Capital Budgeting
Assignment

Q. No. | **Questions/Answers**

1. ANP Ltd. providing the following information:

Annual cost of saving	₹96,000
Useful life	5 years
Salvage value	zero
Internal rate of return	15%
Profitability index	1.05

Table of discount factor:

Discount factor	**Years**					
	1	**2**	**3**	**4**	**5**	**Total**
15%	0.870	0.756	0.658	0.572	0.497	3.353
14%	0.877	0.769	0.675	0.592	0.519	0.432
13%	0.886	0.783	0.693	0.614	0.544	3.52

You are required to calculate:

i) Cost of the project
ii) Payback period
iii) Net present value of cash inflow
iv) Cost of capital

(May 2012 / May 2015 modified/May 2016 modified/ICAI SM)

Ans.

i) Cost of Project

At internal rate of return (IRR) of 15%, the amount of total cash inflows = cost of the project i.e. total cash outflow

Annual cost savings = ₹96,000

Useful life = 5 years

Considering the discount factor table @ 15%, cumulative present value of cash inflows for 5 years is 3.353

Hence, Total Cash inflows for 5 years for the Project is

96,000 × 3.353 = ₹3,21,888

Hence, **Cost of the Project = ₹3,21,888.**

ii) Payback Period

Payback period = $\frac{Cost\ of\ the\ Project}{Annual\ Cost\ Savings} = \frac{₹3,21,888}{96,000}$

Payback Period = 3.353 years

iii) Net Present Value (NPV)

NPV = Sum of Present Values of Cash inflows – Cost of the Project

NPV = ₹3,37,982.40 – 3,21,888 = ₹16,094.40

Net Present Value = ₹16,094.40

Computation of Present value of Inflow:

Profitability Index = $\frac{\text{Presnt value of Inflow}}{\text{Present value of Outflow}}$

1.05 = $\frac{\text{Presnt value of Inflow}}{3,21,888}$

Present value of Inflow = ₹3,37,982.40

iv) Cost of Capital

Profitability Index = $\frac{Sum\ of\ Discounted\ Cash\ inflows}{Cost\ of\ the\ Project}$

1.05 = $\frac{Sum\ of\ Discounted\ Cash\ inflows}{3,21,888}$

∴ Sum of Discounted Cash inflows = ₹3,37,982.40

Since, Annual Cost Saving = ₹96,000

Therefore, cumulative discount factor for 5 years

= $\frac{₹3,37,982.40}{96,000}$

From the discount factor table, at discount rate of 13%, the cumulative discount factor for 5 years is 3.52

Hence, **Cost of Capital = 13%**

2. The management of P Limited is considering to select a machine out of the two mutually exclusive machines. The company's cost of capital is 12 per cent and corporate tax rate for the company is 30 percent. Details of the machines are as follows:

Particulars	Machine – I	Machine II
Cost of machine	₹10,00,000	₹15,00,000
Expected life	5 years	6 years
Annual income before tax and depreciation	₹3,45,000	₹4,55,000

Depreciation is to be charged on straight line basis.

You are required to:

i) Calculate the discounted pay-back period, net present value and internal rate of return for each machine.

ii) Advise the management of P Limited as to which machine they should take up.

The present value factors of ₹ 1 are as follows:

Year	1	2	3	4	5	6
At 12%	0.893	0.797	0.712	0.636	0.567	0.507
At 13%	0.885	0.783	0.693	0.613	0.543	0.480
At 14%	0.877	0.769	0.675	0.592	0.519	0.456
At 15%	0.870	0.756	0.658	0.572	0.497	0.432
At 16%	0.862	0.743	0.641	0.552	0.476	0.410

(May 2010/ May 2013 modified/ January 2021 modified)

Ans. **i) Computation of Discounted Payback Period, Net Present Value (NPV) and Internal Rate of Return (IRR) for Two Machines**

Calculation of Cash Inflows

Particulars	Machine – I (₹)	Machine – II (₹)
Annual Income before Tax and Depreciation	3,45,000	4,55,000
Less: Depreciation		
Machine – I: 10,00,000/5	2,00,000	--
Machine – II: 15,00,000/6	--	2,50,000
Income before Tax	1,45,000	2,05,000
Less: Tax @ 30%	43,500	61,500
Income after Tax	1,01,500	1,43,500
Add: Depreciation	2,00,000	2,50,000
Annual Cash Inflows	3,01,500	3,93,500

	Machine – I				Machine - II		
Year	**P.V. of ₹ 1 @ 12%**	**Cash flow**	**P.V.**	**Cumulative P.V.**	**Cash flow**	**P.V.**	**Cumulative P.V.**
1	0.893	3,01,500	2,69,240	2,69,240	3,93,500	3,51,396	3,51,396
2	0.797	3,01,500	2,40,296	5,09,536	3,93,500	3,13,620	6,65,016
3	0.712	3,01,500	2,14,668	7,24,204	3,93,500	2,80,172	9,45,188
4	0.636	3,01,500	1,91,754	9,15,204	3,93,500	2,50,266	11,95,454
5	0.567	3,01,500	1,70,951	10,86,909	3,93,500	2,23,115	14,18,569
6	0.507	--	--	--	3,93,500	1,99,505	16,18,074

Discounted Payback Period for:

Machine – I

Discounted Payback Period $= 4 + \frac{(10,00,000 - 9,15,958)}{1,70,951}$

$= 4 + \frac{84,042}{1,70,951}$

$= 4 + 0.4916$

= 4.49 years or 4 years and 5.9 months

Machine – II

Discounted Payback Period $= 5 + \frac{(15,00,000 - 14,18,569)}{1,99,505}$

$= 5 + \frac{81,431}{1,99,505}$

$= 5 + 0.4082$

= 5.41 years or 5 years and 4.9 months

Net Present Value for:

Machine – I

NPV = ₹10,86,909 – 10,00,000

= ₹86,909

Machine – II

NPV = ₹16,18,074 – 15,00,000

= ₹1,18,074

Internal Rate of Return (IRR) for:

Machine – I

P.V. Factor = $\frac{Initial\ Investment}{Annual\ Cash\ Inflow} = \frac{10,00,000}{3,01,500} = 3.3167$

PV factor falls between 15% and 16%

Present Value at 15% = 3.353 × 3,01,500 = 10,10,930

Present Value at 16% = 3.274 × 3,01,500 = 9,87,111

IRR = $15 + \frac{10,10,930 - 10,00,0000}{10,10,930 - 9,87,111} \times (16 - 15)$

$= 15 + \frac{10,930}{23,819} \times 1$

= 15.4588% = **15.46%**

Machine – II

P.V. Factor = $\frac{15,00,000}{3,93,500} = 3.8119$

Present Value of Cash Inflow at 14% and 15% will be:

Present Value at 14% = 3.888 × 3,93,500 = 15,29,928

Present Value at 15% = 3.785 × 3,93,500 = 14,89,398

IRR = $14 + \frac{15,29,928 - 15,00,000}{15,29,928 - 14,89,398} \times (15 - 14)$

$= 14 + \frac{29,928}{40,530} \times 1$

= 14.7384% = **14.74%**

ii) Advise to the Management

Ranking of Machine in terms of the Three Methods

Particulars	Machine – I	Machine - II
Discounted Payback Period	I	II
Net Present Value	II	I
Internal Rate of Return	I	II

Advise: Since Machine – I has better ranking than Machine – II, therefore, Machine: I should be selected.

3. 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 operations 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, if 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 year 4 of ₹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 year 0, 1, 3, 4, 5 and 6 respectively 1, 0.9091, 0.8264, 0.7513, 0.6830, 0.6209 and 0.5644).

(November 2008/ ICAI SM modified)

Ans.

Option 1: Purchase Machinery and Service Part at the end of Year 1

Net Present value of cash flow @ 10% per annum discount rate.

$$NPV = -50{,}000 + \frac{18{,}000}{(1.1)} + \frac{18{,}000}{(1.1)^2} + \frac{18{,}000}{(1.1)^3} + \frac{10{,}000}{(1.1)} + \frac{12{,}500}{(1.1)^3}$$

$$= -50{,}000 + 18{,}000\,(0.09091 + 0.8264 + 0.7513) - 10{,}000 \times 0.9091 + 12{,}500 \times 0.7513$$

$$= -50{,}000 + (18{,}000 \times 2.4868) - 9{,}091 + 9{,}391$$

$$= -50{,}000 + 44{,}762 - 9{,}091 + 9{,}391$$

$$NPV = -4{,}938$$

Since, Net Present Value is negative therefore, this option is not to be considered.

If Supplier gives a discount of ₹5,000 then,

NPV = + 5,000 – 4,938 = + 62

In this case, Net Present Value is positive but very small, therefore, this option may not be advisable.

Option II: Purchase Machinery and Replace Part at the end of Year 2.

$$NPV = 50{,}000 + \frac{18{,}000}{(1.1)} + \frac{18{,}000}{(1.1)^2} + \frac{18{,}000}{(1.1)^3} - \frac{15{,}400}{(1.1)^2} + \frac{27{,}000}{(1.1)^4}$$

$$= -50{,}000 + 18{,}000\,(0.09091 + 0.8264 + 0.7513) - (15{,}400 \times 0.8264) + (27{,}000 \times 0.6830)$$

$$= -50{,}000 + 18{,}000\,(2.4868) - (15{,}400 \times 0.8264) + (27{,}000 \times 0.6830)$$

$$= -50{,}000 + 44{,}762 - (15{,}400 \times 0.8264) + (27{,}000 \times 0.6830)$$

$$= -50{,}000 + 44{,}762 - 12{,}727 + 18{,}441$$

$$= -62{,}727 + 63{,}203$$

$$= +476$$

Net Present Value is positive, but very low as compared to the investment.

If the Supplier gives a discount of ₹5,000 then

NPV = 5,000 + 476 = 5,476

Decision: Option II is worth investing as the net present value is positive and higher as compared to Option I.

4. A hospital is considering to purchase a diagnostic machine costing ₹80,000. The projected life of the machine is 8 years and has an expected salvage value of ₹6,000 at the end of 8 years. The annual operating cost of the machine is ₹7,500. It is expected to generate revenues of ₹40,000 per year for eight years. Presently, the hospital is outsourcing the diagnostic work and is earning commission income of ₹12,000 per annum.

Consider tax rate of 30% and Discounting Rate as 10%.

Advise:

Whether it would be profitable for the hospital to purchase the machine?

Give your recommendation as per Net Present Value method and Present Value Index method under below mentioned two situations:

i) If Commission income of ₹12,000 p.a. is before taxes.

ii) If Commission income of ₹12,000 p.a. is net of taxes.

Given:

t	1	2	3	4	5	6	7	8
PVIF (t, 10%)	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467

(November 2022/May2014 modified/ICAI SM modified)

Ans.

Analysis of Investment Decisions

Determination of Cash inflows	**Situation-(i) Commission Income before taxes**	**Situation-(ii) Commission Income after taxes**
Cash flow up-to 7th year:		
Sales Revenue	40,000	40,000
Less: Operating Cost	(7,500)	(7,500)
	32,500	32,500
Less: Depreciation (80,000 – 6,000) ÷ 8	(9,250)	(9,250)
Net Income	23,250	23,250
Tax @ 30%	(6,975)	(6,975)
Earnings after Tax (EAT)	16,275	16,275
Add: Depreciation	9,250	9,250
Cash inflow after tax per annum	25,525	25,525
Less: Loss of Commission Income	(8,400)	(12,000)
Net Cash inflow after tax per annum	17,125	13,525
In 8th Year:		
Net Cash inflow after tax	17,125	13,525
Add: Salvage Value of Machine	6,000	6,000
Net Cash inflow in year 8	23,125	19,525

Calculation of Net Present Value (NPV) and Profitability Index (PI)

	Particulars	**PV factor @10%**	**Situation-(i) [Commission Income before taxes]**	**Situation-(ii) [Commission Income after taxes]**
A	Present value of cash inflows (1st to 7th year)	4.867	83,347.38 (17,125 × 4.867)	65,826.18 (13,525 × 4.867)
B	Present value of cash inflow at 8th year	0.467	10,799.38 (23,125 × 0.467)	9,118.18 (19,525 × 0.467)

C	PV of cash inflows	1.00	94,146.76	74,944.36
D	Less: Cash Outflow		(80,000)	(80,000)
E	Net Present Value (NPV)		14,146.76	(5,055.64)
F	PI = (C÷D)		1.18	0.94

Recommendation: The hospital may consider purchasing of diagnostic machine in situation where commission income is 12,000 before tax as NPV is positive and PI is also greater than 1. Contrary to situation (i), in situation (ii) where the commission income is net of tax, the recommendation is reversed to not purchase the machine as NPV is negative and PI is also less than 1.

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

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

i) The projects are independent of each other and are divisible.

ii) The projects are not divisible. **(November 2019 / ICAI SM)**

Ans. **i) Computation of NPVS per ₹1 of Investment and Ranking of the Projects:**

Project	Investment (₹)	NPV (₹)	NPV per ₹1 Invested	Banking
C	40,000	20,000	0.5	1
D	1,00,000	35,000	0.35	3
E	50,000	24,000	0.48	2
F	60,000	18,000	0.3	4

Building up of a programme of projects based on their Rankings:

Project	Investment (₹)	NPV (₹)
C	40,000	20,000
E	50,000	24,000
D	10,000	3,500
	1,0 ,000	47,500

(1/10 of project total)

Thus, Project F is rejected any only 1/10th of Project D is to be undertaken.

ii) Optimising returns when projects are indivisible

Package	Investment (₹)	Total NPV (₹)
C and E	90,000(40,000 + 50,000)	44,000
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 optimise return within the amount of ₹ 1,00,000 available for investment.

6. 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 lakh per annum forthe next four years. The contract can be terminated upon installation of the aforesaid machine on payment of a compensation of ₹ 90 lakh before the processing operation starts. This compensation is not allowed as deduction for tax purposes.

The machine required for carrying out the processing will cost ₹ 600 lakh to be financed by a loan repayable in 4 equal instalments commencing from end of the year- 1. The interest rate is 14% per annum. At the end of the 4th year, the machine can be sold for ₹ 60 lakh and the cost of dismantling and removal will be ₹ 45 lakh.

Sales and direct costs of the product emerging from waste processing for 4 yearsare estimated as under:

(₹ In lakh)

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 materials required before commencement of the processing operations is ₹ 60 lakh at the start of year 1. The stock levels of materials to be maintained at the end of year 1, 2 and 3 will be ₹ 165 lakh and the stocks at theend of year 4 will be nil. The storage of materials will utilise space which would otherwise have been rented out for ₹ 30 lakh per annum. Labour costs include wages of 40 workers, whose transfer to this process will reduce idle time payments of ₹ 45 lakh in the year- 1 and ₹ 30 lakh in the year- 2. Factory overheads include apportionment of general factory overheads except to the extent of insurance charges of ₹ 90 lakh 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 factors @14%	0.877	0.769	0.674	0.592

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

(RTP November-2020/ICAI SM)

Ans.

