, the average rate of return is:

A. 12%
B. 24%
C. 60%
D. 75%

$ARR = \frac{Avg. PAT}{Avg. Inv.} = \frac{\left(\frac{60000}{5}\right)}{\left(\frac{1L-0}{2}\right)+0} = \frac{12000}{50000} = 0.24 = 24\%$

Q(11). Assume cash outflow equals ₹ 1,20,000 followed by cash inflows of ₹ 25,000 per year for 8 years and a cost of capital of 11%. What is the Net present value?

A. (₹ 38,214)
B. ₹ 9,653
C. ₹ 8,653
D. ₹ 38,214

$NPV = 25000 \times PVAF(11\%, 8) - 120000$
$= (25000 \times 5.146) - 120000$
$= 8650$

Q(12). What is the internal rate of return for a project having cash flows of ₹ 40,000 per year for 10 years and a cost of ₹ 2,26,009?

A. 8%
B. 9%
C. 10%
D. 12%

At 12%
$PVCI = 40000 \times PVAF(12\%, 10)$
$= 226009 = PVCO$

Q(13). While evaluating investments, the release of working capital at the end of the project's life should be considered as:

A. Cash inflow
B. Cash outflow
C. Having no effect upon the capital budgeting decision
D. None of the above

Q(14). Capital rationing refers to a situation where:

A. Funds are restricted and the management has to choose from amongst available alternative investments
B. Funds are unlimited and the management ahs to decide how to allocate them to suitable projects
C. Very few feasible investment proposal are available with the management
D. none of the above

Q(15). Capital budgeting is done for:

A. Evaluating short term investment decisions
B. Evaluating medium term investment decisions
C. Evaluating long term investment decisions
D. None of the above

DIVIDEND DECISIONS - CONCEPTS

1. Dividend

It is return to shareholders i.e. Equity and Preference → % of Div. already fixed

Decision to be taken

- Pay or Not to Pay
- How much to Pay ?

2. Basic Terms

Earning per share (EPS) = $\frac{Earning\ Available\ for\ Equity}{Number\ of\ Equity\ Shares}$

Dividend per share (DPS) = $\frac{Amount\ of\ Dividend}{Number\ of\ Equity\ Shares}$ = EPS × DP Ratio

Dividend Pay-out Ratio (DP Ratio) = $\frac{DPS}{EPS}$ × 100 = 100 – Retention Ratio

Retention Ratio (b) = 100 – DP Ratio

Dividend Rate = $\frac{DPS}{Face\ Value}$ × 100

Dividend Yield = $\frac{DPS}{Market\ price\ per\ share}$ × 100

Earning Yield = $\frac{EPS}{Market\ price\ per\ share}$ × 100

Price Earning Ratio (PE Ratio) = $\frac{MPS}{EPS}$

$$\boxed{\text{PE Ratio} = \frac{1}{Ke}}$$

3. Dividend Policy

- **Relevant**
  - → MV gets affected
  - → Future uncertain, prefer current cash
  - Walter
  - Dividend Discount Model
    - Zero Growth
    - Constant Growth (Gordon)
    - Variable Growth
- **Irrelevant**
  - → MV doesn't affect
  - → Prefer higher return
  - Residual
  - MM

4. Walter Model

Market price of share (P_0) = $\frac{D+(E-D)(r/Ke)}{Ke}$

Where, E = Earning per share

D = Dividend per share

Ke = Cost of equity or rate of capitalization or discount rate → Return of investor

r = Rate of return on investment → Co. Return

Position of r and Ke	Company	Optimum Dividend Payout Ratio
r > Ke	Growth	Zero
r < Ke	Decline	100%
r = Ke	Constant	Every payout ratio is optimum

5. Dividend Discount Model

- Zero Growth Model
- Constant Growth Model (or) Gordon Model
- Variable Growth Model

6. Zero Growth Model

Share's Intrinsic Value (P0) = $\frac{Annual\ Dividend}{Require\ Rate\ of\ Return} = \boxed{\frac{D}{Ke}}$

$Ke = \frac{D}{P_0} \Rightarrow P_0 = \frac{D}{Ke}$

7. Constant Growth Model or Gordon Model

Market Price (P0) = $\boxed{\frac{D1}{Ke-g}} = \frac{D0(1+Ke)}{Ke-g}$

Where, D1 = Next expected dividends or dividends payable at the end of the year

D0 = current year Dividend

Ke = cost of Equity capital or expected rate of return

G = growth rate of dividends = br → b = Retention Ratio, r = Rate of return on investment

$Ke = \frac{D_1}{P_0} + g \Rightarrow Ke - g = \frac{D_1}{P_0} \Rightarrow \boxed{P_0 = \frac{D_1}{Ke-g}}$

8. Variable Growth Rate Model

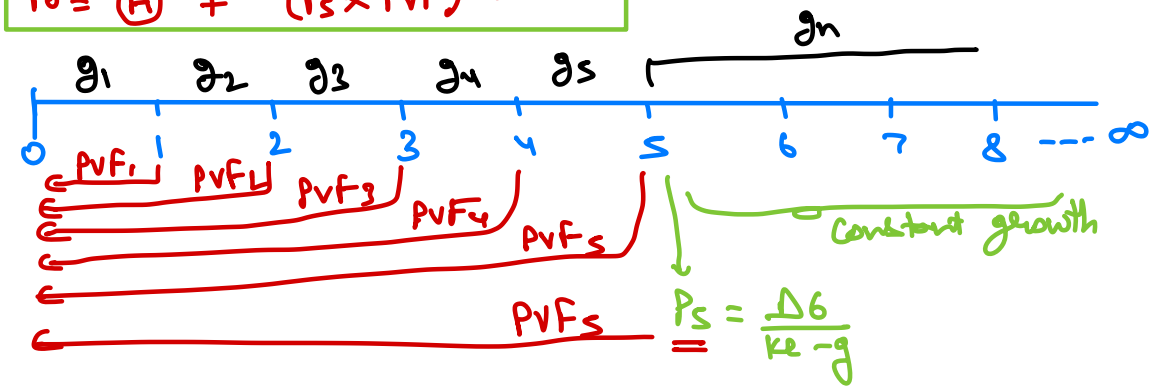
Price = Present value of all future benefits (i.e. dividend) from shares

Yr.	Dividend	PVF	PV
1	–	–	–
2	–	–	–
3	–	–	–
4	–	–	–
5	–	–	–
			Ⓐ ✓

Year upto which growth rate is variable.

$$P_5 = \frac{D_6}{k_e - g} = \checkmark$$

$$\boxed{P_0 = Ⓐ + (P_5 \times PVF) = \checkmark}$$



9. Intrinsic Value Vs Current Value

(IV) (CV)

IV > CV → undervalued (Ⓑ) → Buy

IV < CV → overvalued (Ⓑ) → Don't buy

10. Residual Theory

Step-1) First use earnings for future expansion

Step-2) Balance if any will be distributed among shareholders as dividend

11. Modigliani And Miller (MM) Model

$$P0 = \frac{P1+D1}{1+Ke}$$

Where, P0 = Market price of share today
P1 = Market price of share at the end of year 1
D1 = Dividend per share at the end of year 1
Ke = Cost of equity share capital or discount rate or rate of capitalization

Additional number of shares to be issued at the end of year 1 = $\Delta n = \frac{I1-(E-D)}{P1}$

Where, I1 = Amount required for investment
E = Total earnings of the company
D = Total dividend to be distributed
P1 = Market price of share at the end of year 1

Current Value of Firm = No. of equity shares × MPS = $\frac{(n+\Delta n)(P1)-I+E}{(1+Ke)}$

12. Traditional Model

Market Price (P) = $m\left(D + \frac{E}{3}\right)$

Where, P = Market Price per share
D = Dividend per share
E = Earnings per share
M = Multiplier

13. Linter Model

D1 = D0 + [(EPS × Target payout) – D0] × Af

Where, D1 = Dividend in year 1 or next expected dividend
D0 = Last dear dividend
EPS = Earnings per share
Af = Adjustment factor

DIVIDEND DECISIONS - CONCEPTS

Question – 1

The following information is supplied to you:

	(₹)
Total Earnings	2,00,000
No. of equity shares (of ₹ 100 each)	20,000
Dividend paid	1,50,000
Price/Earnings ratio	12.50

Applying Walter's Model:

(i) Analyze whether the company is following an optimal dividend policy.