Statement of Operating Profit from processing of waste

(₹ in lakh)

Year	1	2	3	4
Sales: (A)	966	966	1,254	1,254
Material consumption	90	120	255	255
Wages	180	195	255	300
Other expenses	120	135	162	210
Factory overheads (insurance only)	90	90	90	90
Loss of rent on storage space (opportunity cost)	30	30	30	30
Interest @14%	84	63	42	21
Depreciation (as per income tax rules)	150	114	84	63
Total cost: (B)	744	747	918	969
Profit (C)=(A)-(B)	222	219	336	285

Tax (30%)	66.6	65.7	100.8	85.5
Profit after Tax (PAT)	155.4	153.3	235.2	199.5

Statement of Incremental Cash Flows

(₹ in lakh)

Year	0	1	2	3	4
Material stock	(60)	(105)	-	-	165
Compensation for contract	(90)	-	-	-	-
Contract payment saved	-	150	150	150	150
Tax on contract payment	-	(45)	(45)	(45)	(45)
Incremental profit	-	222	219	336	285
Depreciation added back	-	150	114	84	63
Tax on profits	-	(66.6)	(65.7)	(100.8)	(85.5)
Loan repayment	-	(150)	(150)	(150)	(150)
Profit on sale of machinery(net)	-	-	-	-	15
Total incremental cash flows	(150)	155.4	222.3	274.2	397.5
Present value factor	1.00	0.877	0.769	0.674	0.592
Present value of cash flows	(150)	136.28	170.95	184.81	235.32
Net present value					577.36

Advice: Since the net present value of cash flows is ₹ 577.36 lakh which is positive the management should install the machine for processing the waste.

Notes:

1) Material stock increases are taken in cash flows.

2) Idle time wages have also been considered

3) Apportioned factory overheads are not relevant only insurance charges of this project are relevant.

4) Interest calculated at 14% based on 4 equal instalments of loan repayment.

5) Sale of machinery- Net income after deducting removal expenses taken.Tax on Capital gains ignored.

6) Saving in contract payment and income tax thereon considered in the cash flows.

7. C Ltd. is considering investing in a project. He expected original investment in the project will be 5 years with no salvage value. The expected net cash inflows after depreciation but before tax during the life of the project will be as following:

Year	1	2	3	4	5
₹	85,000	1,00,000	80,000	80,000	40,000

Cost of the project is ₹ 2,00,000 and project will be depreciated at the rate of 20% on original cost. The company is subjected to 30% tax rate.

Required:

i) Calculate payback period and average rate of return. (ARR).

ii) Calculate net present value and net present value index, if cost of capital is 10%.

iii) Calculate internal rate of return.

Note: The P.V. factors are:

Year	P.V. at 10%	P.V. at 37%	P.V. at 38%	P.V. at 40%
1	0.909	0.730	0.725	0.714
2	0.826	0.533	0.525	0.510
3	0.751	0.389	0.381	0.364

4	0.683	0.284	0.276	0.260
5	0.621	0.207	0.200	0.186

(May 2008 RTP)

Ans.

i) Computation of Payback period:

Year	PBT	PAT (PBT × 0.7)	CFAT (PAT + Dep.)	Cum. CF
1	85,000	59,500	99,500	99,500
2	1,00,000	70,000	1,10,000	2,09,500
3	80,000	56,000	96,000	3,05,500
4	80,000	56,000	96,000	4,01,500
2	40,000	28,000	68,000	4,69,500

Depreciation = 2,00,000 × 20%
= 40,000
Payback period = 1 + (2,00,000 – 99,500)/ 1,10,000
= 1.91 years

Computation of Average Rate of Return

Year	PBT	PAT (PBT × 0.7)
1	85,000	59,500
2	1,00,000	70,000
3	80,000	56,000
4	80,000	56,000
5	40,000	28,000
	Total	2,69,500

Average Annual Profit = 2,69,500/5
= 53,900
Average Investment = (2,00,000 + 0)/2

ARR $= \frac{\text{Average Annual Profit after tax}}{\text{Average Investment}}$

ARR = 53,900 ÷ 1,00,000 = 0.539 i.e. **53.9%**

ii) Calculation of Net Present Value:

Year	PBT	PAT (PBT × 0.7)	CFAT (PAT + Dep.)	PVF (10%, n y ₹)	PV
1	85,000	59,500	99,500	0.909	90,446
2	1,00,000	70,000	1,10,000	0.826	90,860
3	80,000	56,000	96,000	0.751	72,096
4	80,000	56,000	96,000	0.683	65,568
5	40,000	28,000	68,000	0.621	42,228
				Present Value of Inflows	3,61,198
				Present value of outflows	2,00,000
				NPV	1,61,198

NPV is positive hence C Ltd. can accepted the proposal.

NPV Index (PI):

NPV = 3,61,198
= -2,00,000
1,61,198

NPV Index $= \frac{1,61,198}{2,00,000} = 0.81$

iii) Computation of Internal Rate of Return:

Computation of NPV at 37% and at 40%

Year	Cash Flow	PVF (37%)	PV @ 37%	PVF (40%)	PC @ 40%
0	-2,00,000	1	-2,00,000	1	-2,00,000
1	99,500	0.73	72,635	0.714	71,043
2	1,10,000	0.533	58,630	0.51	56,100
3	96,000	0.389	37,344	0.364	34,944
4	96,000	0.284	27,264	0.26	24,960
5	68,000	0.207	14,076	0.186	12,648
		NPV	9,949		-305

Calculation of IRR through Interpolation method

IRR = LR + $\frac{NPV_L}{NPV_L - NPV_H}$ × (Rate difference)

IRR = 37% + $\frac{9,949}{9,949-(-305)}$ × (40% - 37%)

= 37% + $\frac{9,949}{10,254}$ × 3%

= 37% + 2.91%

IRR = 39.91%

8. Suppose there are two Project A and Project B are under consideration. The cash flows associated with these projects are as follows:

Year	Project A	Project B
0	(1,00,000)	(3,00,000)
1	50,000	1,40,000
2	60,000	1,90,000
3	40,000	1,00,000

Assuming Cost of Capital equal to 10%, IDENTIFY which project should be accepted as per NPV Method and IRR Method.

(ICAI SM)

Ans. **Net Present Value (NPV) of Projects:**

Year	Cash Inflows Project A (₹)	Cash Inflows Project B (₹)	Present Value Factor @ 10%	PV of Project A (₹)	PV of Project B (₹)
0	(1,00,000)	(3,00,000)	1.000	(1,00,000)	(3,00,000)
1	50,000	1,40,000	0.909	45,450	1,27,260
2	60,000	1,90,000	0.826	49,560	1,56,940
3	40,000	1,00,000	0.751	30,040	75,100
				25,050	59,300

Internal Rate of Returns (IRR) of projects:

Since by discounting cash flows at 10% we are getting values very far from zero. Therefore, let us discount cash flows using 20% discounting rate.

Year	Cash Inflows Project A (₹)	Cash Inflows Project B (₹)	Present Value Factor @ 20%	PV of Project A(₹)	PV of Project B(₹)
0	(1,00,000)	(3,00,000)	1.000	(1,00,000)	(3,00,000)
1	50,000	1,40,000	0.833	41,650	1,16,620

2	60,000	1,90,000	0.694	41,640	1,31,860
3	40,000	1,00,000	0.579	23,160	57,900
				6,450	6,380

Since by discounting cash flows at 20% we are getting values far from zero.Therefore, let us discount cash flows using 25% discounting rate.

Year	Cash Inflows Project A(₹)	Cash Inflows Project B(₹)	Present Value Factor @ 25%	PV of Project A (₹)	PV of Project B (₹)
0	(1,00,000)	(3,00,000)	1.000	(1,00,000)	(3,00,000)
1	50,000	1,40,000	0.800	40,000	1,12,000
2	60,000	1,90,000	0.640	38,400	1,21,600
3	40,000	1,00,000	0.512	20,480	51,200
				(1,120)	(15,200)

The internal rate of return is, thus, more than 20% but less than 25%. The exact rate can be obtained by interpolation:

$$IRR_A = 20\% + \frac{6,450}{6,450-(1,120)} \times (25\% - 20\%) = 20\% + \left(\frac{6,450}{7,570} \times 5\%\right) = 24.26\%$$

$$IRR_B = 20\% + \frac{6,380}{6,380-(15,200)} \times (25\% - 20\%) = 20\% + \left(\frac{6,380}{21,580} \times 5\%\right) = 21.48\%$$

Overall Position

Particulars	Project A	Project B
NPV @ 10%	25,050	59,300
IRR	24.26%	21.48%

Thus there is contradiction in ranking by two methods.

9. Alpha Company is considering the following investment projects:

	Cash Flows (₹)			
Projects	C_0	C_1	C_2	C_3
A	-10,000	+10,000		
B	-10,000	+7,500	+7,500	
C	-10,000	+2,000	+4,000	+12,000
D	-10,000	+10,000	+3,000	+3,000

a) ANALYSE and rank the projects according to each of the following methods: (i) Payback, (ii) ARR, (iii) IRR and (iv) NPV, assuming discount rates of 10 and 30 per cent.

b) Assuming the projects are independent, which one should be accepted? If theprojects are mutually exclusive, IDENTIFY which project is the best?

(ICAI SM)

Ans. **a)**

i) Payback Period

Project A: (₹)10,000/ (₹)10,000 = 1 year

Project B: (₹)10,000/ (₹)7,500 = 1 1/3 years.

Project C: 2 years + $\frac{(₹)10,000-(₹)6,000}{(₹)12,000} = 2\frac{1}{3}$ years

Project D: 1 year.

ii) ARR (Figures in (₹))

Project A: $\frac{(10,000-10,000)1/2}{(10,000)1/2} = 0$

Project B: $\frac{(15,000-10,000)1/2}{(10,000)1/2} = \frac{2,500}{5,000} = 50\%$

Project C: $\frac{(18,000-10,000)1/3}{(10,000)1/2} = \frac{2,667}{5,000} = 53\%$

Project D: $\frac{(16,000-10,000)1/3}{(10,000)1/2} = \frac{2,000}{5,000} = 40\%$

Note: This net cash proceed includes recovery of investment also.Therefore, net cash earnings are found by deducting initial investment.

iii) IRR

Project A:	The net cash proceeds in year 1 are just equal to investment. Therefore, r = 0%.
Project B:	This project produces an annuity of ₹ 7,500 for two years.Therefore, the required PVAF is: 10,000/7,500 = 1.33. This factor is found under 32% column. Therefore, r =32%
Project C:	Since cash flows are uneven, the trial-and-error method will be followed. Using 20% rate of discount the NPV is + ₹ 1,389. At 30% rate of discount, the NPV is -₹ 633. The true rate of return should be less than 30%. At 27%rate of discount it is found that the NPV is -₹ 86 and at 26% +₹ 105. Through interpolation, we find r = 26.5%
Project D:	In this case also by using the trial-and-error method, itis found that at 37.6% rate of discount NPV becomes almost zero. Therefore, r = 37.6%.

iv) NPV

Project A:

at 10% -10,000+10,000×0.909 = -910

at 30% -10,000+10,000×0.769 = -2,310

Project B:

at 10% -10,000+7,500(0.909+0.826) = +3,013

at 30% -10,000+7,500(0.769+0.592) = +208

Project C:

at 10% -10,000+2,000×0.909+4,000×0.826+12,000×0.751= +4,134

at 30% -10,000+2,000×0.769+4,000×0.592+12,000×0.455 =-633

Project D:

at 10% -10,000+10,000×0.909+3,000× (0.826+0.751) = + 3,821

at 30% -10,000+10,000×0.769+3,000× (0.592 +0.455) = + 831

The projects are ranked as follows according to the various methods:

	Ranks				
Projects	**PBP**	**ARR**	**IRR**	**NPV (10%)**	**NPV (30%)**
A	1	4	4	4	4
B	2	2	2	3	2
C	3	1	3	1	3
D	1	3	1	2	1

b) Payback and ARR are theoretically unsound method for choosing between the investment projects. Between the two time-adjusted (DCF) investment criteria, NPV and IRR, NPV gives consistent results. If the projects are independent (and there is no capital rationing), either IRR or NPV can be used since the same set of projects will be accepted by any of the methods. In the present case, except Project A all the three projects should be accepted if the discount rate is 10%. Only Projects B and D should be undertaken if the discount rate is 30%.

If it is assumed that the projects are mutually exclusive, then under the assumption of 30% discount rate, the choice is between B and D (A and C are unprofitable). Both criteria IRR and NPV give the same results – D is the best. Under the assumption of 10% discount rate, ranking according to IRR and NPV conflict (except for Project A). If the IRR rule is followed, Project D should be accepted. But the NPV rule tells that Project C is the best. The NPV rule generally gives consistent results in conformity with the wealth maximization principle. Therefore, Project C should be accepted following the NPV rule.

10. ABC Ltd is a small company that is currently analyzing capital expenditure proposals for the purchase of equipment; the company uses the net present value technique to evaluate projects. The capital budget is limited to ₹ 500,000 which ABC Ltd believes is the maximum capital it can raise. The initial investment and projected net cash flows for each project are shown below. The cost of capital of ABC Ltd is 12%. You are required to COMPUTE the NPV of the different projects.

(Amount in ₹)

Particulars	Project A	Project B	Project C	Project D
Initial Investment	200,000	190,000	250,000	210,000
Project Cash Inflows				
Year 1	50,000	40,000	75,000	75,000
2	50,000	50,000	75,000	75,000
3	50,000	70,000	60,000	60,000
4	50,000	75,000	80,000	40,000
5	50,000	75,000	100,000	20,000

(ICAI SM)

Ans. **Calculation of net present value:**

Period	PV factor	Project A (₹)	Project B (₹)	Project C (₹)	Project D (₹)
0	1.000	(2,00,000)	(1,90,000)	(2,50,000)	(2,10,000)
1	0.893	44,650	35,720	66,975	66,975
2	0.797	39,850	39,850	59,775	59,775
3	0.712	35,600	49,840	42,720	42,720
4	0.636	31,800	47,700	50,880	25,440
5	0.567	28,350	42,525	56,700	11,340
Net Present Value		(19,750)	25,635	27,050	(3,750)

11. City Clap Ltd. is in the business of providing housekeeping services. There is a proposal before the company to purchase a mechanized cleaning system for a sum of ₹ 40 lakhs. The present system of the company is to use manual labour for the cleaning job. You are provided with the following information:

Proposed Mechanized System:

Cost of the machine	₹ 40 lakhs
Life of the machine	7 years
Depreciation (on straight line basis)	15%
Operating cost of mechanized system	₹ 20 lakhs per annum
Present system (Manual):	
Manual labour	350 persons
Cost of manual labour	₹ 15,000 per person per annum

The company has an after-tax cost of fund at 10% per annum.

The applicable tax rate is 50%.

PV factor for 7 years at 10% are as follows:

Years	1	2	3	4	5	6	7
P.V. factor	0.909	0.826	0.751	0.683	0.621	0.564	0.513

You are required to DETERMINE whether it is advisable to purchase the mechanized cleaning system. Give your recommendations with workings. **(MTP April, 2021)**

Ans. **Calculation of NPV**

Particulars	(₹)	(₹)
Cost of Manual System (₹ 15,000 × 350)		52,50,000
Less: Cost of Mechanised System:		
Operating Cost	20,00,000	
Depreciation (₹ 40,00,000 × 0.15)	6,00,000	26,00,000
Saving per annum		26,50,000
Less: Tax (50%)		13,25,000
Saving after tax		13,25,000
Add: Depreciation		6,00,000
Cash flow per annum		19,25,000
Cumulative PV Factor for 7 years @ 10%		4.867
Present value of cash flow for 7 years		93,68,975
Less: Cost of the Machine		40,00,000
NPV		53,68,975

The mechanized cleaning system should be purchased since NPV is positive by ₹ 53,68,975.

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 years
Residual Value	0	0
Annual Operating days	300	300
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

(July 2021)

Ans.

Statement of NPV

Year	Particulars	₹	DF @ 10%	PV
0	Initial outflows	(8,00,000)	1,000	(8,00,000)
1	Incremental CFAT	2,53,960	0.909	2,30,850
2	Incremental CFAT	2,46,568	0.826	2,03,665
3	Incremental CFAT	2,40,652	0.751	1,80,730
4	Incremental CFAT + Working Capital (2,35,923 + 1,00,000)	3,53,923	0.683	2,41,729
NPV				**56,974**

Advise: The company should go ahead with replacement of machine, since it has positive NPV.

Working Notes:

1) Calculation of Initial outflow:

Cost of new machine	₹10,00,000
Less: Sales value of old machine	(₹3,00,000)
Add: Increase in Working Capital	₹1,00,000
Initial outflow	**₹8,00,000**

2) Total operating hours = 300 days × 6 hours = 1,800 hours

3) Increase in output = 1,800 hours × (40 – 20) = 36,000 units

4) Incremental Depreciation:

Year 1 = (1,00,000 – (6,00,000 × 80% × 80%)) × 20% = 1,23,200

Year 2 = 1,23,200 × 80% = 98,560

Year 3 = 98,560 × 80% = 78,840

Year 4 = 78,840 × 80% = 63,078

5) Calculation of incremental CFAT:

Particulars	1	2	3	4
Increase in Sales (36,000 units × ₹10)	3,60,000	3,60,000	3,60,000	3,60,000
Add: Decrease in Cash Fixed cost (1,00,000 – 60,000)	40,000	40,000	40,000	40,000
Less: Increase in Material cost (36,000 units × ₹2)	(72,000)	(72,000)	(72,000)	(72,000)
Less: Increase in Labour cost (1,800 hours × (30 – 20))	(18,000)	(18,000)	(18,000)	(18,000)
Less: Increase in Depreciation	(1,23,200)	(98,560)	(78,840)	(63,078)
Incremental PBT	**1,86,800**	**2,11,440**	**2,31,160**	**2,40,922**
Less: Tax @ 30%	(56,040)	(63,432)	(69,348)	(74,077)
Incremental PAT	**1,30,760**	**1,48,008**	**1,61,812**	**1,72,845**
Add: Incremental Depreciation	1,23,200	98,560	78,840	63,078
Incremental CFAT	**2,53,960**	**2,46,568**	**2,40,652**	**2,35,923**

Notes: Since company has several machines in 20% block of assets, there is no tax benefit on loss on sale of machine.

13. XYZ Ltd. is planning to introduce a new product with a project life of 8 years. The project is to be setup in Special Economic Zone (SEZ), Qualifies for one time (at starting) tax free subsidy from the State Government of ₹25,00,000 on Capital investment. Initial equipment cost will be ₹1.75 crores. Additional equipment cost ₹12,50,000 will be purchased at the end of the third year from

the cash inflow of this year. At the end of 8 years, the original equipment will have no resale value, but additional equipment can be sold for ₹1,25,000. A Working Capital of ₹20,00,000 will be needed and it will be released at the end of the eighth year. The project will be financed with sufficient amount of Equity Capital.

The sales volumes over eight years have been estimated as follows:

Year	1	2	3	4	5
Units	72,000	1,08,000	2,60,000	2,70,000	1,80,000

Sales price of ₹120 per unit is expected and variable expenses will amount to 60% of sales revenue. Fixed Cash operating costs will amount ₹18,00,000 per year. The loss of any year will be set off from the profits of subsequent two years. The company is subject to 30% tax rate and consider 12 per cent to be an appropriate after-tax cost of Capital for this project. The company follows straight line method of depreciation.

Required:

Calculate the net present value of the project and advise the management to take appropriate decision.

Note:

The PV factors at 12% are

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

(November 2007 RTP/ ICAI SM)

Ans.

Yr.	Sales	VC	FC	Dep.	Profit	Tax	PAT	Dep.	Cash Inflow
1	86.40	51.84	18	21.875	(5.315)	--	--	21.875	16.56
2	129.60	77.76	18	21.875	11.965 – (5.315) = 6.65 after adjustment of loss	1.995	4.655	21.875	26.63
3	312.00	187.20	18	21.875	84.925	25.4775	59.4475	21.875	81.3225
4 – 5	324.00	194.40	18	24.125	87.475	26.2425	61.2325	24.125	85.3575
6 – 8	216.00	129.60	18	24.125	44.275	13.2825	30.9925	24.125	56.1175

Particulars	₹
Cost of New Equipment	1,75,00,000
Less: Subsidy	25,00,000
Add: Working Capital	20,00,000
Outflow	1,70,00,000

Computation of NPV

	Cash Inflows	PV Factor	NPV
	(₹)		(₹)
1	16,56,000	0.893	14,78,808
2	31,84,000	0.797	25,38,047
3	81,32,250 – 12,50 000 = 68,82,250	0.712	49,00,162
4	85,35,750	0.636	54,28,737
5	85,35,750	0.567	48,39,770
6	55,11,750	0.507	27,94, 457
7	55,11,750	0.452	24,91,311

8	55,11,750 + 20,00,000 + 1,25,000 = 76,36,750	0.404	30,85,247
	Net Present Value		**2,75,56,539**

NPV	2,75,56,539
Less: Out flow	1,70,00,000
Saving	1,05,56,539

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

Working Note:

1) Computation of Depreciation:

$$\text{Depreciation} = \frac{\text{Cost of Asset} - \text{Termianl value}}{\text{Useful life of the asset}}$$

$$\text{Depreciation on original asset} = \frac{1,75,00,000}{8} = 21,87,500$$

Depreciation for the first three years = ₹21,87,500 for each year

$$\text{Depreciation on additional equipment cost} = \frac{12,50,000 - 1,25,000}{5} = ₹2,25,000$$

Total depreciation for year 4 to 8 = 21,87,500 + 2,25,000 = ₹24,12,500

14. PD Ltd. an existing company, is planning to introduce a new product with projected life of 8 years. Project cost will be ₹2,40,00,000. At the end of 8 years no residual value will be realized. Working capital of ₹30,00,000 will be needed. The 100% capacity of the project is 2,00,000 units p.a. but the Production and Sales Volume is expected are as under:

Year	Number of Units
1	60,000 units
2	80,000 units
3 – 5	1,40,000 units
6 – 8	1,20,000 units

Other Information:

i) Selling price per unit ₹200.

ii) Variable cost is 40% of sales.

iii) Fixed cost p.a. ₹30,00,000.

iv) In addition to these advertisement expenditure will have to be incurred as under:

Year	1	2	3 – 5	6 – 8
Expenditure (₹)	50,00,000	25,00,000	10,00,000	5,00,000

v) Income Tax is 25%.

vi) Straight line method of depreciation is permissible for tax purpose.

vii) Cost of capital is 10%.

viii) Assume that loss cannot be carried forward.

Present Value Table								
Year	1	2	3	4	5	6	7	8
PVF @ 10%	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467

Advise about the project acceptability. **(November 2018)**

Ans. ✓ **Calculation of Cash inflows (₹ in lakhs)**

Year	Sales	V.C.	F.C.	Advt. Exp.	Dep.	Profit	Tax 25%	PAT	Dep.	Cash Inflow
1	120	48	30	50	30	(38)	-	-	30	(8)
2	160	64	30	25	30	11	2.75	8.25	30	38.25
3 – 5	280	112	30	10	30	98	24.5	73.5	30	103.5
6 – 8	240	96	30	5	30	79	19.75	59.25	30	89.25

Working Note:

1) Computation of Depreciation:

$$\text{Depreciation} = \frac{\text{Cost of Asset} - \text{Termianl value}}{\text{Useful life of the asset}}$$

$$\text{Depreciation on original asset} = \frac{2,40,00,000}{8} = ₹30,00,000$$

Total Outflow:

Cost of New Project	= ₹2,40,00,000
Working Capital	= ₹30,00,000
Outflow	₹2,70,00,000

✓ **Calculation of Present Value of Future Cash Flows**

Year	Cash inflow (₹)	PV Factor	Present Value of CF (₹)
1	(8,00,000)	0.909	7,27,200
2	38,25,000	0.826	31,59,450
3	1,03,50,000	0.751	77,72,850
4	1,03,50,000	0.683	70,69,050
5	1,03,50,000	0.621	64,27,350
6	89,25,000	0.564	50,33,700
7	89,25,000	0.513	45,78,525
8	89,25,000	0.467	41,67,975
Total Cash Flow (PV)			**3,89,36,100**

✓ **Calculation of NPV**

Particulars	₹
PV of Cash inflow	,89,36,100
Less: Cash outflow	-2,70,00,000
NPV	**1,19, 36,100**

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

15. Door Ltd. considering an investment of ₹4,00,000. This investment is expected to generate substantial cash inflows over the next five years. Unfortunately the annual cash flows this investment is uncertain, but the following probability distribution has been established.

Annual Cash Flow (₹)	Probability
50,000	0.3
1,00,000	0.3
1,50,000	0.4

At the end of its 5 years life, the investment is expected to have a residual value of ₹40,000. The cost of capital is 5%.

i) Calculate NPV under the three different scenarios.

ii) Calculate Expected Net Present Value.

iii) Advise Door Ltd. on whether the investment is to be undertaken.

Year	1	2	3	4	5
DF @ 5%	0.952	0.907	0.864	0.823	0.784

(November 2019)

Ans. **i) NPV under the three different scenarios**

a) When Probability is 0.3

NPV = Annual cash flow (PVAI, 5%, 5) + Residual value (PVIF 5%, 5) – Initial Investment

NPV = (₹50,000 × 4.33) + (₹40,000 × 0.784) – ₹4,00,000

NPV = ₹2,16,500 + ₹31,360 – ₹4,00,000

NPV = - ₹1,52,140

b) When Probability is 0.3

NPV = (₹1,00,000 × 4.33) + (₹40,000 × 0.784) – ₹4,00,000
= ₹4,33,000 + ₹31,360 – ₹4,00,000
NPV = ₹64,360

c) When Probability is 0.4

NPV = (₹1,50,000 × 4.33) + (₹40,000 × 0.784) – ₹4,00,000
= ₹6,49,500 + ₹31,360 - ₹4,00,000
NPV = ₹2,80,860

ii) Expected Net Present Value:

Annual Expected cash flows
= (₹50,000 ×0.3) + (₹1,00,000 ×0.3) + (₹1,50,000 × 0.4)
= ₹1,05,000

NPV = (₹1,05,000 ×4.33) + (₹40,000 ×0.784) - ₹4,00,000
= ₹4,54,650 + ₹31,360 – ₹4,00,000
NPV = ₹86,010

Since the expected NPV from the investment is positive ₹86,010. Door Ltd. should undertake the project.

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

Cost of 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 Variable Cost per unit	₹3
Estimated Annual Fixed Cost (Excluding depreciation)	₹1,00,000
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:	

Analyse the above-mentioned proposal using the Net Present Value Method and advice.
P.V. factor @ 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

(November 2020)

Ans. **a) Calculation of Net Cash flows**

Contribution = (₹ 6 – ₹ 3) × 1,00,000 units = ₹ 3,00,000

Year	Capital (₹)	Contribution (₹)	Fixed costs (₹)	Advertisement/ Maintenance expenses (₹)	Net cash flow (₹)
0	(2,50,000)				(2,50,000)
1		3,00,000	(1,00,000)	(20,000)	1,80,000
2		3,00,000	(1,00,000)		2,00,000
3		3,00,000	(1,00,000)		2,00,000
4		3,00,000	(1,00,000)		2,00,000
5		3,00,000	(1,00,000)	(30,000)	1,70,000
6		3,00,000	(1,00,000)		2,00,000
7		3,00,000	(1,00,000)		2,00,000
8		3,00,000	(1,00,000)		2,00,000

Fixed costs (excluding depreciation) = ₹ 1,00,000

Calculation of Net Present Value

Year	Net cash flow (₹)	12% discount factor	Present value (₹)
0	(2,50,000)	1.000	(2,50,000)
1	1,80,000	0.893	1,60,740
2	2,00,000	0.797	1,59,400
3	2,00,000	0.712	1,42,400
4	2,00,000	0.636	1,27,200
5	1,70,000	0.567	96,390
6	2,00,000	0.507	1,01,400
7	2,00,000	0.452	90,400
8	2,00,000	0.404	80,800
			7,08,730

Advise: CK Ltd. should buy the new machine, as the net present value of the proposal is positive i.e. ₹ 7,08,730.

17. SS Limited is considering the purchase of a new automatic machine which will carry out some operations which are at present performed by manual labour. NM - A_1 and NM - A_2 , two alternative models are available in the market. The following details are collected:

Particulars	Machine	
	NM - A_1	**NM - A_2**
Cost of Machine	₹20,00,000	25,00,000
Estimated working life	5 years	5 years
Estimated saving in direct wages per annum	₹7,00,000	9,00,000
Estimated saving in scrap per annum	₹60,000	1,00,000
Estimated additional cost of indirect material per annum	₹30,000	90,000
Estimated additional cost of indirect labour per annum	₹40,000	50,000
Estimated additional cost of repairs and maintenance per annum	₹45,000	85,000

Depreciation will be charged on a straight-line method. Corporate tax rate is 30 percent and expected rate of return may be 12 percent.