(ii) Compute P/E ratio at which the dividend policy will have no effect on the value of the share.

(iii) Will you decision change if the P/E ratio is 8 instead of 12.5? Analyze.

Solution

EPS $= \frac{Total\ Earnings}{No.\ of\ equity\ shares} = \frac{2,00,000}{20,000} =$ ₹ 10 per share

DPS $= \frac{Dividend\ paid}{No.\ of\ equity\ shares} = \frac{1,50,000}{20,000} =$ ₹ 7.50 per share

Rate of return, r $= \frac{Total\ earningns}{Total\ equity\ value} \times 100 = \frac{2,00,000}{20,000 \times 100} \times 100 = 10\%$

Ke $= \frac{1}{P/E\ Ratio} = \frac{1}{12.50} = 0.08 = 8\%$

(i) At present, company pays dividend of ₹ 7.50 per share at which market price comes at:

$$P0 = \frac{D+(E-D)(r \div Ke)}{Ke} = \frac{7.50+(10-7.50)(0.10 \div 0.08)}{0.08} = ₹\ 132.81$$

Since, r(10%) is greater than Ke(8%), thus as per Walter Model, the optimum dividend payout ratio should be zero. Market price at zero dividend is:

$$P0 = \frac{D+(E-D)(r \div Ke)}{Ke} = \frac{0+(10-0)(0.10 \div 0.08)}{0.08} = ₹\ 156.25$$

Thus, theoretically the market price of the share can be increased by adopting a zero payout.

(ii) As per Walter Model, when r = Ke, than dividend policy will have no effect on the value of the share price. Thus, Ke = 10% will be the required level.

P/E Ratio $= \frac{1}{Ke} = \frac{1}{0.10} = 10$ times

(iii) If P/E ratio is 8, than Ke $= \frac{1}{P/E\ Ratio} = \frac{1}{8} = 0.125 = 12.5\%$

Now r(10%) is less than Ke(12.50%). As per Walter model, in such case it is advisable to distribute maximum dividend to maximize the value of the share.

If 100% dividend is given than, price of share is:

$$P0 = \frac{D+(E-D)(r \div Ke)}{Ke} = \frac{10+(10-10)(0.10 \div 0.125)}{0.125} = ₹\ 80$$

Question – 2

The following figures are collected from the annual report of XYZ Ltd.:

Net Profit	₹ 30 lakhs
Outstanding 12% Preference shares	₹ 100 lakhs
No. of equity shares	3 lakhs
Return on Investment (r)	20%
Cost of capital i.e. (Ke)	16%

b=75% b=50%

CALCULATE price per share using Gordon's Model when dividend pay-out is (i) 25%; (ii) 50% and (iii) 100%.

b = 0%

Solution

As per Gordon's Formula, P = $\frac{E(1-b)}{Ke-(b\times r)}$

PD = 100L × 12%

Earning per share (E) = $\frac{Earning\ available\ for\ equity}{No.\ of\ equity\ shares} = \frac{30,00,000-12,00,000}{3.00.000} =$ ₹ 6

Cost of equity (Ke) = 16% = 0.16

Return on investment (r) = 20% = 0.20

(i) When dividend pay-out ratio is 25%, P = $\frac{6\times0.25}{0.16-(0.75\times0.20)} = \frac{1.50}{0.16-0.15} =$ ₹ 150

(ii) When dividend pay-out ratio is 50%, P = $\frac{6\times0.50}{0.16-(0.50\times0.20)} = \frac{3}{0.16-0.10} =$ ₹ 50

(iii) When dividend pay-out ratio is 100%, P = $\frac{6\times1}{0.16-(0\times0.20)} = \frac{6}{0.16} =$ ₹ 37.50

Question – 3

The following figures are collected from the annual report of XYZ Ltd.:

Net Profit	₹ 30 lakhs
Outstanding 12% Preference shares	₹ 100 lakhs
No. of equity shares	3 lakhs
Return on Investment	20%
Cost of capital i.e. (Ke)	16%

CALCULATE price per share using Gordon's Model when dividend pay-out is (i) 25%; (ii) 50% and (iii) 100%.

Solution

As per Gordon's Formula, P = $\frac{E(1-b)}{Ke-(b\times r)}$

Earning per share (E) = $\frac{Earning\ available\ for\ equity}{No.\ of\ equity\ shares} = \frac{30,00,000-12,00,000}{3.00.000} =$ ₹ 6

Cost of equity (Ke) = 16% = 0.16

Return on investment (r) = 20% = 0.20

(i) When dividend pay-out ratio is 25%, P = $\frac{6\times0.25}{0.16-(0.75\times0.20)} = \frac{1.50}{0.16-0.15} =$ ₹ 150

(ii) When dividend pay-out ratio is 50%, P = $\frac{6\times0.50}{0.16-(0.50\times0.20)} = \frac{3}{0.16-0.10}$ = ₹ 50

(iii) When dividend pay-out ratio is 100%, P = $\frac{6\times1}{0.16-(0\times0.20)} = \frac{6}{0.16}$ = ₹ 37.50

Question – 4

The following figures are extracted from the annual report of RJ Ltd.:

Net Profit	₹ 50 Lakhs
Outstanding 13% preference shares	₹ 200 Lakhs
No. of Equity shares	6 Lakhs
Return on Investment (r)	25%
Cost of Capital (Ke)	15%

You are required to compute the approximate dividend pay-out ratio by keeping the share price at ₹ 40 by using Walter's Model.

Solution

Earning available for equity = Net Profit – Preference Dividend

= 50 lakhs – (200 lakhs × 13%) = ₹ 24 Lakhs

Earnings per share = $\frac{Earning\ available\ for\ Equity}{No.\ of\ Equity\ Shares} = \frac{24,00,000}{6,00,000}$ = ₹ 4

As per Walter Model, P = $\frac{D+(E-D)(r\div Ke)}{Ke}$

Where,

P = Market price per share = ₹ 40

E = Earnings per share = ₹ 4

D = Dividend per share

r = Return earned on investment = 25% = 0.25

Ke = Cost of equity capital = 15% = 0.15

∴ P = $\frac{D+(4-D)(0.25\div0.15)}{0.15}$

40 = $\frac{D+(4-D)(1.6667)}{0.15}$

6 = D + 6.667 - (1.667)D

0.667D = 0.6667

D = ₹ 1

Required dividend pay-out ratio = $\frac{Dividend\ per\ share}{Earning\ per\ share} \times 100 = \frac{1}{4} \times 100$ = 25%

Question – 5

S Ltd. is foreseeing a growth rate of 12% p.a. in the next two years. The growth rate is likely to be 10% for the third and fourth year. After that the growth rate is expected to stabilize at 8% p.a. If the last dividend was ₹ 1.50 per share and the investor's required rate of return is 16%, determine the current value of equity share of the company. The present value factors at 16% are as below:

Year	1	2	3	4
PVF	0.862	0.743	0.641	0.552

Solution

Year	Particulars	Amount	PVF @ 16%	Present Value
1	Dividend	1.50×(1+0.12) = 1.68	0.862	1.45
2	Dividend	1.68×(1+0.12) = 1.88	0.743	1.40
3	Dividend	1.88×(1+0.10) = 2.07	0.641	1.33
4	Dividend	2.07×(1+0.10) = 2.28	0.552	1.24
			Total	**5.42**

Price at end of 4th year, P4 = $\frac{D5}{Ke-g} = \frac{2.28(1+.0.08)}{0.16-0.08}$ = ₹ 30.78

Current value of equity share = ₹ 5.42 + (₹ 30.78 × 0.552) = ₹ 22.41

Question – 6

ZX Ltd. has a paid-up share capital of ₹ 1,00,00,000 face value for ₹ 100 each. The current market price of the shares is ₹ 100 each. The Board of Directors of the company has an agenda of meeting to pay a dividend of 50% to its shareholders. The company expects a net income of ₹ 75,00,000 at the end of the current financial year. Company also plans for a capital expenditure for the next financial year for a cost of ₹ 95,00,000, which can be financed through retained earnings and issue of new equity shares. Company's desired rate of investment is 15%.