You are required to evaluate the alternatives by calculating the:

i) Payback Period

ii) Accounting (Average) Rate of Return; and

iii) Profitability Index or P.V. Index (P.V. factor for ₹1 @ 12% 0.893; 0.797; 0.712; 0.636; 0.567; 0.507). **(November 2012)**

Ans. **Evaluation of Alternatives**

Working Notes:

Depreciation of Machine NM - A_1 $= \frac{20,00,000}{5}$

$= 4,00,000$

Depreciation of Machine NM – A_2 $= \frac{25,00,000}{5}$

$= 5,00,000$

Particulars	Machine NM – A_1 (₹)	Machine NM – A_2 (₹)
Annual Savings:		
Direct Wages	7,00,000	9,00,000
Scraps	60,000	1,00,000

Total Savings (A)	7,60,000	10,00,000
Annual Estimated Cash Cost:	30,000	90,000
Indirect Material Indirect Labour	40,000	50,000
Repairs and Maintenance	45,000	85,000
Total Cost (B)	1,15,000	2,25,000
Annual Cost Savings (A- B)	6,45,000	7,75,000
Less: Depreciation	4,00,000	5,00,000
Annual Savings before Tax	2,45,000	2,75,000
Less: Tax @ 30%	73,500	82,500
Annual Savings/Profits after tax	1,71,500	1,92,500
Add: Depreciation	4,00,000	5,00,000
Annual Cash Inflows	5,71,500	6,92,500

i) Payback Period

Machine NM – A_1 $= \frac{Total\ Initial\ Capital\ Investment}{Annual\ expcted\ ater\ tax\ net\ cash\ inflow}$

$= \frac{20,00,000}{5,71,500}$

$= 3.50$ years

Machine NM – A_2 $= \frac{25,00,000}{6,92,500} = 3.61\ Years$

Decision: Machine NM – A_1, is better.

ii) Accounting (Average) Rate of Return (ARR)

ARR $= \frac{Averge\ Annual\ Net\ Savings}{Average\ Investment} \times 100$

Machine NM – $A1$ $= \frac{1,71,500}{10,00,000} \times 100 = 17.156\%$

Machine NM – $A2$ $= \frac{1,92,500}{12,50,000} \times 100 = 15.4\%$

Decision: Machine NM – A_1, is better.

(**Note:** ARR may be computed alternatively by taking initial investment in the denominator).

iii) Profitability Index or PV Index

Present Value Cash Inflow = Annual Cash Inflow × PV factor at 12%

Machine NM – A_1 = 5,71,500 × 3.605 = ₹20,60,258

Machine NM – A_2 = 6,92,500 × 3.605 = ₹24,96,463

PV Index $= \frac{Present\ Value\ of\ Cash\ Inflow}{Investment}$

Machine NM – A_1 $= \frac{20,60,258}{20,00,000} = 1.03$

Machine NM – A_2 $= \frac{24,96,463}{25,00,000} = 0.9$

Decision: Machine NM – A_1, is better.

18. X Limited in considering to purchase of new plant worth ₹80,00,000. The expected net cash flows after taxes and before depreciation are as follows:

Year	Net Cash Flows (₹)
1	14,00,000
2	14,00,000
3	14,00,000
4	14,00,000
5	14,00,000
6	16,00,000
7	20,00,000
8	30,00,000

9	20,00,000
10	8,00,000

The rate of cost of capital is 10%.
You are required to calculate:
i) Payback period
ii) Net present value at 10% discount factor
iii) Profitability index at 10% discount factor
iv) Internal rate of return with the help of 10% and 15% discount factor

The following present value table is given for you:

Year	Present value of ₹1 at 10% discount rate	Present value of ₹1 at 15% discount rate
1	0.909	0.870
2	0.826	0.756
3	0.751	0.658
4	0.683	0.572
5	0.621	0.497
6	0.564	0.432
7	0.513	0.376
8	0.467	0.327
9	0.424	0.284
10	0.386	0.247

(May 2017)

Ans.

Year	Cash Flow	Cumulative
0	80,00,000	--
1	14,00,000	14,00,000
2	14,00,000	28,00,000
3	14,00,000	42,00,000
4	14,00,000	56,00,000
5	14,00,000	70,00,000
6	16,00,000	86,00,000
7	20,00,000	
8	30,00,000	
9	20,00,000	
10	8,00,000	

i) Calculation of Pay-back Period

Cash Outlay of the Project	= ₹80,00,000
Total Cash Inflow for the first five years	= ₹70,00,000
Balance of cash outlay left to be paid Back in the 6th year	= ₹10,00,000
Cash inflow for 6th year	16,00,000

So the payback period is between 5th and 6th years, i.e.,
= 5 Years + $\frac{₹10,00,000}{₹16,00,000}$ = 5.625 Years or 5 years 7.5 months

Year	Cash Flow (A)	PVF @ 10% (B)	PV C = A × B	PVF @ 15%	PV
1	14,00,000	0.909	12,72,600	0.870	12,18,000
2	14,00,000	0.826	11,56,400	0.756	10,59,800
3	14,00,000	0.751	10,51,400	0.658	9,21,200
4	14,00,000	0.683	9,56,200	0.572	8,00,800
5	14,00,000	0.621	8,69,400	0.497	6,95,800
6	16,00,000	0.564	9,04,000	0.432	6,91,200
7	20,00,000	0.513	10,28,000	0.376	7,52,000
8	30,00,000	0.467	14,01,000	0.327	9,81,000
9	20,00,000	0.424	8,50,000	0.284	5,68,000
10	8,00,000	0.386	3,08,800	0.247	1,97,600
PV of CIF			97,97,800		78,85,400
PV of COF			(80,00,000)		(80,00,000)
NPV			17,97,800		- 1,14,600

ii) NPV @ 10% = ₹17,97,800

iii) PI @ 10% = $\frac{PV\ of\ CIF}{PV\ of\ COF} = \frac{97,97,800}{80,00,000} = 1.225$

iv) IRR = $10 + \left[\frac{17,97,800}{17,97,800+1,14,600} \times 5\right]$

= $10 + \left[\frac{17,97,800}{19,12,400} \times 5\right]$

= 14.70% (Approx.)

→ **Final Answer**

1	**Payback Period**	**5.625 Year**
2	NPV	17,97,800
3	PI	1.225
4	IRR	14.70%

19. Mr. B will require ₹30 lakhs after 10 years from now. He wants to ascertain an amount to be invested in a fund which pays interest @ 10% per annum.

Following options are available to him;

i) To make annual payment into the fund at the end of each year.

ii) To invest a lumpsum amount in the fund at the end of the year.

iii) To make annual payment into the fund in the beginning of each year.

Find out the amount to be invested under each of the options given above.

Factors are as under:

FVIF/CVF (10%, 10) = 2.594

FVIFA / CVF (10%, 10) = 15.937

PVIF/PVF (10%, 10) = 0.386

PVIFA/PVFA (10%, 10) = 6.145 **(November 2017)**

Ans. **i)** Here,

FVA = 30,00,000

n = 10

i = 0.10

Since, FVA = R [FVIFA (i, n)]

FVIFA (10%, 10) – 15.937

R = $\frac{30,00,000}{15.937}$ = ₹1,88,241.1997

ii) FV_n = R $[1 + i]^n$

R = $\frac{FV_n}{[1+i]^n}$

R = 30,00,000 × 0.386 = ₹11,58,000

iii) Future Value = Annual payment × (FVIFA n, i) × (1+i)

30,00,000 = Annual payment × (FVIFA 10, 10%) × (1+ 0.10)

R = = $\frac{30,00,000}{15.937 \times 1.1}$

R = $\frac{30,00,000}{17.5307}$

Future Value = ₹1,71,128.3634.

20. Kanoria Enterprises wishes to evaluate two mutually exclusive projects X and Y.

The particulars are as under:

	Project X (₹)	**Project Y (₹)**
Initial Investment	1,20,000	1.20,000
Estimated cash inflows (per annum for 8 years)		
Pessimistic	26,000	12,000
Most Likely	28,000	28,000
Optimistic	36,000	52,000

The cut off rate is 14%. The discount factor at 14% are:

Year	1	2	3	4	5	6	7	8	9
Discount factor	0.88	0.77	0.68	0.592	0.519	0.456	0.4	0.351	0.308

Advise management about the acceptability of projects X and Y. **(May 2019)**

Ans. **Calculation of NPV:**

Project – X

Particulars	**CF (₹)**	**PVAF @ 14%**	**Dis. CF (₹)**	**Initial (₹) Investment**	**NPV (₹)**
Pessimistic	26,000	4.639	1,20,614	1,20,000	**614**
Most Likely	28,000	4.639	1,29,892	1,20,000	**9,892**
Optimistic	36,000	4.639	1,67,004	1,20,000	**47,004**

Project – Y

Particulars	**CF (₹)**	**PVAF @ 14%**	**Dis. CF (₹)**	**Initial (₹) Investment**	**NPV (₹)**
Pessimistic	12,000	4.639	55,668	1,20,000	**-64332**
Most Likely	28,000	4.639	1,29,892	1,20,000	**9,892**
Optimistic	52,000	4.639	2,41,228	1,20,000	**1,21,228**

In pessimistic situation project X will be better as it gives low but positive NPV whereas Project Y yield highly negative NPV under this situation. In most likely situation both the project will give same result. However, in optimistic situation Project Y will be better as it will gives very high NPV. So, project X is a risk less project as it gives positive NPV in all the situation whereas Y is a risky project as it will result into negative NPV in pessimistic situation and highly positive NPV in optimistic situation. So, acceptability of project will largely depend on the risk-taking capacity (Risk seeking/ Risk aversion) of the management.

21. AT Limited is considering three projects A, B and C. The cash flows associated with the projects are given below:

Project	C_0	C_1	C_2	C_3	C_4
A	(10,000)	2,000	2,000	6,000	0
B	(2,000)	0	2,000	4,000	6,000
C	(10,000)	2,000	2,000	6,000	10,000

You are required to:

a) Calculate the payback period of each of the three project.

b) If the cut-off period is two years, then which projects should be accepted?

c) Projects with positive NPVs if the opportunity cost of capital is 10 percent.

d) "Payback gives too much weight to cash flows that occur after the cut-off date." True or false?

e) "If a firm used a single cut – off period for all projects, it is likely to accept too many short-lived projects. "True or false?

P.V. Factor @ 10%

Year	0	1	2	3	4	5
P.V.	1.000	0.909	0.826	0.751	0.683	0.621

(May 2019)

Ans.

a) Payback Period of Projects

Projects	C_0 **(₹)**	C_1 **(₹)**	C_2 **(₹)**	C_3 **(₹)**	**Payback**
A	(1 ,000)	2,000	2,000	6,000	2,000 + 2,000 + 6,000 = 10,000 i.e. 3 years
B	(2,000)	0	2,000	NA	0 + 2,000 = 2,000 i.e. years
C	(10,000)	2,000	2,000	6,000	2,000 + 2,000 + 6,000 = 10,000 i.e. 3 years

b) If standard payback period is **2 years,** Project B is the **only acceptable project.**

c) Calculation of NPV

Year	**PVF @ 10%**	**Project A**		**Project B**		**Project C**	
		Cash Flows (₹)	**PV of cash flows (₹)**	**Cash Flows (₹)**	**PV of cash flows (₹)**	**Cash Flows (₹)**	**PV of cash flows (₹)**
0	1	(10,000)	(10,000)	(2,000)	(2,000)	(10,000)	(10,000)
1	0.909	2,000	1,818	0	0	2,000	1,818
2	0.826	2,000	1,652	2,000	1,652	2,000	1,652
3	0.751	6,000	4,506	4,000	3,004	6,000	4,506
4	0.683	0	0	6,000	4,098	10,000	6,830
NPV			(-2,024)		6,754		4,806

So, Projects with positive, NPV are Project B and Project C

d) False: Payback gives no weightage to cash flows after the cut-off date.

e) True: The payback rule ignores all cash flows after the cut-off date, meaning that future years' cash inflows are not considered. Thus, payback is biased towards short-term projects.

22. 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 use 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

(MTP March 2021)

Ans. Since the life span of each machine is different and time span exceeds the useful lives of each modeI, we shall use Equivalent Annual Cost method to decide which brand should be chosen.

i) If machine is used for 20 years

a) Residual value of machine of brand X

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

b) Residual value of machine of brand Y

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

Present Value (PV) of cost if machine of brand X is purchased

Period	Cash Outflow (₹)	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)
			19,20,778

PVAF for 1-15 years = 6.812

Equivalent Annual Cost = $\frac{₹19,20,778}{6.812}$ = ₹2,81,969.76

Present Value (PV) of cost if machine of brand Y is purchased

Period	Cash Outflow (₹)	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)
			14,68,320

PVAF for 1-10 years = 5.651

Equivalent Annual Cost = $\frac{₹14,68,320}{5.651}$ = ₹2,59,833.66

Present Value (PV) of cost if machine of brand Y is taken on rent

Period	Cash Outflow (₹)	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
			15,26,120

PVAF for 1-10 years = 5.651

Equivalent Annual Cost = $\frac{₹15,26,120}{5.651}$ = ₹2,70,061.94

Decision: Since Equivalent Annual Cash Outflow is least in case of purchase of Machine of brand Y the same should be purchased.

ii) If machine is used for 5 years

a) Scrap value of machine of brand X
= [₹ 15,00,000 – (1 - 0.10)] - (₹ 15,00,000 × 0.06 × 4) = ₹ 9,90,000

b) Scrap value of machine of brand Y
= [₹ 10,00,000 – (1 - 0.40)] - (₹ 10,00,000 × 0.06 × 4) = ₹ 3,60,000

Present Value (PV) of cost if machine of brand X is purchased

Period	Cash Outflow (₹)	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)
			11,18,920

Present Value (PV) of cost if machine of brand Y is purchased

Period	Cash Outflow (₹)	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)
			10,48,230

Present Value (PV) of cost if machine of brand Y is taken on rent

Period	Cash Outflow (₹)	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
			9,69,920

* [₹ 2,20,000 - (₹ 22,000 × 5) = ₹ 1,10,000]

Decision: Since Cash Outflow is least in case of rent of Machine of brand Y the same should be taken on rent.

23. ABC Ltd is evaluating the purchase of a new machinery with a depreciable base of ₹ 1,00,000; expected economic life of 4 years and change in earnings before taxes and depreciation of ₹ 45,000 in year 1, ₹ 30,000 in year 2, ₹ 25,000 in year 3 and ₹ 35,000 in year 4. Assume straight-line depreciation and a 20% tax rate. You are required to COMPUTE relevant cash flows.

(ICAI SM)

Ans.