Required:

Following the Modigilani-Miller (MM) Hypothesis, determine value of the company when:

(a) It does not pay dividend and

(b) It does pay dividend

Solution

Working Notes:

1) Market price per share = [redacted] = ₹ 100

As per MM Model, the price of the share (if dividend is paid):

$$Po = \frac{D1 + P1}{(1 + Ke)} \Rightarrow 100 = \frac{50+P1}{(1+0.15)} \Longrightarrow \boxed{P1 = ₹\ 65}$$

2) As per MM Model, the price of the share (if dividend is not paid):

$$Po = \frac{D1 + P1}{(1 + Ke)} \Rightarrow 100 = \frac{0+P1}{(1+0.15)} \Longrightarrow \boxed{P1 = ₹\ 115}$$

Value after 1 Yr. $(12 + 107692) \times 65 = 13499980$ $(12 + 17391) \times 115 = 13499965$

The number of new equity shares can be found as follows:

	Dividends Distributed (₹)	Dividends Not Distributed (₹)
Net Income	75,00,000	75,00,000
Total Dividends (1,00,000 × 50)	50,00,000	-
Retained Earnings	25,00,000	75,00,000
Investment Budget	95,00,000	95,00,000
Amount to be raised by new issues	70,00,000	20,00,000
Relevant market Price (₹ Per share)	65	115
No. of shares to be issued	$\frac{70L}{65}$ = 1,07,692	$\frac{20L}{115}$ = 17,391

(a) Value of ZX Ltd. when dividends are not paid

$$\text{Value} = \frac{(n+\Delta n)P1-I+E}{1+Ke} = \frac{[(1,00,000+17,391)\times 115]-95,00,000+75,00,000}{(1+0.15)} = ₹\ 1,00,00,000$$

(b) Value of ZX Ltd. when dividends are paid

$$\text{Value} = \frac{(n+\Delta n)P1-I+E}{1+Ke} = \frac{[(1,00,000+1,07,692)\times 65]-95,00,000+75,00,000}{(1+0.15)} = ₹\ 1,00,00,000$$

Current Value

Question – 7

The dividend payout ratio of S Ltd. is 40%. If the company follows traditional approach to dividend policy with a multiplier of 9, what will be the MPS/EPS or PE Ratio of S Ltd.

Solution

As per Traditional approach, P0 = m × (D + E/3)

m = multiplier = 9

D = Dividend per share = E × 40% = 0.40 × E

P0 = Market price

P0 = m × (D + E/3)

$P0 = 9 \times \left[(E \times 0.40) + \frac{E}{3}\right]$

$P0 = 9 \times \frac{(1.20E + E)}{3}$

P0 = 3 × 2.20 × E

$\frac{P0}{E} = 6.60$

$\frac{MPS}{EPS} = 6.60$

PE Ratio = 6.60

Question – 8

$\frac{14}{0.4}$ = D_1

The target payout ratio for S Ltd. is 0.4. The dividend per share for the current year is ₹ 14. The dividend per share in previous year was ₹ 12. The weightage given to the current year earnings is 0.60. The

D_0 AF

$PE = \frac{MPS}{EPS}$

$9 \times EPS = MPS$

number of equity shares outstanding in the company is 10,00,000. If the P/E multiple is 9, applying Lintner Model of dividend policy to the company, compute the market capitalization of the company.

Solution

As per Linter Model, D1 = D0 + [(E × Target Payout) – D0] × AF

D1 = Next expected dividend = 14

D0 = Last paid dividend = 12

Target payout = 0.4

AF = Adjustment Factor = 0.6

∴ 14 = 12 + [(E × 0.40) – 12] × 0.60

2 = (0.4E – 12) × 0.60

3.33 = 0.4E – 12

0.4E = 15.33

E = 38.33

∴Earning per share = E = ₹ 38.33

PE Ratio = MPS ÷ EPS

MPS = PE Ratio × EPS = 9 × 38.33 = ₹ 344.97

Market capitalization = No. of equity shares × MPS = 10,00,000 × 344.97 = ₹ 3,449.7 lakhs

Dividend Decisions

MCQs

Q(1). Which one of the following is the assumption of Gordon's Model:
A. Ke > g
B. Retention ratio, (b), Once decide upon, is constant
C. Firm is an all equity firm
D. All of the above

Q(2). What should be the optimum Dividend pay-out ratio, when r = 15% & Ke = 12%
A. 100%
B. 50%
C. Zero
D. None of the above

Q(3). Which of the following is the irrelevance theory?
A. Walter model
B. Gordon model
C. M.M. hypothesis
D. Linter's model

Q(4). If the company's D/P ratio is 60% & ROI is 16%, what should be the growth rate?
A. 5%
B. 7%
C. 6.4%
D. 9.6%

$b = 0.40 \quad r = 16$

$g = (b)(r) = (16)(0.4)$
$= 6.4\%$

Q(5). If the shareholders prefer regular income, how does this affect the dividend decision:
A. It will lead to payment of dividend
B. If it's the indicator to retain more earnings
C. It has no impact on dividend decision
D. Can't say

Q(6). Mature companies having few investment opportunities will show high payout ratios, this statement is:
A. False
B. True
C. Partial true
D. None of these

Q(7). Which of the following is the limitation of Linter's model?
A. This model does not offer a market price for the shares
B. the adjustment factor is an arbitrary number and not based on any scientific criterion or methods
C. Both (a) & (b)
D. None of the above

Q(8). What are the different options other than cash used for distributing profits to shareholders?
A. Bonus shares
B. Stock split
C. Both (a) & (b)
D. None of the above

Q(9). Which of the following statement is correct with respect to Gordon's model?
A. When IRR is greater than cost of capital, the price per share increases and dividend pay-out decreases
B. When IRR is greater than cost of capital, the price per share decreases and dividend pay-out increases
C. When IRR is lower than cost of capital, the price per share increases and dividend pay-out decreases
D. When IRR is lower than cost of capital, the price per share increases and dividend pay-out decreases

Q(10). Compute EPS according to Graham & Dodd approach from the given information:

Market price	₹ 56
Dividend pay-out ratio	60%
Multiplier	2

A. ₹ 30
B. ₹ 56
C. ₹ 28
D. ₹ 84

$MP = m(D + E/3)$
$56 = 2[(E)(0.6) + E/3]$
$28 = \frac{(1.8)E + E}{3}$
$E = \frac{28 \times 3}{2.8} = 30$

Q(11). Which among the following is not an assumption of Walter's Model?
A. Rate of return and cost of capital are constant
B. Information is freely available to all
C. There is discrimination in taxes
D. The firm has perpetual life

RATIO ANALYSIS – CONCEPTS

1. Meaning of Ratio

It is a mathematical expression of the relationship between two accounting figures.

2. Ratio Analysis

Ratio analysis is the process of identifying the financial strengths and weaknesses of the enterprise by logically establishing relationship between the items of Balance Sheet or Income Statement or both and interpreting the results there of in order to derive meaningful conclusions

3. Type of Ratios

The ratios may be classified on the basis of requirements of various users. The classification is as follows:

(a) Liquidity Ratios or Short-term Solvency Ratios → WC

(b) Long-term Solvency Ratios or Leverage Ratios → Capital & FA

(c) Activity Ratios or Efficiency Ratios or Turnover Ratios or Performance Ratios → P&L & B/S

(d) Profitability Ratios → P&L

4. Liquidity Ratios or Short-term Solvency Ratios

These ratios are used to evaluate the firm's short term solvency.

(a) $Current\ Ratio = \frac{Current\ Assets}{Current\ Liabilites}$

(b) $Quick\ Ratio = \frac{Quick\ Assets}{Current\ Liabilites}$

Quick Assets = Current Assets – Inventory – Prepaid Expenses + Realizable value of inventory (if any)

(c) $Absolute\ Cash\ Ratio = \frac{Cash\ \&\ Bank\ Balance + Marketable\ Securities}{Current\ Liabilites}$

$= \frac{Cash\ \&\ Bank\ Balance + Current\ Invest.}{Current\ Liabilites}$

(d) $Basic\ Defense\ Interval\ /\ Interval\ Measure = \frac{Quick\ Assets}{Dailly\ Cash\ Operating\ Expenses}$

$= \frac{Cash\ \&\ Bank\ Balance + Marketable\ Securities + Net\ Receivables}{Dailly\ Cash\ Operating\ Expenses}$

Daily Cash Operating Expenses = $\frac{General\ Expenses - Non\ cash\ Expenses}{No.\ of\ days\ in\ a\ year}$

(e) Net Working Capital = Current Assets – Current Liabilities (excluding short-term bank borrowing)

5. Long Term Solvency Ratios or Leverage Ratios

These ratios are used to evaluate firm's long term solvency.

(a) $Equity\ Ratio = \frac{Owner's\ Fund}{Net\ Assets}$

(b) $Debt\ Ratio = \frac{Total\ Debt}{Net\ Assets}$

(c) $Debt - Equity\ Ratio = \frac{Long-term\ Debts}{Shareholder's\ Funds} = \frac{Total\ Debts}{Shareholder's\ Funds}$

(d) $Total\ Debt\ to\ Assets\ Ratio = \frac{Total\ Debt}{Total\ Assets}$

(e) $Capital\ Gearing\ Ratio = \frac{Funds\ Bearing\ Fixed\ Financial\ Payments}{Equity\ Shareholder's\ Funds}$

$= \frac{Preference\ Share\ Capital + Debentures + Other\ borrowed\ funds}{Equity\ Shareholder's\ Funds}$

(f) $Proprietary\ Ratio = \frac{Proprietar's\ Fund}{Total\ Assets} \times 100$

(g) $Interest\ Coverage\ Ratio = \frac{EBIT}{Interest}$

(h) $Prefence\ Dividend\ Coverage\ Ratio = \frac{EAT}{Preference\ Dividend}$

(i) $Equity\ Dividend\ Coverage\ Ratio = \frac{EAE}{Equity\ Dividend}$

(j) $Debt\ Service\ Coverage\ Ratio = \frac{Earnings\ available\ for\ debt\ service}{Interest + Principal\ portion\ of\ installment}$ $\frac{[(PAT + Dep.) + Int.]}{(Pr. + Int.)}$

(k) $Fixed\ Charges\ Coverage\ Ratio = \frac{EBIT + Non-cash\ Operating\ Expenses}{Interest + Principal\ portion\ of\ installment}$

6. Points to Remember (PTRs)

Equity Shareholder Fund / Net Worth = Eq. Sh. Capital + Res. & Surplus – Fictitious Assets

(Excluding Revaluation Reserve)

Cap. | FA
CA - CL = WC

Shareholder's Fund/ Owners Fund/ Proprietary Fund = Eq. Sh. fund + Pref. Sh. Capital

Capital Employed = Eq. Sh. Cap. + All R&S - Fictitious Assets + PSC
+ LT Debt - Investment (not related to business)
- Non trade loans & advances - Capital WIP

OR = Fixed Assets + Working Capital

Total Debt or Total Outside Liabilities = LT Debt + (ST Debt or CL)

7. Activity or Efficiency or Performance or Turnover or Velocity Ratio

These ratios help in commenting on the efficiency of the enterprise in managing its assets.

(a) $Total\ Assets\ Turnover\ Ratio = \frac{Net\ Sales/COGS}{Total\ Assets}$

(b) $Fixed\ Assets\ Turnover\ Ratio = \frac{Net\ Sales/COGS}{Net\ Fixed\ (Operating) Assets}$

(c) $Capital\ Turnover\ Ratio = \frac{Net\ Sales/COGS}{Capital\ Employed}$

(d) $Current\ Assets\ Turnover\ Ratio = \frac{Net\ Sales/COGS}{Current\ Assets}$

(e) $Working\ Capital\ Turnover\ Ratio = \frac{Net\ Sales/COGS}{Working\ Capital}$

(f) $Inventory\ (Finsihed\ Stock)\ Turnover\ Ratio = \frac{Cost\ of\ Goods\ Sold/Sales}{Average\ FG\ Stock}$

(g) $Inventory\ (Finished\ Stock) Velocity = \frac{Average\ FG\ Stock}{Average\ Cost\ of\ Goods\ Sold\ per\ day}$

$= \frac{12\ months\ /\ 52\ weeks\ /\ 365\ days}{Stock\ Turnover\ Ratio}$

(h) $Inventory\ (Raw\ Material)\ Turnover\ Ratio = \frac{Raw\ Material\ Stock\ Consumed}{Average\ RM\ Stock}$

(i) $Inventory\ (Finished\ Stock) Velocity = \frac{Average\ RM\ Stock}{Average\ RM\ Consumed\ per\ day}$

$= \frac{12\ months\ /\ 52\ weeks\ /\ 365\ days}{Inventory\ Turnover\ Ratio}$

(j) $Receivables\ Turnover\ Ratio = \frac{Credit\ Sales}{Average\ account\ receivables}$

(k) $Receivables\ Velocity = \frac{Average\ Receivables}{Average\ Credit\ Sales\ per\ day}$

$= \frac{12\ months\ /\ 52\ weeks\ /\ 365\ days}{Receivables\ Turnover\ Ratio}$

(l) $Payables\ Turnover\ Ratio = \frac{Credit\ Purchases}{Average\ account\ payables}$

(m) $Payables\ Velocity = \frac{Average\ Payables}{Average\ Credit\ Purchases\ per\ day}$

$= \frac{12\ months\ /\ 52\ weeks\ /\ 365\ days}{Payables\ Turnover\ Ratio}$

8. Points to Remember (PTRs)

- Sales will be excluding GST and net of returns if any.

- It is prefer to take average figure in denominator. If average can't be computed then consider closing values.

9. Profitability Ratios

These are used to measure the firm's operating efficiency or profitability.

These are further classified in four categories:

(A) Related to Sales

(B) Related to Overall Return on Assets or Investment

(C) From Owner's Point of View

(D) Related to Market or Valuation or Investors

10. Profitability Ratios Related to Sales

(a) $Gross\ Profit\ Ratio = \frac{Gross\ Profit}{Net\ Sales} \times 100$

(b) $Net\ Profit\ Ratio\ (after\ tax) = \frac{Net\ profit\ or\ EAT}{Sales} \times 100$

(c) $Net\ Profit\ Ratio\ (before\ tax) = \frac{EBT}{Sales} \times 100$

(d) $Operating\ Profit\ Ratio = \frac{Operating\ Profit\ or\ EBIT}{Sales} \times 100$

P&L

OM, DL, D.Exp, F.OH	COGS	Sales	
GP			
Adm., S&D, NP		GP b/d	

Op. Pft. (EBIT) = Sales − Op. Cost (Var. Fix)

Op. Cost = COGS + Adm. + S&D

(or) Op. Exp. = All exp. except Int., Tax, P.D & non-business

(e) $Cost\ of\ Goods\ Sold\ Ratio = \frac{Cost\ of\ Goods\ Sold}{Net\ Sales} \times 100$

(f) $Operating\ Expense\ Ratio = \frac{Operating\ Expenses}{Sales} \times 100$

(g) $Operating\ Ratio = \frac{COGS + Operating\ Expenses}{Sales} \times 100$

(h) $Financial\ Expenses\ Ratio = \frac{Financial\ Expenses}{Sales} \times 100$

(i) $Administration\ Expenses\ Ratio = \frac{Administration\ Expenses}{Sales} \times 100$

(j) $S\ \&\ D\ Expenses\ Ratio = \frac{Selling\ \&\ Distribution}{Sales} \times 100$

11. Profitability Ratios related to Overall Return on Investment or Assets

(a) Return on Assets (ROA) $= \frac{Net\ Profit\ after\ Tax}{Average\ Total/Tangible/Fixed\ Assets}$

$= \frac{EBIT(1-t)}{Average\ Total/Tangible/Fixed\ Assets}$

$= \frac{(PAT + Interest)}{Average\ Total/Tangible/Fixed\ Assets}$

RoTA = Return on Total Assets

(b) Return on Net Assets (RONA) $= \frac{EBIT(1-t)}{Average\ Net\ Assets}$

(c) Return on Capital Employed (ROCE) (Before Tax) $= \frac{EBIT}{Average\ Capital\ Employed} \times 100$

(d) Return on Capital Employed (ROCE) (After Tax) $= \frac{EBIT(1-t)}{Average\ Capital\ Employed} \times 100$

(e) Return on Equity (ROE) $= \frac{Earning\ for\ Equity\ (EAE)}{Equity\ Shareholder's\ Fund} \times 100$