Amount (in ₹)

Particulars	Years			
	1	2	3	4
Earnings before tax and depreciation	45,000	30,000	25,000	35,000
Less: Depreciation	(25,000)	(25,000)	(25,000)	(25,000)
Earnings before tax	20,000	5,000	0	10,000
Less: Tax @20%	(4,000)	(1,000)	0	(2,000)
	16,000	4,000	0	8,000
Add: Depreciation	25,000	25,000	25,000	25,000
Net Cash flow	41,000	29,000	25,000	33,000

Working Note:

Depreciation = ₹ 1,00,000 ÷ 4 = ₹ 25,000

24. A project requiring an investment of ₹ 10,00,000 and it yields profit after tax and depreciation which is as follows:

Years	Profit after tax and depreciation (₹)
1	50,000
2	75,000
3	1,25,000
4	1,30,000
5	80,000
Total	4,60,000

Suppose further that at the end of the 5th year, the plant and machinery of the project can be sold for ₹ 80,000. DETERMINE Average Rate of Return.

(ICAI SM)

Ans. In this case the rate of return can be calculated as follows:

$$\frac{\text{Total Profit} \div \text{No.of of years}}{\text{Average investment/Initial Investment}} \times 100$$

a) If Initial Investment is considered then,

$$= \frac{₹4,60,000 \div 5 \text{ years}}{₹10,00,000} \times 100 = \frac{₹92,000}{₹10,00,000} \times 100 = 9.2\%$$

This rate is compared with the rate expected on other projects, had the same funds been invested alternatively in those projects. Sometimes, the management compares this rate with the minimum rate (called-cut off rate). For example, management may decide that they will not undertake any project which has an average annual yield after tax less than 20%. Any capital expenditure proposal which has an average annual yield of less than 20% will be automatically rejected.

b) If Average investment is considered, then,

$$= \frac{92,000}{\text{Average investment}} \times 100 = \frac{92,000}{5,40,000} \times 100 = 17.04\%$$

Where,

Average Investment = ½ (Initial investment – Salvage value) + Salvage value

= ½ (10,00,000 – 80,000) + 80,000

= 4,60,000 + 80,000 = 5,40,000

25. Suppose we have three projects involving discounted cash outflow of ₹ 5,50,000, ₹ 75,000 and ₹ 1,00,20,000 respectively. Suppose further that the sum of discounted cash inflows for these projects are ₹ 6,50,000, ₹ 95,000 and ₹ 1,00,30,000 respectively. CALCULATE the desirability factors for the three projects. **(ICAI SM)**

Ans. The desirability factors for the three projects would be as follows:

1) $\frac{₹6,50,000}{₹5,50,000} = 1.18$

2) $\frac{₹75,000}{₹75,000} = 1.27$

3) $\frac{₹1,00,30,000}{₹1,00,20,000} = 1.001$

It would be seen that in absolute terms project 3 gives the highest cash inflows yetits desirability factor is low. This is because the outflow is also very high. The **Desirability/ Profitability Index factor helps us in ranking various projects**.

Since PI is an extension of NPV it has same advantages and limitation.

26. A Ltd. is evaluating a project involving an outlay of ₹ 10,00,000 resulting in an annual cash inflow of ₹ 2,50,000 for 6 years. Assuming salvage value of the project is zero; DETERMINE the IRR of the project.

(ICAI SM)

Ans. First of all, we shall find an approximation of the payback period:

$\frac{(₹)10,00,000}{(₹)2,50,000} = 4$

Now we shall search this figure in the PVAF table corresponding to 6-year row.

The value 4 lies between values 4.111 and 3.998 correspondingly discounting rates are 12% and 13% respectively.

NPV @ 12%

$NPV_{12\%}1$= (10,00,000) + 4.111 × 2,50,000 = 27,750

$NPV_{13\%}$= (10,00,000) + 3.998 × 2,50,000 = -500

The internal rate of return is, thus, more than 12% but less than 13%. The exact rate can be obtained by interpolation:

$$IRR = 12\% + \frac{27,750}{27,750-(-500)} \times (13\% - 12\%)$$

$$= 12\% + \frac{27,750}{28,250} = 12.982\%$$

IRR = 12.982%

27. An investment of ₹1,36,000 yields the following cash inflows (profits before depreciation but after tax). DETERMINE MIRR considering 8% as cost of capital.

Year	₹
1	30,000
2	40,000
3	60,000
4	30,000
5	20,000
	1,80,000

(ICAI SM)

Ans. Year 0 – Cash-outflow ₹ 1,36,000

The MIRR is calculated on the basis of investing the inflows at the cost of capital. The table below shows the value of the inflows if they are immediately reinvested at 8%.

Year	Cash flow	@ 8% reinvestment rate factor	₹
1	30,000	1.3605*	40,815
2	40,000	1.2597	50,388
3	60,000	1.1664	69,984

4	30,000	1.0800	32,400
5	20,000	1.0000	20,000
			2,13,587

* Investment of ₹ 1 at the end of the year 1 is reinvested for 4 years (at the end of 5 years) shall become $1(1.08)^4$= 1.3605. Similarly, reinvestment rate factor for remaining years shall be calculated. Please note investment at the end of 5th year shall be reinvested for zero year hence reinvestment rate factor shall be 1.00.

The total cash outflow in year 0 (₹1,36,000) is compared with the possible inflow at year 5 and the resulting figure of $\frac{1,36,000}{2,13,587}$ = 0.6367 is the discount factor in year 5. By looking at the year 5 row in the present value tables, you will see that thisgives a return of 9%. This means that the ₹ 2,13,587 received in year 5 is equivalent to ₹ 1,36,000 in year 0 if the discount rate is 9%. Alternatively, we can compute MIRR as follows:

Total return = $\frac{2,13,587}{1,36,000} = 1.5705$

MIRR = $^1/_5 = \sqrt{1.5705} - 1 = 9\%$.

28. R plc is considering modernizing its production facilities and it has two proposals under consideration. The expected cash flows associated with these projects and their NPV as per discounting rate of 12% and IRR is as follows:

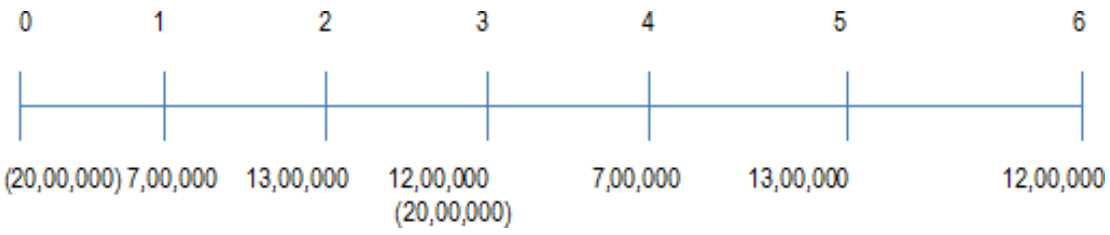
Year	Cash Flow	
	Project A (₹)	Project B (₹)
0	(40,00,000)	(20,00,000)
1	8,00,000	7,00,000
2	14,00,000	13,00,000
3	13,00,000	12,00,000
4	12,00,000	0
5	11,00,000	0
6	10,00,000	0
NPV @12%	6,49,094	5,15,488
IRR	17.47%	25.20%

IDENTIFY which project should R plc accept?

(ICAI SM)

Ans. Although from NPV point of view Project A appears to be better but from IRR point of view Project B appears to be better. Since, both projects have unequal lives, selection on the basis of these two methods shall not be proper. In such situation we shall use any of the following method:

i) Replacement Chain (Common Life) Method: Since the life of the Project A is 6 years and Project B is 3 years to equalize lives we can have second opportunity of investing in project B after one time investing. The position of cash flows in such situation shall be as follows:



NPV of extended life of 6 years of Project B shall be ₹ 8,82,403 and IRR of 25.20%. Accordingly, with extended life NPV of Project B it appears to be more attractive.

ii) **Equivalent Annualized Criterion**: The method discussed above has one drawback when we have to compare two projects one has a life of 3 years and other has 5 years. In such case the above method shall require analysis of a period of 15 years i.e. common multiple of these two values. The simple solution to this problemis use of Equivalent Annualised Criterion involving following steps:

a) Compute NPV using the WACC or discounting rate.

b) Compute Present Value Annuity Factor (PVAF) of discounting factor used abovefor the period of each project.

c) Divide NPV computed under step (a) by PVAF as computed under step (b) and compare the values.

Accordingly, for proposal under consideration:

Particulars	Project A	Project B
NPV @ 12%	₹ 6,49,094	₹ 5,15,488
PVAF @12%	4.112	2.402
Equivalent Annualized Criterion	₹ 1,57,854	₹ 2,14,608

Thus, Project B should be selected.

29. Lockwood Limited wants to replace its old machine with a new automatic machine. Two models A and B are available at the same cost of ₹ 5 lakhs each. Salvage value of the old machine is ₹ 1 lakh. The utilities of the existing machine can be used if the company purchases A. Additional cost of utilities to be purchased in that case are ₹ 1 lakh. If the company purchases B then all the existing utilities will have to be replaced with new utilities costing ₹ 2 lakhs. The salvage value of the old utilities will be ₹ 0.20 lakhs. The earnings after taxation are expected to be:

Year	(Cash in-flows of)		
	A ₹	B ₹	P.V. Factor@ 15%
1	1,00,000	2,00,000	0.870
2	1,50,000	2,10,000	0.756
3	1,80,000	1,80,000	0.658
4	2,00,000	1,70,000	0.572
5	1,70,000	40,000	0.497
Salvage Value at the end of Year 5	50,000	60,000	

The targeted return on capital is 15%. You are required to (i) COMPUTE, for the two machines separately, net present value, discounted payback period and desirability factor and (ii) STATE which of the machines is to be selected? **(ICAI SM)**

Ans. **Working:**

Calculation of Cash – outflow at year zero

Particulars	A (₹)	B (₹)
Cost of Machine	5,00,000	5,00,000
Cost of Utilities	1,00,000	2,00,000
Salvage value of Old Machine	(1,00,000)	(1,00,000)
Salvage of value Old Utilities	–	(20,000)
Total Expenditure (Net)	5,00,000	5,80,000

i)

a) Calculation of NPV

Year	NPV Factor @ 15%	Machine A		Machine B	
		Cash inflows	Discounted value of inflows	Cash inflows	Discounted value of inflows
0	1.000	(5,00,000)	(5,00,000)	(5,80,000)	(5,80,000)
1	0.870	1,00,000	87,000	2,00,000	1,74,000
2	0.756	1,50,000	1,13,400	2,10,000	1,58,760
3	0.658	1,80,000	1,18,440	1,80,000	1,18,440
4	0.572	2,00,000	1,14,400	1,70,000	97,240
5	0.497	1,70,000	84,490	40,000	19,880
Salvage	0.497	50,000	24,850	60,000	29,820
			5,42,580		5,98,140
Net Present Value			42,580		18,140

Since the Net present Value of both the machines is positive bothare acceptable.

b) Discounted Pay-back Period **(Amount in ₹)**

Year	Machine A		Machine B	
	Discounted cash inflows	Cumulative Discounted cash inflows	Discounted cash inflows	Cumulative Discounted cash inflows
1	87,000	87,000	1,74,000	1,74,000
2	1,13,400	2,00,400	1,58,760	3,32,760
3	1,18,440	3,18,840	1,18,440	4,51,200
4	1,14,400	4,33,240	97,240	5,48,440
5	1,09,340*	5,42,580	49,700*	5,98,140

* Includes salvage value

Discounted Payback Period (For A and B):

Machine A = 4 years + $\left(\frac{5,00,000-4,33,240}{1,09,340}\right)$ = 4.61 years

Machine B = 4 years + $\left(\frac{5,80,000-5,48,440}{49,700}\right)$ = 4.63 years

c) Desirability Factor or Profitability Index:

Profitability Index (PI) = $\frac{Sum\ of\ present\ value\ of\ net\ cash\ inflow}{Initial\ cash\ outflow}$

Machine A = $\frac{₹5,42,580}{₹5,00,000}$ = 1.08;

Machine B = $\frac{₹5,98,140}{₹5,80,000}$ = 1.03

ii) Since the absolute surplus in the case of A is more than B and also the desirability factor, it is better to choose A.

The discounted payback period in both the cases is almost same, also thenet present value is positive in both the cases but the desirability factor (profitability index) is higher in the case of Machine A, it is therefore better to choose Machine A.

30. Hind lever Company is considering a new product line to supplement its range ofproducts. It is anticipated that the new product line will involve cash investmentsof ₹7,00,000 at time 0 and ₹10,00,000 in year 1. After-tax cash inflows of ₹2,50,000 are expected in year 2, ₹3,00,000 in year 3, ₹3,50,000 in year 4 and ₹4,00,000 each year thereafter through year 10. Although the product line might be viable after year 10, the company prefers to be conservative and end all calculations at that time.

a) If the required rate of return is 15 per cent, COMPUTE net present value of the project? Is it acceptable?

b) ANALYSE What would be the case if the required rate of return were 10 per cent?

c) CALCULATE its internal rate of return?

d) COMPUTE the project's payback period?

(ICAI SM)

Ans.

a) Computation of NPV at 15% discount rate

Year	Cash flow	Discount Factor(15%)	Present value
	(₹)		**(₹)**
0	(7,00,000)	1.000	(7,00,000)
1	(10,00,000)	0.870	(8,70,000)
2	2,50,000	0.756	1,89,000
3	3,00,000	0.658	1,97,400
4	3,50,000	0.572	2,00,200
5-10	4,00,000	2.163	8,65,200
		Net Present Value	(1,18,200)

As the net present value is negative, the project is unacceptable.

b) Computation of NPV if discount rate would be 10% discount rate

Year	Cash flow	Discount Factor(10%)	Present value
	(₹)		**(₹)**
0	(7,00,000)	1.000	(7,00,000)
1	(10,00,000)	0.909	(9,09,000)
2	2,50,000	0.826	2,06,500
3	3,00,000	0.751	2,25,300
4	3,50,000	0.683	2,39,050
5-10	4,00,000	2.974	11,89,600
		Net Present Value	2,51,450

Since NPV = ₹ 2,51,450 is positive, hence the project would be acceptable.

c) Calculation of IRR:

$$\text{IRR} = \text{LR} + \frac{NPV\ at\ LR}{NPV\ at\ LR - NPV\ at\ HR} \times (\text{HR} - \text{LR})$$

$$= 10\% + \frac{₹2,51,450}{₹2,51,450 - (-)1,18,200} \times (15\% - 10\%)$$

$$= 10\% + 3.4012 \text{ or } 13.40\%$$

d) Computation of Pay-back period of the project:

Payback Period = 6 years:

-₹ 7,00,000-₹ 10,00,000 + ₹ 2,50,000 + ₹ 3,00,000 + ₹ 3,50,000 + ₹ 4,00,000 + ₹ 4,00,000 = 0

31. Elite Cooker Company is evaluating three investment situations: (1) produce a new line of aluminium skillets, (2) expand its existing cooker line to include several new sizes, and (3) develop a new, higher-quality line of cooker If only the project in question is undertaken, the expected present values and the amounts of investment required are:

Project	Investment required	Present value of Future Cash-Flows
	₹	**₹**
1	2,00,000	2,90,000
2	1,15,000	1,85,000
3	2,70,000	4,00,000

If projects 1 and 2 are jointly undertaken, there will be no economies; the investments required and present values will simply be the sum of the parts. With projects 1 and 3, economies are possible in investment because one of the machines acquired can be used in both production processes. The total investment required for projects 1 and 3 combined is ₹ 4,40,000. If projects 2 and 3 are undertaken, there are economies to be achieved in marketing and producing the products but not in investment. The expected present value of future cash flows for projects 2 and 3 is ₹ 6,20,000. If all three projects are undertaken simultaneously, the economies noted will still hold. However, a ₹ 1,25,000 extension on the plant will be necessary, as space is not available for all three projects. CALCULATE NPV of the projects and STATE which project or projects should be chosen?