(f) Return on Shareholder's Fund $= \frac{EAT}{Shareholder's\ Fund} \times 100$

12. Profitability Ratios from Owner's Point of View

(a) Earning per Share (EPS) $= \frac{Earning\ for\ Equity}{No.\ of\ Equity\ Shares}$

(b) Dividend Per Share (DPS) $= \frac{Equity\ Dividend}{No.\ of\ Equity\ Shares}$

(c) Dividend Payout Ratio (DP Ratio) $= \frac{DPS}{EPS} \times 100$

13. Profitability Ratios related to Market or Valuation or Investors

(a) Price Earning Ratio (PE Ratio) $= \frac{Market\ Price\ per\ share\ (MPS)}{Earning\ Per\ Share\ (EPS)}$

Return

(b) Dividend Yield Ratio = $\frac{DPS}{MPS} \times 100$

(c) Earning Yield Ratio = $\frac{EPS}{MPS} \times 100$

(d) Market Value / Book Value Per share (MV / BV) = $\frac{Market\ Value\ per\ share}{Book\ Value\ per\ share}$

(e) Q Ratio = $\frac{Market\ value\ of\ equity\ and\ liabilities}{Estimated\ replacement\ cost\ of\ assets}$

14. Du Pont Model

$\frac{EBIT}{Cap.\ Em} = \frac{EBIT}{Sales} \times \frac{Sales}{Cap.\ Em}$

(A) Return on Capital Employed (ROCE) = Operating Profit Margin × Capital Turnover

(B) Return on Equity (ROE) = Net Profit Margin × Assets Turnover × Equity Multiplier

RATIO ANALYSIS – QUESTIONS

Question – 1

The following is the Profit and loss account and Balance Sheet of KLM LLP.

Trading and Profit & loss Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Opening stock	12,46,000	By Sales	1,96,56,000
To Purchases	1,56,20,000	By Closing stock	14,28,000
To Gross Profit c/d	42,18,000		
	2,10,84,000		2,10,84,000
To Administrative expenses	18,40,000	By Gross profit b/d	42,18,000
To Selling & Dist. exp.	7,56,000	By Interest on investment	24,600
To Interest on loan	2,60,000	By Dividend received	22,000
To Net Profit	14,08,600		
	42,64,600		42,64,600

Balance Sheet as on……..

Capital & Liabilities	Amount (₹)	Assets	Amount (₹)
Capital	20,00,000	Plant & Machinery	24,00,000
Retained earnings	42,00,000	Building	42,00,000
General reserve	12,00,000	Furniture	12,00,000
Term loan from bank	26,00,000	Sundry receivables	13,50,000
Sundry payables	7,20,000	Inventory	14,28,000
Other liabilities	2,80,000	Cash & Bank balance	4,22,000
	1,10,00,000		1,10,00,000

You are required to COMPUTE:

(a) Gross profit ratio
(b) Net Profit ratio
(c) Operating cost ratio
(d) Operating profit ratio
(e) Inventory turnover ratio
(f) Current ratio
(g) Quick ratio
(h) Interest coverage ratio
(i) Return on capital employed
(j) Debt to assets ratio

Solution

(a) Gross profit ratio $= \frac{Gross\ Profit}{Sales} \times 100 = \frac{42,18,000}{1,96,56,000} \times 100 = 21.46\%$

(b) Net Profit ratio $= \frac{Net\ Profit}{Sales} \times 100 = \frac{14,08,600}{1,96,56,000} \times 100 = 7.17\%$

(c) Operating ratio = $\frac{Operating\ cost}{Sales} \times 100 = \frac{(1,54,38,000+25,96,000)}{1,96,56,000} \times 100 = 91.75\%$

Cost of goods sold = Sales – Gross profit = 1,96,56,000 – 42,18,000 = ₹ 1,54,38,000

Operating expenses = Administrative exp. + Selling & dist. Exp.

= 18,40,000 + 7,56,000= ₹ 25,96,000

(d) Operating profit ratio = 100 – operating cost ratio = 100 – 91.75% = 8.25%

(e) Inventory turnover ratio = $\frac{Cost\ of\ goods\ sold}{Average\ stock} = \frac{1,54,38,000}{(14,28,000+12,46,000)\div 2}$ = 11.55 times

(f) Current ratio = $\frac{Current\ assets}{Current\ liabilities} = \frac{13,50,000+14,28,000+4,22,000}{7,20,000+2,80,000} = \frac{32,00,000}{10,00,000}$ = 3.2 times

(g) Quick ratio = $\frac{Quick\ assets}{Current\ liabilities} = \frac{32,00,000-14,28,000}{10,00,000}$ = 1.77 times

(h) Interest coverage ratio = $\frac{EBDIT}{Interest} = \frac{Net\ Profit+Interest}{Interest} = \frac{14,08,600+2,60,000}{2,60,000}$ = 6.42 times

(i) Return on capital employed = $\frac{EBIT}{Capital\ employed} \times 100 = \frac{14,08,600+2,60,000}{1,00,00,000} \times 100$ = 16.69%

Capital employed = Capital + Retained earnings + General reserve + Term loan

= 20,00,000 + 42,00,000 + 12,00,000 + 26,00,000 = ₹ 1,00,00,000

(j) Debt to assets ratio = $\frac{Debt}{Total\ assets} \times 100 = \frac{26,00,000}{1,10,00,000} \times 100$ = 23.64%

CA = 200 CL = 100

Question – 2

Assuming the current ratio of a company is 2, STATE in each of the following cases whether the ratio will improve or decline or will have no change:

(a) Payment of current liability → CL = 100 - 20 = 80 CA = 200 - 20 = 180 CR = 180/80 = 2.25

(b) Purchase of fixed assets by cash → CL = 100 CA = 200 - 20 = 180 CR = 180/100 = 1.8

(c) Cash collected from customers → CL = 100 CA = 200 - 20 + 20 = 200 CR = 200/100 = 2

(d) Bill receivable dishonored → CL = 100 CA = 200 CR = 200/100 = 2

(e) Issue of new shares → CL = 100 CA = 200 + 20 = 220 CR = 220/100 = 2.2

Solution

Given, Current ratio = $\frac{Current\ Assets}{Current\ Liabilities}$ = 2

S. No.	Situation	Improve/Decline/No Change	Reason
(a)	Payment of current liability	Current ratio will improve	Let us assume CA is ₹ 2 lakhs & CL is ₹ 1 lakhs. If payment of CL is ₹ 10,000 then CA = 1,90,000 and CL = 90,000

			Current ratio = $\frac{1,90,000}{90,000}$ = 2.11 Payment of current liability will reduce the same amount in the numerator and denominator. Hence, the ratio will improve.
(b)	Purchase of fixed assets by cash	Current ratio will decline	Since the cash being a current asset converted into fixed asset, current assets reduced, thus current ratio will fall.
(c)	Cash collected from customers	Current ratio will not change	Cash will increase and debtors will reduce. Hence no change in current assets.
(d)	Bills receivable dishonored	Current ratio will not change	Bills receivable will come down and debtors will increase. Hence no change in current assets.
(e)	Issue of new shares	Current ratio will improve	As cash will increase, current assets will increase and current ratio will increase.

Question – 3

The following accounting information and financial ratios of A&R Limited relate to the year ended 31st March, 2020:

Inventory Turnover Ratio	→	6 Times
Creditors Turnover Ratio	→	10 Times
Debtors Turnover Ratio	→	8 Times
Current Ratio	→	2.4
Gross Profit Ratio	→	25%

Total sales ₹ 6,00,00,000; cash sales 25% of credit sales; cash purchases ₹ 46,00,000; working capital ₹ 56,00,000; closing inventory is ₹ 16,00,000 more than opening inventory.