(ICAI SM)

Ans.

Project	Investment Required	Present value of Future Cash Flows	Net Present value
	₹	₹	₹
1	2,00,000	2,90,000	90,000
2	1,15,000	1,85,000	70,000
3	2,70,000	4,00,000	1,30,000
1 and 2	3,15,000	4,75,000	1,60,000
1 and 3	4,40,000	6,90,000	2,50,000
2 and 3	3,85,000	6,20,000	2,35,000
1, 2 and 3 (Refer Working note 1)	6,80,000*	9,10,000	2,30,000

Working Note:

i) Total Investment required if all the three projects are undertaken simultaneously:

Particulars	(₹)
Project 1& 3	4,40,000
Project 2	1,15,000
Plant extension cost	1,25,000
Total	6,80,000

ii) Total of Present value of Cash flows if all the three projects are undertaken simultaneously:

Particulars	(₹)
Project 2& 3	6,20,000
Project 1	2,90,000
Total	9,10,000

Projects 1 and 3 should be chosen, as they provide the highest net present value.

32. Cello Limited is considering buying a new machine which would have a useful economic life of five years, a cost of ₹ 1,25,000 and a scrap value of ₹ 30,000, with 80 per cent of the cost being payable at the start of the project and 20 percent at the end of the first year. The machine would produce 50,000 units per annum of a new product with an estimated selling price of ₹ 3 per unit. Direct costs would be ₹ 1.75 per unit and annual fixed costs, including depreciation calculated on a straight- line basis, would be ₹ 40,000 per annum.

In the first year and the second year, special sales promotion expenditure, not included in the above costs, would be incurred, amounting to ₹ 10,000 and ₹ 15,000 respectively.

CALCULATE NPV of the project for investment appraisal, assuming the company's cost of capital is 10 percent. **(ICAI SM)**

Ans. **Calculation of Net Cash flows**

Contribution = (3.00 – 1.75) × 50,000 = ₹ 62,500

Fixed costs = 40,000 – [(1,25,000 – 30,000)/5] = ₹ 21,000

Year	Capital (₹)	Contribution (₹)	Fixed costs (₹)	Adverts (₹)	Net cash flow (₹)
0	(1,00,000)				(1,00,000)
1	(25,000)	62,500	(21,000)	(10,000)	6,500
2		62,500	(21,000)	(15,000)	26,500
3		62,500	(21,000)		41,500
4		62,500	(21,000)		41,500
5	30,000	62,500	(21,000)		71,500

Calculation of Net Present Value

Year	Net cash flow (₹)	10% discount factor	Present value (₹)
0	(1,00,000)	1.000	(1,00,000)
1	6,500	0.909	5,909
2	26,500	0.826	21,889
3	41,500	0.751	31,167
4	41,500	0.683	28,345
5	71,500	0.621	44,402
	NPV		31,712

The net present value of the project is ₹ 31,712.

33. Ae Bee Cee Ltd. is planning to invest in machinery, for which it has to make a choice between the two identical machines, in terms of Capacity, 'X' and 'Y'. Despite being designed differently, both machines do the same job. Further, details regarding both the machines are given below:

Particulars	Machine 'X'	Machine 'Y'
Purchase Cost of the Machine (₹)	15,00,000	10,00,000
Life (years)	3	2
Running cost per year (₹)	4,00,000	6,00,000

The opportunity cost of capital is 9%.

You are required to:

IDENTIFY the machine the company should buy? The present value (PV) factors at 9% are:

Year	t_1	t_2	t_3
$PVIF_{0.09.t}$	0.917	0.842	0.772

(ICAI SM)

Ans. **Statement Showing the Evaluation of Two Machines**

	Particulars	Machine 'X'	Machine 'Y'
i)	Purchase Cost	₹ 15,00,000	₹ 10,00,000
ii)	Life of Machine	3 years	2 years
iii)	Running Cost of Machine per year	₹ 4,00,000	₹ 6,00,000
iv)	PVIFA 0.09, 3	2.531	
	PVIFA 0.09, 2		1.759
v)	PV of Running Cost of Machine {(iii)×(iv)}	₹ 10,12,400	₹ 10,55,400
vi)	Cash outflows of Machine {(i) + (v)}	₹ 25,12,400	₹ 20,55,400
vii)	Equivalent PV of Annual Cash outflow (vi/iv)	₹ 9,92,651	₹ 11,68,505

Recommendation: Ae Bee Cee Ltd. should buy Machine 'X' since equivalent annual cash outflow is less than that of Machine 'Y'.

34. The General Manager of Merry Ltd. is considering the replacement of five -year-old equipment. The company has to incur excessive maintenance cost of the equipment. The equipment has zero written down value. It can be modernized at a cost of ₹ 1,40,000 enhancing its economic life to 5 years. The equipment could be sold for ₹ 30,000 after 5 years. The modernization would help in material handling and in reducing labour, maintenance & repairs costs.

The company has another alternative to buy a new machine at a cost of ₹3,50,000 with an economic life of 5 years and salvage value of ₹ 60,000. The new machine is expected to be more efficient in reducing costs of material handling, labour, maintenance & repairs, etc.

The annual cost are as follows:

Particulars	Existing Equipment (₹)	Modernization (₹)	New Machine (₹)
Wages & Salaries	45,000	35,500	15,000
Supervision	20,000	10,000	7,000
Maintenance	25,000	5,000	2,500
Power	30,000	20,000	15,000
	1,20,000	70,500	39,500

Assuming tax rate of 50% and required rate of return of 10%, should the company modernize the equipment or buy a new machine?

PV factor at 10% are as follows:

7B Year	1	2	3	4	5
PV factor	0.909	0.826	0.751	0.683	0.621

(RTP May 2021)

Ans. Calculation of Depreciation:

On Modernized Equipment = $\frac{₹1,40,000-₹30,000}{5 \text{ years}}$ = ₹22,000 p. a.

On New machine = $\frac{₹3,50,000-₹60,000}{5 \text{ years}}$ = ₹58,000 p. a.

i) Calculation of Incremental annual cash inflows/ savings:

Particulars	Existing Equipment (₹)	Modernization		New Machine	
		Amount (₹)	Savings (₹)	Amount (₹)	Savings (₹)
	(1)	(2)	(3) = (1)-(2)	(4)	(5) = (1)-(4)
Wages & Salaries	45,000	35,500	9,500	15,000	30,000
Supervision	20,000	10,000	10,000	7,000	13,000
Maintenance	25,000	5,000	20,000	2,500	22,500
Power	30,000	20,000	10,000	15,000	15,000
Total	1,20,000	70,500	49,500	39,500	80,500
Less: Depreciation (Refer Workings)			22,000		58,000
Total Savings			27,500		22,500
Less: Tax @ 50%			13,750		11,250
After Tax Savings			13,750		11,250
Add: Depreciation			22,000		58,000
Incremental Annual Cash Inflows			35,750		69,250

ii) Calculation of Net Present Value (NPV)

Particulars	Year	Modernization (₹)	New Machine (₹)
Initial Cash outflow (A)	0	1,40,000.00	3,50,000.00
Incremental Cash Inflows	1-5	1,35,492.50 (₹ 35,750 × 3.790)	2,62,457.50 (₹ 69,250 × 3.790)
Salvage value	5	18,630.00 (₹ 30,000 × 0.621)	37,260.00 (₹ 60,000 × 0.621)
PV of Cash inflows (B)		1,54,122.50	2,99,717.50
Net Present Value (B - A)		14,122.50	(50,282.50)

Advise: The company should modernize its existing equipment and not buy a new machine because NPV is positive in modernization of equipment.

35. HMR Ltd. is considering replacing a manually operated old machine with a fully automatic new machine. The old machine had been fully depreciated for tax purpose but has a book value of ₹ 2,40,000 on 31st March 2XX1. The machine has begun causing problems with breakdowns and it cannot fetch more than ₹ 30,000 if sold in the market at present. It will have no realizable value after 10 years. The company has been offered ₹ 1,00,000 for the old machine as a trade in on the new machine which has a price (before allowance for trade in) of ₹ 4,50,000. The expected life of new machine is 10 years with salvage value of ₹ 35,000.

Further, the company follows straight line depreciation method but for tax purpose, written down value method depreciation @ 7.5% is allowed taking that this is the only machine in the block of assets.

Given below are the expected sales and costs from both old and new machine:

Particulars	Old machine (₹)	New machine (₹)
Sales	8,10,000	8,10,000
Material cost	1,80,000	1,26,250
Labour cost	1,35,000	1,10,000
Variable overhead	56,250	47,500
Fixed overhead	90,000	97,500
Depreciation	24,000	41,500
PBT	3,24,750	3,87,250
Tax @ 30%	97,425	1,16,175
PAT	2,27,325	2,71,075

From the above information, ANALYSE whether the old machine should be replaced or not if required rate of return is 10%? Ignore capital gain tax.

PV factors @ 10%:

Year	1	2	3	4	5	6	7	8	9	10
PVF	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467	0.424	0.386

(RTP November 2021/ ICAI SM)

Ans. **1) Calculation of Base for depreciation or Cost of New Machine**

Particulars	(₹)
Purchase price of new machine	4,50,000
Less: Sale price of old machine	1,00,000
	3,50,000

2) Calculation of Profit before tax as per books

Particulars	Old machine (₹)	New machine (₹)	Difference (₹)
PBT as per books	3,24,750	3,87,250	62,500
Add: Depreciation as per books	24,000	41,500	17,500
Profit before tax and depreciation (PBTD)	3,48,750	4,28,750	80,000

Calculation of Incremental NPV

Year	PVF @ 10%	PBTD (₹)	Dep. @ 7.5% (₹)	PBT (₹)	Tax @ 30% (₹)	Cash Inflows (₹)	PV of Cash Inflows (₹)
	(1)	(2)	(3)	(4)	(5) = (4) x 0.30	(6) = (4) – (5) + (3)	(7) = (6) × (1)
1	0.909	80,000.00	26,250.00	53,750.00	16,125.00	63,875.00	58,062.38
2	0.826	80,000.00	24,281.25	55,718.75	16,715.63	63,284.38	52,272.89
3	0.751	80,000.00	22,460.16	57,539.84	17,261.95	62,738.05	47,116.27
4	0.683	80,000.00	20,775.64	59,224.36	17,767.31	62,232.69	42,504.93
5	0.621	80,000.00	19,217.47	60,782.53	18,234.76	61,765.24	38,356.21
6	0.564	80,000.00	17,776.16	62,223.84	18,667.15	61,332.85	34,591.73
7	0.513	80,000.00	16,442.95	63,557.05	19,067.12	60,932.88	31,258.57
8	0.467	80,000.00	15,209.73	64,790.27	19,437.08	60,562.92	28,282.88
9	0.424	80,000.00	14,069.00	65,931.00	19,779.30	60,220.70	25,533.58
10	0.386	80,000.00	13,013.82	66,986.18	20,095.85	59,904.15	23,123.00
							3,81,102.44
Add: PV of Salvage value of new machine (₹ 35,000 × 0.386)							13,510.00
Total PV of incremental cash inflows							3,94,612.44
Less: Cost of new machine							3,50,000.00
Incremental Net Present Value							44,612.44

Analysis: Since the Incremental NPV is positive, the old machine should be replaced.

36. ABC & Co. is considering whether to replace an existing machine or to spend money on revamping it. ABC & Co. currently pays no taxes. The replacement machine costs ₹18,00,000 now and requires maintenance of ₹2,00,000 at the end of every year for eight years. At the end of eight years, it would have a salvage value of ₹4,00,000 and would be sold. The existing machine requires increasing amounts of maintenance each year and its salvage value fall each year as follows:

Year	Maintenance (₹)	Salvage (₹)
Present	0	8,00,000
1	2,00,000	5,00,000
2	4,00,000	3,00,000
3	6,00,000	2,00,000
4	8,00,000	0

The opportunity cost of capital for ABC & Co. is 15%.

REQUIRED:

When should the company replace the machine?

The following present value table is given for you:

Year	1	2	3	4	5	6	7	8
Present value of ₹ 1 at 15% discount rate	0.8696	0.7561	0.6575	0.5718	0.4972	0.4323	0.3759	0.3269

(May 2022 RTP)

Ans.

ABC & Co.

Equivalent Annual Cost (EAC) of new machine

	Particulars	(₹)
i)	Cost of new machine now	18,00,000
	Add: PV of annual repairs @ ₹ 2,00,000 per annum for 8 years (₹ 2,00,000 × 4.4873)	8,97,460
		26,97,460
	Less: PV of salvage value at the end of 8 years (₹ 4,00,000×0.3269)	1,30,760
		25,66,700
	Equivalent annual cost (EAC) (₹ 25,66,700/4.4873)	5,71,992

PV of cost of replacing the old machine in each of 4 years with new machine

Scenario	Year	Cash Flow (₹)	PV @ 15%	PV (₹)
Replace Immediately	0	(5,71,992)	1.00	(5,71,992)
	0	8,00,000	1.00	8,00,000
				2,28,008
Replace in one year	1	(5,71,992)	0.8696	(4,97,404)
	1	(2,00,000)	0.8696	(1,73,920)
	1	5,00,000	0.8696	4,34,800
				(2,36,524)
Replace in two years	1	(2,00,000)	0.8696	(1,73,920)
	2	(5,71,992)	0.7561	(4,32,483)
	2	(4,00,000)	0.7561	(3,02,440)
	2	3,00,000	0.7561	2,26,830
				(6,82,013)
Replace in three years	1	(2,00,000)	0.8696	(1,73,920)
	2	(4,00,000)	0.7561	(3,02,440)
	3	(5,71,992)	0.6575	(3,76,085)
	3	(6,00,000)	0.6575	(3,94,500)
	3	2,00,000	0.6575	1,31,500
				(11,15,445)
Replace in four years	1	(2,00,000)	0.8696	(1,73,920)
	2	(4,00,000)	0.7561	(3,02,440)
	3	(6,00,000)	0.6575	(3,94,500)
	4	(5,71,992)	0.5718	(3,27,065)
	4	(8,00,000)	0.5718	(4,57,440)
				(16,55,365)

Advice: The company should replace the old machine immediately because the PV of cost of replacing the old machine with new machine is least.