↳ cl. = op. + 16l

↳ cl. − op. = 16l

You are required to calculate:

(a) Average Inventory
(b) Purchases
(c) Average Debtors
(d) Average Creditors
(e) Average Payment Period
(f) Average Collection Period
(g) Current Assets
(h) Current Liabilities

Cash Sales = 25% × Cr.
Cash + Cr. = TS
(0.25) Cr. + Cr. = TS
(1.25)(Cr.) = TS
Cr. = $\frac{TS}{1.25}$ = $\frac{TS}{125}$ × 100 = 80% × TS

Solution

(a) Computation of Average Inventory

Gross Profit = 25% of 6,00,00,000 = ₹ 1,50,00,000

Cost of goods sold (COGS) = 6,00,00,000 - 1,50,00,000 = ₹ 4,50,00,000

Inventory Turnover Ratio = $\frac{\text{Cost of Goods sold}}{\text{Average Stock}}$

COGS = op. + Purch. − cl.
Purch. = COGS + cl. − op.

$$6 = \frac{4,50,00,000}{Average\ Stock}$$

Average stock = ₹ 75,00,000

(b) Computation of Purchases

(cl. − op.)

Purchases = COGS + Increase in Stock = 4,50,00,000 + 16,00,000 = ₹ 4,66,00,000

(c) Computation of Average Debtors

Let Credit Sales be ₹ 100

Cash sales = 25% of 100 = ₹ 25

Total Sales = 100 + 25 = ₹ 125

If total sales is ₹ 6,00,00,000, then credit sales = $\frac{6,00,00,000}{125} \times 100$ = ₹ 4,80,00,000

Thus, Cash Sales = ₹ 6,00,00,000 - ₹ 4,80,00,000 = ₹ 1,20,00,000

$$\text{Debtors Turnover Ratio} = \frac{\text{Net Credit Sales}}{\text{Average Debtors}}$$

$$8 = \frac{4,80,00,000}{Average\ Debtors}$$

Average Debtors = ₹ 60,00,000

(d) Computation of Average Creditors

Credit Purchases = Purchases — Cash Purchases

= 4,66,00,000 — 46,00,000 = ₹ 4,20,00,000

$$\text{Creditors Turnover Ratio} = \frac{\text{Net Credit Purch.}}{\text{Average Creditors}}$$

$$10 = \frac{4,20,00,000}{Average\ Creditors}$$

Average Creditors = ₹ 42,00,000

(e) Computation of Average Payment Period

$$\text{Average Payment Period} = \frac{\text{Average Creditors}}{\text{Average Daily Credit Purchases}} = \frac{42,00,000}{(4,20,00,000 \div 365)} = 36.5 \text{ days}$$

OR

Average Payment Period = 365/Creditors Turnover Ratio = 365/10 = 36.5 days

(f) Computation of Average Collection Period

$$\text{Average Collection Period} = \frac{\text{Average Debtors}}{\text{Average Daily Credit Sales}} = \frac{60,00,000}{(4,80,00,000 \div 365)} = 45.625 \text{ days}$$

OR

Average collection period = 365/Debtors Turnover Ratio = 365/8 = 45.625 days

(g) Computation of Current Assets

$$\text{Current Ratio} = \frac{\text{Current Assets (CA)}}{\text{Current Liabilities (CL)}}$$

$$2.4 = \frac{CA}{CL}$$

CA = (2.4)(CL)

56l = (2.4)(CL) − CL
56l = (1.4) CL
CL = 40l
∴ CA = 40l × 2.4
= 96l

CL = CA/2.4
Working capital = Current Assets — Current liabilities
56,00,000 = CA – (CA/2.4)
CA = 96,00,000

(h) Computation of Current Liabilities

Current liabilities = 96,00,000 ÷ 2.4 = ₹ 40,00,000

Question – 4

With the following ratios and further information given below prepare a Trading Account, Profit and Loss Account and Balance Sheet of ABC Company.

Fixed Assets	₹ 40,00,000
Closing stock	₹ 4,00,000
Stock turnover ratio	10
Gross profit ratio	25 percent
Net profit ratio	20 percent
Net profit to capital	1/5
Capital to total liabilities	1/2
Fixed assets to capital	5/4
Fixed assets / Total current assets	5/7

FA/Cap. = 5/4 ⇒ Cap. = 40l × 4/5 = 32l
FA/CA = 5/7 ⇒ CA = 40l × 7/5 = 56l

Solution

Trading and P&L Account

To Opening Stock (w.n. – 9)	80,000	By Sales (w.n. – 5) (6.40l / 20%)	32,00,000
To Purchases (bal. fig.)	27,20,000	By Closing Stock (given)	4,00,000
To Gross Profit (w.n. – 6) (32l × 25%)	8,00,000		
	36,00,000		36,00,000
To Expenses (bal. fig.)	1,60,000	By Gross Profit b/d	8,00,000
To Net Profit (w.n. – 4) (32l × 1/5)	6,40,000		
	8,00,000		8,00,000

Balance Sheet

Capital (w.n. – 1)	32,00,000	Fixed Assets (given)	40,00,000
Other Liabilities (w.n. – 3)	64,00,000	Current Assets:	
		Stock (given)	4,00,000
		Other CA (w.n. – 10)	52,00,000
	96,00,000		96,00,000

56l

Working Notes:

1. $\frac{\text{Fixed Assets}}{\text{Capital}} = \frac{40,00,000}{\text{Capital}} = \frac{5}{4}$. Thus, Capital = ₹ 32,00,000

2. $\frac{\text{Fixed Assets}}{\text{Total Current Assets}} = \frac{40,00,000}{\text{Total Current Assets}} = \frac{5}{7}$. Thus, Total Current Assets = ₹ 56,00,000

3. $\frac{\text{Capital}}{\text{Other liabilities}} = \frac{32,00,000}{\text{Other liabilities}} = \frac{1}{2}$. Thus, Other Liabilities = ₹ 64,00,000

Total liabilities is taken/assumed as "External Liabilities", i.e. excluding capital.

4. $\frac{\text{Net Profit}}{\text{Capital}} = \frac{\text{Net Profit}}{32,00,000} = \frac{1}{5}$. Thus, Net Profit = ₹ 6,40,000

5. Net Profit ratio $= \frac{\text{Net Profit}}{\text{Sales}} = \frac{6,40,000}{\text{Sales}} = 20\%$. Thus, Sales = ₹ 32,00,000

6. Gross Profit Ratio = 25%. Thus, Gross profit = 32,00,000 × 25% = ₹ 8,00,000

7. Cost of goods sold = Sales – Gross profit = 32,00,000 – 8,00,000 = ₹ 24,00,000

8. Stock Turnover ratio $= \frac{\text{Cost of Goods Sold}}{\text{Average Stock}} = \frac{24,00,000}{\text{Average Stock}} = 10$.

   Thus, Average Stock = ₹ 2,40,000

9. Average Stock $= \frac{\text{Opening stock} + \text{closing stock}}{2} = \frac{\text{Opening stock} + 4,00,000}{2} = 2,40,000$.

   Thus, Op. Stock = ₹ 80,000

10. Other Current Assets = Total Current Assets – Stock = 56,00,000 – 4,00,000 = ₹ 60,00,000

Question – 5

Following is the abridged balance Sheet of the SK Ltd. as at 31st March, 2020:

Balance Sheet

Liabilities	₹	Assets		₹
Paid up share capital	5,00,000	Free hold property		4,00,000
Profit & Loss A/c	85,000	Plant & Machinery	2,50,000	
Current Liabilities	2,00,000	Less: Acc. Depreciation	75,000	1,75,000
		Stock		1,05,000
		Debtors		1,00,000
		Bank		5,000
	7,85,000			7,85,000

From the following information you are required to prepare Profit & Loss A/c (2020-21) and Balance Sheet as at 31st March, 2021:

(a) The composition of the total of 'liabilities' side to the company's Balance Sheet as at 31st March, 2021 (the paid-up capital remaining the same as at 31st March, 2020) was:

Share Capital	50%
Profit & Loss A/c	15%
10% Debentures	10%
Creditors	25%

The debentures were issued on 1st April, 2020. Interest is to be paid on 30th September, 2020 and 31st March, 2021.

(b) During the year ended on 31st March, 2021, additional Plant and Machinery had been bought and a further ₹ 25,000 depreciation written off. Freehold property remained unchanged. The total fixed assets then constituted 60% of total fixed and current assets.

(c) The current ratio was 1.6:1. The quick ratio was 1:1

(d) The debtors (four-fifth of the quick assets) to sales ratio revealed a credit period of two months.

(e) Gross Profit was at the rate of 15% of selling price and return on net worth as at 31st March, 2021 was 10%. Ignore taxation.