37. HMR Ltd. is considering replacing a manually operated old machine with a fully automatic new machine. The old machine had been fully depreciated for tax purpose but has a book value of ₹2,40,000 on 31st March 20x1. The machine has begun causing problems with breakdowns and it cannot fetch more than ₹30,000 if sold in the market at present. It will have no realizable value after 10 years. The company has been offered ₹1,00,000 for the old machine as a trade in on the

new machine which has a price (before allowance for trade in) of ₹4,50,000. The expected life of new machine is 10 years with salvage value of ₹35,000.

Further, the company follows straight line depreciation method but for tax purpose, written down value method depreciation @ 7.5% is allowed taking that this is the only machine in the block of assets.

Given below are the expected sales and costs from both old and new machine:

Particulars	Old machine (₹)	New machine (₹)
Sales	8,10,000	8,10,000
Material cost	1,80,000	1,26,250
Labour cost	1,35,000	1,10,000
Variable overhead	56,250	47,500
Fixed overhead	90,000	97,500
Depreciation	24,000	41,500
PBT	3,24,750	3,87,250
Tax @ 30%	97,425	1,16,175
PAT	2,27,325	2,71,075

From the above information, ANALYSE whether the old machine should be replaced or not if required rate of return is 10%? Ignore capital gain tax.

PV factors @ 10%:

Year	1	2	3	4	5	6	7	8	9	10
PVF	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467	0.424	0.386

(Nov. 2021 RTP)

Ans.

Workings:

1) Calculation of Base for depreciation or Cost of New Machine

Particulars	(₹)
Purchase price of new machine	4,50,000
Less: Sale price of old machine	1,00,000
	3,50,000

2) Calculation of Profit before tax as per books

Particulars	Old machine (₹)	New machine (₹)	Difference (₹)
PBT as per books	3,24,750	3,87,250	62,500
Add: Depreciation as per books	24,000	41,500	17,500
Profit before tax and depreciation (PBTD)	3,48,750	4,28,750	80,000

Calculation of Incremental NPV

Year	PVF @ 10%	PBTD (₹)	Dep. @ 7.5% (₹)	PBT (₹)	Tax @ 30% (₹)	Cash Inflows (₹)	PV of Cash Inflows (₹)
	(1)	(2)	(3)	(4)	(5) = (4) × 0.30	(6) = (4) – (5) + (3)	(7) = (6) × (1)
1	0.909	80,000.00	26,250.00	53,750.00	16,125.00	63,875.00	58,062.38
2	0.826	80,000.00	24,281.25	55,718.75	16,715.63	63,284.38	52,272.89
3	0.751	80,000.00	22,460.16	57,539.84	17,261.95	62,738.05	47,116.27
4	0.683	80,000.00	20,775.64	59,224.36	17,767.31	62,232.69	42,504.93
5	0.621	80,000.00	19,217.47	60,782.53	18,234.76	61,765.24	38,356.21
6	0.564	80,000.00	17,776.16	62,223.84	18,667.15	61,332.85	34,591.73
7	0.513	80,000.00	16,442.95	63,557.05	19,067.12	60,932.88	31,258.57

8	0.467	80,000.00	15,209.73	64,790.27	19,437.08	60,562.92	28,282.88
9	0.424	80,000.00	14,069.00	65,931.00	19,779.30	60,220.70	25,533.58
10	0.386	80,000.00	13,013.82	66,986.18	20,095.85	59,904.15	23,123.00
							3,81,102.44
Add: PV of Salvage value of new machine (₹ 35,000 × 0.386)							13,510.00
Total PV of incremental cash inflows							3,94,612.44
Less: Cost of new machine							3,50,000.00
Incremental Net Present Value							44,612.44

Analysis: Since the Incremental NPV is positive, the old machine should be replaced.

38. COMPUTE the net present value for a project with a net investment of ₹ 1,00,000 and net cash flows for year one is ₹ 55,000; for year two is ₹ 80,000 and for year three is ₹ 15,000. Further, the company's cost of capital is 10%.
[PVIF @ 10% for three years are 0.909, 0.826 and 0.751] **(ICAI SM)**

Ans.

Year	Net Cash Flows (₹)	PVIF @ 10%	Discounted Cash Flows (₹)
0	(1,00,000)	1.000	(1,00,000)
1	55,000	0.909	49,995
2	80,000	0.826	66,080
3	15,000	0.751	11,265
Net Present Value			27,340

Recommendation: Since the net present value of the project is positive, the company should accept the project.

39. A company proposes to install machine involving a capital cost of ₹ 3,60,000. The life of the machine is 5 years and its salvage value at the end of the life is nil. The machine will produce the net operating income after depreciation of ₹ 68,000 per annum. The company's tax rate is 45%.

The Net Present Value factors for 5 years are as under:

Discounting rate	14	15	16	17	18
Cumulative factor	3.43	3.35	3.27	3.20	3.13

You are required to COMPUTE the internal rate of return of the proposal. **(ICAI SM)**

Ans. **Computation of Cash inflow per annum** ₹

Particulars	(₹)
Net operating income per annum	68,000
Less: Tax @ 45%	(30,600)
Profit after tax	37,400
Add: Depreciation (₹ 3,60,000/5 years)	72,000
Cash inflow	1,09,400

The IRR of the investment can be found as follows:
NPV = – ₹3,60,000 + ₹1,09,400 ($PVAF_{5,}$ r) = 0
Or $PVAF_{5,}$ r (Cumulative factor) = $\frac{₹3,60,000}{₹1,09,400}$ = 3.29

Computation of Internal Rate of Return

Particulars	Discounting Rate	
	15%	16%
Cumulative factor	3.35	3.27
PV of inflows (₹)	3,66,490 (₹1,09,400×3.35)	3,57,738 (₹1,09,400×3.27)

Less: Initial outlay (₹)	3,60,000	3,60,000
NPV (₹)	6,490	(2,262)

IRR = 15 + $[\frac{6,490}{6,490+2,262}]$ × (16–15) = 15 + 0.74 = 15.74%

40. Suppose ABC Ltd. is considering two Project X and Project Y for investment. The cash flows associated with these projects are as follows:

Year	Project X (₹)	Project Y (₹)
0	(2,50,000)	(3,00,000)
1	2,00,000	50,000
2	1,00,000	1,00,000
3	50,000	3,00,000

Assuming Cost of Capital be 10%, IDENTIFY which project should be accepted as per NPV Method and IRR Method. **(ICAI SM)**

Ans. **Net Present Value of Projects**

Year	Cash inflows of Project X (₹)	Cash inflows of Project Y (₹)	Present value Factor @ 10%	PV of Project X (₹)	PV of Project Y (₹)
0	(2,50,000)	(3,00,000)	1.000	(2,50,000)	(3,00,000)
1	2,00,000	50,000	0.909	1,81,800	45,450
2	1,00,000	1,00,000	0.826	82,600	82,600
3	50,000	3,00,000	0.751	37,550	2,25,300
NPV				51,950	53,350

Internal Rate of Returns (IRR) of projects

Since by discounting cash flows at 10%, we are getting values very far from zero. Therefore, let us discount cash flows using 20% discounting rate.

Year	Cash Inflows of Project X (₹)	Cash Inflows of Project Y (₹)	Present Value Factor @ 20%	PV of Project X (₹)	PV of Project Y (₹)
0	(2,50,000)	(3,00,000)	1.000	(2,50,000)	(3,00,000)
1	2,00,000	50,000	0.833	1,66,600	41,650
2	1,00,000	1,00,000	0.694	69,400	69,400
3	50,000	3,00,000	0.579	28,950	1,73,700
NPV				14,950	(15,250)

Since, by discounting cash flows at 20% we are getting that value of Project X is positive and value of Project Y is negative. Therefore, let us discount cash flows of Project X using 25% discounting rate and Project Y using discount rate of 15%.

Year	Cash Inflows of Project X (₹)	Present Value Factor @ 25%	PV of Project X (₹)	Cash Inflows of Project Y (₹)	Present Value Factor @ 15%	PV of Project Y (₹)
0	(2,50,000)	1.000	(2,50,000)	(3,00,000)	1.000	(3,00,000)
1	2,00,000	0.800	1,60,000	50,000	0.870	43,500
2	1,00,000	0.640	64,000	1,00,000	0.756	75,600
3	50,000	0.512	25,600	3,00,000	0.658	1,97,400
NPV			(400)			16,500

The internal rate can be obtained by interpolation:

$IRR_x = 20\% + \frac{14,950}{14,950-(400)} \times (25\%-20\%)$

$= 20\% + \left(\frac{14,950}{15,350} \times 5\%\right) = 24.87\%$

$IRR_B = 15\% + \frac{16,500}{16,500-(15,250)} \times (20\%-15\%)$

$= 15\% + \left(\frac{16,500}{31,750} \times 5\%\right) = 17.60\%$

Overall Position

	Project A	Project B
NPV @ 10%	₹51,950	₹53,350
IRR	24.87%	17.60%

Thus, there contradiction in ranking by two methods.

41. Suppose MVA Ltd. is considering two Project A and Project B for investment. The cash flows associated with these projects are as follows:

Year	Project A (₹)	Project B (₹)
0	(5,00,000)	(5,00,000)
1	7,50,000	2,00,000
2	0	2,00,000
3	0	7,00,000

Assuming Cost of Capital equal to 12%, ANALYSE which project should be accepted as per NPV Method and IRR Method? **(ICAI SM)**

Ans. **Net Present Value of Projects**

Year	Cash Inflows of Project A (₹)	Cash Inflows of Project B (₹)	Present Value Factor @ 50%	PV of Project A (₹)	PV of Project B (₹)
0	(5,00,000)	(5,00,000)	1.000	(5,00,000)	(5,00,000)
1	7,50,000	2,00,000	0.893	6,69,750	1,78,600
2	0	2,00,000	0.797	0	1,59,400
3	0	7,00,000	0.712	0	4,98,400
NPV				1,69,750	3,36,400

Internal Rate of Returns of projects

Let us discount cash flows using 50% discounting rate.

Year	Cash Inflows of Project A (₹)	Cash Inflows of Project B (₹)	Present Value Factor @ 50%	PV of Project A (₹)	PV of Project B (₹)
0	(5,00,000)	(5,00,000)	1.00	(5,00,000)	(5,00,000)
1	7,50,000	2,00,000	0.667	5,00,250	1,33,400
2	0	2,00,000	0.444	0	88,800
3	0	7,00,000	0.296	0	2,07,200
NPV				250	(70,600)

Since, IRR of project A shall be 50% as NPV is very small. Further, by discounting cash flows at 50%, we are getting NPV of Project B negative. Therefore, let us discount cash flows of Project B using 15% discounting rate.

Year	Cash Inflows of Project B (₹)	Present Value Factor @ 15%	PV of Project B (₹)
0	(5,00,000)	1.000	(5,00,000)
1	2,00,000	0.870	1,74,000
2	2,00,000	0.756	1,51,200
3	7,00,000	0.68	4,60,600
NPV			2,85,800

The internal rate can be obtained by interpolation:

$IRR_B = 15\% + \frac{2,85,800}{2,85,800-(70,600)} \times (50\%-15\%)$

$= 15\% + \left(\frac{2,85,800}{3,56,400} \times 35\%\right) = 43.07\%$

Overall Position

Particulars	Project A	Project B
NPV @ 12%	₹1,69,750	₹3,36,400
IRR	50.00%	43.07%

Thus, there is contradiction in ranking by two methods.

42. Shiva Limited is planning its capital investment programme for next year. It has five projects all of which give a positive NPV at the company cut-off rate of 15 percent, the investment outflows and present values being as follows:

Project	Investment (₹)	NPV @ 15% (₹)
A	(50,000)	15,400
B	(40,000)	18,700
C	(25,000)	10,100
D	(30,000)	11,200
E	(35,000)	19,300

The company is limited to a capital spending of ₹ 1,20,000.

You are required to ILLUSTRATE the returns from a package of projects within the capital spending limit. The projects are independent of each other and are divisible (i.e., part- project is possible). **(ICAI SM)**

Ans. **Computation of NPVs per ₹1 of Investment and Ranking of the Projects**

Project	Investment ₹ '000	NPV @ 15% ₹ '000	NPV per ₹ 1 invested	Ranking
A	(50)	15.4	0.31	5
B	(40)	18.7	0.47	2
C	(25)	10.1	0.40	3
D	(30)	11.2	0.37	4
E	(35)	19.3	0.55	1

Building up of a Programme of Project based on their Rankings

Project	Investment ₹000	NPV @ 15% ₹000
E	(35)	19.3
B	(40)	18.7
C	(25)	10.1
D	(20)	7.5 (2/3 of project total)
	120	55.6

Thus, Project A should be rejected and only two–third of Project D be undertaken. If the projects are not divisible then other combinations can be examined as:

	Investment	NPV @ 15%
	₹000	₹000
E + B + C	100	48.1
E + B + D	105	49.2

In this case E + B + D would be preferable as it provides a higher NPV despite D ranking lower than C.

43. The expected cash flows of three projects are given below. The cost of capital is 10 per cent.

1) CALCULATE the payback period, net present value, internal rate of return and accounting rate of return of each project.
2) IDENTIFY the rankings of the projects by each of the four methods.