Solution

Working Notes:

(1)

Particulars	%	Amount	
Share capital	50%	5,00,000	(Because it remains same for next year)
P&L Account	15%	1,50,000	(10,00,000 × 15%)
10% Debentures	10%	1,00,000	(10,00,000 × 10%)
Creditors	25%	2,50,000	(10,00,000 × 25%)
		10,00,000	(5,00,000 ÷ 50%)

(2) Interest on debenture = 1,00,000 × 10% = ₹ 10,000

(3) Total assets = Total liabilities = ₹ 10,00,000

Fixed assets = 60% × Total assets = 60% × 10,00,000 = ₹ 6,00,000

Current assets = 10,00,000 – 6,00,000 = ₹ 4,00,000

(4) Fixed assets = Freehold property + Plant & Machinery

6,00,000 = 4,00,000 + Plant & Machinery

Plant & Machinery = ₹ 2,00,000

(5) Current ratio = $\frac{Current\ Assets}{Current\ Liabilities}$

1.60 = $\frac{4,00,000}{Current\ Liabiliities}$

Current Liabilities = ₹ 2,50,000

(6) Quick ratio = $\frac{Liquid\ assets}{Liquid\ liabilities}$

1 = $\frac{4,00,000 - Stock}{2,50,000}$

Stock = ₹ 1,50,000

(7) Debtors = $\frac{4}{5}$ × Quick Assets = $\frac{4}{5}$ × (4,00,000 – 1,50,000) = ₹ 2,00,000

(8) Other current assets = 4,00,000 – 1,50,000 – 2,00,000 = ₹ 50,000

(9) Credit period = $\frac{Average\ Debtors}{Credit\ Sales}$ × 12

2 = $\frac{2,00,000}{Credit\ sales}$ × 12

Credit sales = ₹ 12,00,000

(10) Gross Profit = 15% × Sales = 15% × 12,00,000 = ₹ 1,80,000

(11) Return on net worth = $\frac{Profit}{Shareholder\ fund}$

$\frac{10}{100} = \frac{Profit}{5,00,000+1,50,000}$

Profit = ₹ 65,000

Trading and Profit and Loss Account

Particulars	₹	Particulars	₹
To Opening Stock	1,05,000	By Sales	12,00,000
To Purchases & Other exp. (Bal. fig.)	10,65,000	By Closing Stock	1,50,000
To Gross Profit c/d	1,80,000		
	13,50,000		13,50,000
To Depreciation	25,000	By Gross Profit b/d (Bal. fig.)	1,80,000
To Interest on Debentures	10,000		
To Other exp. (Bal. fig.)	80,000		
To Net profit for the year c/d	65,000		
	1,80,000		1,80,000

Balance Sheet

Liabilities	₹	Assets		₹
Share Capital	5,00,000	Fixed assets:		
Profit & loss A/c	1,50,000	Freehold property	4,00,000	
10% Debentures	1,00,000	Plant & Machinery	2,00,000	6,00,000
Creditors	2,50,000	Current assets:		
		Stock	1,50,000	
		Debtors	2,00,000	
		Other CA	50,000	4,00,000
	10,00,000			10,00,000

Question – 6

Using the information given below, complete the Balance Sheet of PQR Private Limited:

(i)	Current ratio	1.6:1
(ii)	Cash and Bank balance	15% of total current assets
(iii)	Debtors turnover ratio	12 times
(iv)	Stock turnover (cost of goods sold) ratio	16 times
(v)	Creditors turnover (cost of goods sold) ratio	10 times
(vi)	Gross profit ratio	20%
(vii)	Capital gearing ratio	0.6
(viii)	Depreciation rate	15% on WDV
(ix)	Net Fixed Assets	20% of total assets

(Assume all purchase and sales are on credit)

Balance Sheet of PQR Private Limited as at 31.03.2019

Liabilities		₹	Assets		₹
Share Capital		25,00,000	Fixed Assets		
Reserve & Surplus		?	Opening WDV	?	
12% Long term debt		?	Less: Depreciation	?	?
Current Liabilities			**Current Assets**		
Creditors	?		Stock	?	
Provision & outstanding expenses	?	68,50,000	Debtors	?	
			Cash & Bank balance	?	?
Total		?	Total		?

Solution

Balance Sheet of SK Private Limited as at 31.03.2022

Liabilities		₹	Assets		₹
Share Capital		(4) 25,00,000	Fixed Assets		27,40,000 / 85%
Reserve & Surplus		17,81,250	Opening WDV	32,23,529	
12% Long term debt		25,68,750	Less: Depreciation 15%	4,83,529	27,40,000
Current Liabilities			**Current Assets**		
Creditors	55,89,600		Stock	34,93,500	
Provision & outstanding expenses	12,60,400	68,50,000 (4)	Debtors	58,22,500	
			Cash & Bank balance	16,44,000	1,09,60,000
Total		1,37,00,000	Total		1,37,00,000

Working Notes:

1) Current ratio = $\frac{Current\ Assets}{Current\ Liabilites}$

$1.6 = \frac{Current\ Assets}{Current\ Liabilities}$

Current Assets = 1.6 × Current Liabilities = 1.6 × 68,50,000 = ₹ 1,09,60,000

So, Cash and Bank balance = 15% × Current Assets = 15% × 1,09,60,000 = ₹ 16,44,000

2) Total Assets = Net fixed assets + Current assets

Total assets = 20% of total assets + 1,09,60,000

Total assets = 1,37,00,000

Net fixed assets = 20% of Total Assets = 20% × 1,09,60,000 = ₹ 27,40,000

3) Stock + Debtors = Current assets – Cash & bank = 1,09,60,000 – 16,44,000 = ₹ 93,16,000

4) Let Sales = y

Debtors = $\frac{Credit\ sales}{Debtors\ turnover\ ratio} = \frac{y}{12}$

DTR = $\frac{\text{Cr. Sales}}{\text{Debs.}}$

Stock (on cost of goods sold) = $\frac{Sales - 20\%\ of\ sales}{16} = \frac{y - 20\%\ of\ y}{16} = \frac{0.80y}{16} = \frac{y}{20}$

$\frac{y}{12} + \frac{y}{20} = 93,16,000$

y = 6,98,70,000

Sales = ₹ 6,98,70,000,

Cost of goods sold = ₹ 5,98,96,000

Stock (COGS ÷ 16) = ₹ 34,93,500

Debtors (Sales ÷ 12) = ₹ 58,22,500

Creditors (COGS ÷ 10) = ₹ 55,89,600

5) Calculation of provision of outstanding expenses = 68,50,000 – 55,89,600 = ₹ 12,60,400

6) Reserve & surplus + Long term debt = 1,37,00,000 – 68,50,000 – 25,00,000 = ₹ 43,50,000

Capital Earning Ratio = 0.6

$\frac{12\%\ Long\ Term\ Debt}{Equity\ Share\ Capital + Reserve\ \&\ Surplus} = 0.60$

$\frac{43,50,000 - Reserve\ \&\ Surplus}{25,00,000 + Reserve\ \&\ Surplus} = 0.60$

Reserve & Surplus = ₹ 17,81,250

12% Long term debt = ₹ 25,68,750

Question – 7

The following figures and ratios pertain to ABG Company Limited for the year ending 31st March 2016:

Annual sales (credit)	₹ 50,00,000
Gross profit ratio	28%
Fixed assets turnover ratio (based on cost of goods sold)	1.5
Stock turnover ratio (based on cost of goods sold)	6
Quick ratio	1:1
Current Ratio	1.5
Debtors collection period	45 days
Reserves & surplus to share capital	0.60:1
Capital gearing ratio	0.5
Fixed Assets to net worth	1.2:1

(a) Prepare the balance sheet as at 31st March 2016, based on the above information. Assume 360 days in a year.

(b) The statement showing working capital requirement, if the company wants to make a provision for contingencies @15% of net working capital.

Solution

(a) **Balance Sheet**

Liabilities	₹	Assets	₹
1. Shareholder's Funds:		**1. Non-current assets:**	
Share capital (WN6)	12,50,000	Fixed Assets (WN 3)	24,00,000

Reserves & surplus (WN6)	7,50,000	**2. Current Assets:**	
2. Non-current liabilities:		Stock (WN4)	6,00,000
Long-term loans (bal. fig.)	10,00,000	Debtors (WN5)	6,25,000
3. Current Liabilities (WN8)	12,00,000	Bank (WN9)	5,75,000
	42,00,000		18,00,000
			42,00,000

(b) **Statement of Working Capital Requirement**

Particulars	Amount
Current Assets:	
Stock	6,00,000
Debtors	6,25,000
Bank	5,75,000
	18,00,000
Less: Current liabilities	(12,00,000)
Working capital before contingencies provision	6,00,000
Add: Provision for contingencies @15%	90,000
Working capital after contingencies provision	6,90,000

15%

Working notes and calculations:

1. Gross Profit ratio = 28% of sales. So Gross Profit = 28% × ₹ 50,00,000 = ₹ 14,00,000
2. Cost of goods sold (COGS) = Sales – Gross Profit = ₹ 50,00,000 – ₹ 14,00,000 = ₹ 36,00,000
3. Fixed Assets Turnover (based on COGS) = $\frac{\text{COGS}}{\text{Fixed Assets}} = \frac{36,00,000}{\text{Fixed Assets}} = 1.5\text{times}$

   Hence, Fixed Assets = ₹ 24,00,000
4. Stock Turnover = $\frac{\text{COGS}}{\text{Inventory}} = \frac{36,00,000}{\text{Inventory}} = 6$ times

   So, inventory = ₹ 6,00,000

   Note: In the absence of information, it is assumed that opening stock = closing stock = average stock
5. Debt collection period = 45 days

   So, debtors = Sales × $\frac{45}{360}$ = ₹ 50,00,000 × $\frac{45}{360}$ = ₹ 6,25,000
6. $\frac{\text{Fixed Assets}}{\text{Net Worth}} = \frac{24,00,000}{\text{Net Worth}} = 1.20 \Longrightarrow$ So, Net worth = ₹ 20,00,000

   RFS = 20l × 0.6/1.6 = 7.5l

   Sh. = 20l × 1/1.6 = 12.5l
7. Current Ratio = $\frac{\text{Current Assets}}{\text{Current Liabilities}}$ = 1.5 times

   So, currently assets = 1.5 x current liabilities
8. Quick ratio = $\frac{\text{Quick Assets}}{\text{Quick Liabilities}}$ = 1 time

   So, $\frac{\text{Current Assets - Stock}}{\text{Current Liabilities}} = 1$

   On substitution, $\frac{(1.5 \times \text{Current Assets}) - \text{Rs.}6,00,000}{\text{Current Liabilities}} = 1$

(1.5)CL − 6l = CL

(1.5)CL − CL = 6l

(0.5) CL = 6l

CL = 12l

CA = 1.5 × 12l

= 18l

On solving, we get, current liabilities = ₹ 12,00,000

9. Hence, current assets = 1.5 x 12,00,000 = ₹ 18,00,000

   Cash & Bank = Total CA – Debtors – Inventory = 18,00,000 – 6,00,000 – 6,25,000 = ₹ 5,75,000

10. Verification: Capital Gearing Ratio = $\frac{\text{Prefernce Capital} + \text{Debt}}{\text{Equity Shareholders Fund}} = \frac{\text{Nil} + 10,00,000}{20,00,000} = 0.5 \text{ times}$

Note: In the absence of information, share capital = Equity share capital only. Debt is taken from B/s above.

Alternatively, using the capital gearing ratio, debt can be computed as balancing figure, (using equity shareholders' funds from WN6, and the balance sheet shall be found tallied.

Question – 8

A Limited Company's books reveal following information: Net Income

Net Income	₹ 3,60,000
Shareholder's Equity	₹ 4,00,000
Assets Turnover	2.5 times
Net profit margin	12%

You are required to calculate ROE (Return on Equity) of the company based on the 'DuPont Model'.

Solution

Net Profit Margin = Net Income ÷ Revenue

0.12 = 3,60,000 ÷ Revenue

Revenue = ₹ 30,00,000

Assets turnover = Revenue ÷ Assets

2.5 = 30,00,000 ÷ Assets

Assets = ₹ 12,00,000

Equity Multiplier = Assets ÷ Shareholder's Equity = 12,00,000 ÷ 4,00,000 = 3

Return on Equity = Net Profit Margin × Assets Turnover × Equity Multiplier

= 0.12 × 2.5 × 3 = 0.9 = 9%

$\frac{NP}{Eq.} = \frac{NP}{Sales} \times \frac{Sales}{Assets} \times \frac{Assets}{Eq.}$

Ratio Analysis

MCQs

Q(1). Ratio of Net sales to Net working capital is a:
A. Profitability ratio
B. Liquidity ratio
C. current ratio
D. Working capital turnover ratio

Q(2). Long-term solvency is indicated by:
A. Debt/equity ratio
B. Current ratio
C. Operating ratio
D. Net profit ratio

Q(3). Ratio of net profit before interest and tax to sales is:
A. Gross profit ratio
B. Net profit ratio
C. Operating profit ratio
D. Interest coverage ratio

Q(4). Observing changes in the financial variables across the year is:
A. Vertical analysis
B. Horizontal analysis
C. Peer-firm analysis
D. Industry analysis

Q(5). The Receivable-Turnover ratio helps management to:
A. Managing resources
B. Managing inventory
C. Managing customer relationship
D. Managing working capital

Q(6). Which of the following is a liquidity ratio?
A. Equity ratio
B. Proprietary ratio
C. Net Working capital
D. Capital gearing ratio

Q(7). Which of the following is not a part of Quick assets?
A. Disposal investments
B. Receivables
C. Cash and cash equivalents
D. Prepaid expenses

Q(8). Capital Gearing ratio is the fraction of:
A. Preference share capital and debentures to Equity share capital and reserve & surplus
B. Equity share capital and reserve and surplus to preference share capital and debentures
C. Equity share capital to total assets
D. Total assets to equity share capital

$PE = \frac{MPS}{EPS} = \frac{48}{3} = 16$

Q(9). From the following information, calculate P/E ratio:

Equity share capital of ₹ 10 each	₹ 8,00,000
9% Preference share capital of ₹ 10 each	₹ 3,00,000
Profit (after 35% tax)	₹ 2,67,000
Depreciation	₹ 67,000
Market price of equity shares	₹ 48

$EPS = \frac{2.67l - (3l \times 9\%)}{80\,000} = 3$

A. 15 times
B. 16 times
C. 17 times
D. 18 times

Q(10). Equity multiplier allows the investor to see:
A. What proportion of interest on debt can be covered from earnings available to equity shareholders?
B. How many times preference share interest be paid from earnings available to equity shareholders?
C. What portion of return on equity is the result of debt?
D. How many times equity is multiplied to get the value of debt?

Q(11). A company has average accounts receivable of ₹ 10,00,000 and annual credit sales of ₹ 60,00,000. Its average collection period would be:
A. 60.83 days
B. 6.00 days
C. 1.67 days
D. 0.67 days

$ACP = \frac{10l}{\left(\frac{60l}{365}\right)} = 60.83$

Q(12). A company has net profit margin of 5%, total assets of ₹ 90,00,000 and return on assets of 9%. Its total asset turnover ratio would be:

A. 1.6
B. 1.7
C. 1.8
D. 1.9

Pft. = 90L × 9% = 8.10L
Sales = 8.10L / 5% = 162L
Asset Turn. Ratio = 162L / 90L = 1.8

Q(13). What does Q ratio measures?

A. Relationship between market value and book value per equity share.
B. Proportion of profit available per equity share
C. Overall earnings on average total assets
D. Market value of equity as well as debt in comparison to all assets at their replacement cost

Q(14). Calculate operating expenses from the information given below:

Sales	→	₹ 75,00,000
Rate of income tax	→	50%
Net profit to sales	→	5%
Cost of goods sold	→	₹ 32,90,000
Interest on debentures	→	₹ 60,000

NP = 75L × 5% = 375000
(+) Tax @ 50% 375000
PBT (3.75L ÷ 50%) = 750000
(+) Int. 60000
EBIT = 810000
(−) GP (75L − 32.90L) = 4210000
Op. Exp. = 34L

A. ₹ 41,00,000
B. ₹ 8,10,000
C. ₹ 34,00,000
D. ₹ 33,90,000

Q(15). Which of the following is not a profitability ratio?

A. P/E Ratio
B. Return on capital employed (ROCE)
C. Q Ratio
D. Preference Dividend Coverage Ratio