(₹ in '000)

Period	Project A (₹)	Project B (₹)	Project C (₹)
0	(5,000)	(5,000)	(5,000)
1	900	700	2,000
2	900	800	2,000
3	900	900	2,000
4	900	1,000	1,000
5	900	1,100	
6	900	1,200	
7	900	1,300	
8	900	1,400	
9	900	1,500	
10	900	1,600	

(ICAI SM)

Ans.

a) Payback Period Method:

A = 5 + (500/900) = 5.56 years

B = 5 + (500/1,200) = 5.42 years

C = 2 + (1,000/2,000) = 2.5 years

Net Present Value Method:

NPV_A = (–5,000) + (900 × 6.145) = (5,000) + 5,530.5 = ₹530.5

NPV_B is calculated as follows:

Year	Cash flow (₹)	10% discount factor	Present value (₹)
0	(5000)	1.000	(5,000)
1	700	0.909	636
2	800	0.826	661
3	900	0.751	676
4	1000	0.683	683
5	1100	0.621	683
6	1200	0.564	677
7	1300	0.513	667
8	1400	0.467	654
9	1500	0.424	636
10	1600	0.386	618
			1591

NPV_C is calculated as follows:

Year	Cash flow (₹)	10% discount factor	Present value (₹)
0	(5000)	1.000	(5,000)
1	2000	0.909	1,818
2	2000	0.826	1,652
3	2000	0.751	1,502
4	1000	0.683	683
			655

Internal Rate of Return

Project A

NPV at 12% = (5,000) + 900 × 5.650

= (5,000) + 5085 = 85

NPV at 13% = (5,000) + 900 × 5.426

= (5,000) + 4,883.40 = –116.60

IRR_A = $12+\left(\frac{85}{85+116.60}\right) \times (13–12) = 12 + 0.42$

= 12.42%

Project B

IRRB

Year	Cash flow (₹)	10% discount factor	Present value (₹)	16% discount factor	Present value (₹)
0	(5,000)	1.000	(5,000)	1.000	(5,000)
1	700	0.909	636	0.862	603
2	800	0.826	661	0.743	595
3	900	0.751	676	0.641	577
4	1,000	0.683	683	0.552	552
5	1,100	0.621	683	0.476	524
6	1,200	0.564	677	0.410	493
7	1,300	0.513	667	0.354	460
8	1,400	0.467	654	0.305	460
9	1,500	0.424	636	0.263	394
10	1,600	0.386	618	0.227	363
			1,591		(12)

Interpolating: $IRR_B = 10\% + \frac{1,591}{(1,591+12)} \times (16\%– 10\%) = 10\% + 5.94\% = 15.94\%$

Project C

IRR_C

Year	Cash flow (₹)	15% discount factor	Present value (₹)	18% discount factor	Present value (₹)
0	(5,000)	1.000	(5,000)	1.000	(5,000)
1	2,000	0.870	1,740	0.847	1,694
2	2,000	0.756	1,512	0.718	1,436
3	2,000	0.658	1,316	0.609	1,218
4	1,000	0.572	572	0.516	516
			140		(136)

Interpolating: $IRR_C = 15\% + \frac{140}{(140+136)} \times (18\%-15\%) = 15\% + 1.52\% = 16.52\%$

Accounting Rate of Return:

ARR_A: Average capital employed = $\frac{5,000}{2}$ = ₹2,500

Average accounting profit = $\frac{(9,000-5,000)}{10}$ = ₹400

$ARR_A = \frac{(400\times100)}{2,500}$ = 16 per cent

ARR_B: Average accounting profit = $\frac{(11,500-5,000)}{10}$ = ₹650

$ARR_B = \frac{(650\times100)}{2,500}$ = 26 per cent

ARR_C: Average accounting profit = $\frac{(7,000-5,000)}{4}$ = ₹500

$ARR_C = \frac{(500\times100)}{2,500}$ = 20 per cent

b) Summary of Results

Particulars	A	B	C
Payback (years)	5.5	5.4	2.5
NPV (₹)	530.50	1,591	655
IRR (%)	12.42	15.94	16.52
ARR (%)	16	26	20

Comparison of Rankings

Method	Payback	NPV	IRR	ARR
1	C	B	C	B
2	B	C	B	C
3	A	A	A	A

44. X Limited is considering purchasing of new plant worth ₹ 80,00,000. The expected net cash flows after taxes and before depreciation are as follows:

Year	1	2	3	4	5	6	7	8	9	10
Net Cash Flows (₹)	*14,00,000*	*14,00,000*	*14,00,000*	*14,00,000*	*14,00,000*	*16,00,000*	*20,00,000*	*30,00,000*	*20,00,000*	*8,00,000*

The rate of cost of capital is 10%.

You are required to CALCULATE:

1) Pay-back period
2) Net present value at 10 discount factor
3) Profitability index at 10 discount factor
4) Internal rate of return with the help of 10% and 15% discount factor

The following present value table is given for you:

Year	Present value of ₹ 1 at 10% discount rate	Present value of ₹ 1 at 15% discount rate
1	0.909	0.87
2	0.826	0.756
3	0.751	0.658
4	0.683	0.572
5	0.621	0.497
6	0.564	0.432
7	0.513	0.376

8	0.467	0.327
9	0.424	0.284
10	0.386	0.247

(ICAI SM)

Ans.

1) Calculation of Pay–back Period

Cash Outlay of the Project = ₹80,00,000
Total Cash Inflow for the first years = ₹70,00,000
Balance of cash outlay left to be paid back in the 6th year = ₹10,00,000
Cash inflow for 6th year = ₹16,00,000
Cash inflow for 6th year

So, the payback period is between 5th and 6th years, i.e.,

5 years + $\frac{₹10,00,000}{₹16,00,000}$ = 5.625 years or 5 years 7.5 months

2) Calculation of Net Present Value (NPV) @ 10% discount rate:

Year	Net Cash Inflow (₹)	Present Value at Discount Rate of 10%	Present Value (₹)
	(a)	(b)	(c) = (a) × (b)
1	14,00,000	0.909	12,72,600
2	14,00,000	0.826	11,56,400
3	14,00,000	0.751	10,51,400
4	14,00,000	0.683	9,56,200
5	14,00,000	0.621	8,69,400
6	16,00,000	0.564	9,02,400
7	20,00,000	0.513	10,26,000
8	30,00,000	0.467	14,01,000
9	20,00,000	0.424	8,48,000
10	8,00,000	0.386	3,08,800
			97,92,200

Net Present Value (NPV) = Cash Outflow – Present Value of Cash Inflows
= ₹80,00,000 – ₹97,92,200 = 17,92,200

3) Calculation of Profitability Index @ 10% discount rate:

Profitability Index = $\frac{\text{Present Value of Cash Inflows}}{\text{Cost of the investment}}$

= $\frac{₹97,92,200}{₹80,00,000}$ = 1.224

4) Calculation of Internal Rate of Return:

Net present value @ 10% interest rate factor has already been calculated in (ii) above, we will calculate Net present value @ 15%% rate factor.

Year	Net Cash Inflow (₹)	Present Value at Discount Rate of 15%	Present Value (₹)
	(a)	(b)	(c) = (a) × (b)
1	14,00,000	0.870	12,18,000
2	14,00,000	0.756	10,58,400
3	14,00,000	0.658	9,21,200
4	14,00,000	0.572	8,00,000
5	14,00,000	0.497	6,95,800

	6	16,00,000	0.432	6,91,200
	7	20,00,000	0.376	7,52,000
	8	30,00,000	0.327	9,81,000
	9	20,00,000	0.284	5,68,000
	10	8,00,000	0.247	1,97,600
				78,84,000

Net Present Value at 15% = ₹78,84,000 – ₹80,00,000 = ₹ –1,16,000

As the net present value @ 15% discount rate is negative, hence internal rate of return falls in between 10% and 15%. The correct internal rate of return can be calculated as follows:

$$IRR = L + \frac{NPV_L}{NPV_L - NPV_H}(H - L)$$

$$= 10\% + \frac{₹\,17,92,200}{₹17,92,200 - (-₹1,16,000)}(15\% - 10\%)$$

$$= 10\% + \frac{₹\,17,92,200}{₹19,08,200} \times 5\% = 14.7\%$$

45. XYZ Ltd. is presently all equity financed. The directors of the company have been evaluating investment in a project which will require ₹270 lakhs capital expenditure on new machinery. They expect the capital investment to provide annual cash flows of ₹ 42 lakhs indefinitely which is net of all tax adjustments. The discount rate which it applies to such investment decisions is 14% net.

The directors of the company believe that the current capital structure fails to take advantage of tax benefits of debt and propose to finance the new project with undated perpetual debt secured on the company's assets. The company intends to issue sufficient debt to cover the cost of capital expenditure and the after-tax cost of issue.

The current annual gross rate of interest required by the market on corporate undated debt of similar risk is 10%. The after-tax costs of issue are expected to be ₹ 10 lakhs. Company's tax rate is 30%.

You are REQUIRED to:

i) Calculate the adjusted present value of the investment,

ii) Calculate the adjusted discount rate and

iii) Explain the circumstances under which this adjusted discount rate may be used to evaluate future investments.

(ICAI SM)

Ans.

i) Calculation of Adjusted Present Value of Investment ((APV)

Adjusted PV = Base Case PV + PV of financing decisions associated with the project Base Case NPV for the project:

(-) ₹270 lakhs + (₹42 lakhs/0.14) = (-) ₹270 lakhs + ₹300 lakhs
= ₹30

Issue costs = ₹10 lakhs

Thus, the amount to be raised = ₹270 lakhs + ₹10 lakhs
= ₹280 lakhs

Annual tax relief on interest payment = ₹280 × 0.1 × 0.3
= ₹8.4 lakhs in perpetuity

The value of tax relief in perpetuity = ₹8.4 lakhs/0.1
= ₹84 lakhs

Therefore, APV = Base case PV – Issue Costs + PV of Tax Relief on debt interest
= ₹30 lakhs – ₹10 lakhs + 84 lakhs = ₹104 lakhs

ii) Calculation of Adjusted Discount Rate (ADR)

Annual Income/Savings required to allow an NPV to zero

Let the annual income be x.
(-) ₹280 lakhs X (Annual Income/0.14) = (-) ₹104 lakhs
Annual Income/0.14 = (-) ₹104 + ₹280 lakhs
Therefore, Annual income = ₹176 × 0.14 = ₹24.64 lakhs
Adjusted discount rate = (₹24.64 lakhs / ₹280 lakhs) × 100
= 8.8%

iii) Useable circumstances

This ADR may be used to evaluate future investments only if the business risk of the new venture is identical to the one being evaluated here and the project is to be financed by the same method on the same terms. The effect on the company's cost of introducing debt into the capital structure cannot be ignored.

46. Following data has been available for a capital project:

Annual cash inflows	₹ 1,00,000
Useful life	4 years
Salvage value	0
Internal rate of return	12%
Profitability index	1.064

You are required to CALCULATE the following for this project:

i) Cost of project
ii) Cost of capital
iii) Net present value
iv) Payback period

PV factors at different rates are given below:

Discount factor	12%	11%	10%	9%
1 year	0.893	0.901	0.909	0.917
2 year	0.797	0.812	0.826	0.842
3 year	0.712	0.731	0.751	0.772
4 year	0.636	0.659	0.683	0.708

(ICAI SM)

Ans. **i) Cost of the Project**

At 12% internal rate of return (IRR), the sum of total cash inflows = cost of the project i.e initial cash outlay
Annual cash inflows = ₹ 1,00,000
Useful life = 4 years

Considering the discount factor table @ 12%, cumulative present value of cash inflows for 4 years is 3.038 (0.893 + 0.797 + 0.712 + 0.636).
Hence, Total Cash inflows for 4 years for the Project is:
₹ 1,00,000 × 3.038 = ₹ 3,03,800
Hence, Cost of the Project = ₹ 3,03,800

ii) Cost of Capital

Profitability Index = $\frac{Sum\ of\ Discounted\ Cash\ in\ flows}{Cost\ of\ the\ project}$

1.064 = $\frac{Sum\ of\ Discounted\ Cash\ in\ flows}{₹3,03,800}$

∴ Sum of Discounted Cash inflows = ₹3,23,243.20

Since, Annual Cash Inflows = ₹1,00,000

Hence, cumulative discount factor for 4 years = $\frac{₹3,23,243.20}{₹1,00,000} = 3.232$

From the discount factor table, at discount rate of 9%, the cumulative discount factor for 4 years is 3.239 (0.917 + 0.842 + 0.772 + 0.708).

Hence, Cost of Capital = 9% (approx.)

iii) Net Present Value (NPV)

NPV = Sum of Present Values of Cash inflows – Cost of the Project

= ₹ 3,23,243.20 – ₹ 3,03,800 = ₹ 19,443.20

iv) Payback Period

$Payback\ period = \frac{Cost\ of\ the\ Project}{Annual\ Cash\ Inflows} = \frac{₹3,03,800}{₹1,00,000} = 3.038\ years$

47. Alley Pvt. Ltd. is planning to invest in a machinery that would cost ₹ 1,00,000 at the beginning of year 1. Net cash inflows from operations have been estimated at ₹ 36,000 per annum for 3 years. The company has two options for smooth functioning of the machinery - one is service, and another is replacement of parts. If the company opts to service a part of the machinery at the end of year 1 at ₹ 20,000, in such a case, the scrap value at the end of year 3 will be ₹ 25,000. However, if the company decides not to service the part, then it will have to be replaced at the end of year 2 at ₹ 30,800, and in this case, the machinery will work for the 4th year also and get operational cash inflow of ₹ 36,000 for the 4th year. It will have to be scrapped at the end of year 4 at ₹ 18,000.

Assuming cost of capital at 10% and ignoring taxes, DETERMINE the purchase of this machinery based on the net present value of its cash flows.

If the supplier gives a discount of ₹ 10,000 for purchase, what would be your decision?

Note: The PV factors at 10% are:

Year	0	1	2	3	4	5	6
PV Factor	1	0.9091	0.8264	0.7513	0.6830	0.6209	0.5645

(ICAI SM)

Ans. **Option I: Purchase Machinery and Service Part at the end of Year 1.**

Net Present value of cash flow @ 10% per annum discount rate.

NPV (in ₹) = $- 1,00,000 + \frac{36,000}{(1.1)} + \frac{36,000}{(1.1)^2} + \frac{36,000}{(1.1)^3} - \frac{20,000}{(1.1)} + \frac{25,000}{(1.1)^3}$

= - 1,00,000 + 36,000 (0.9091 + 0.8264 + 0.7513) – (20,000 × 0.9091) + (25,000 × 0.7513)

= - 1,00,000 + (36,000 × 2.4868) – 18,182 + 18,782.5

= - 1,00,000 + 89,524.8 – 18,182 + 18,782.5

NPV = - 9,874.7

Since, Net Present Value is negative; therefore, this option is not to be considered.

If Supplier gives a discount of ₹ 10,000, then:

NPV (in ₹) = + 10,000 – 9,874.7 = + 125.3

In this case, Net Present Value is positive but very small; therefore, this option may not be advisable.

Option II: Purchase Machinery and Replace Part at the end of Year 2.

NPV (in ₹) = $- 1,00,000 + \frac{36,000}{(1.1)} + \frac{36,000}{(1.1)^2} + \frac{36,000}{(1.1)^3} - \frac{30,800}{(1.1)^2} + \frac{54,000}{(1.1)^4}$

= - 1,00,000+ 36,000 (0.9091 + 0.8264 + 0.7513) – (30,800 × 0.8264) + (54,000 × 0.6830)

= - 1,00,000 + 36,000 (2.4868) – 25,453.12 + 36,882

= - 1,00,000 + 89,524.8 – 25,453.12 + 36,882

NPV = + 953.68

Net Present Value is positive, but very low as compared to the investment.

If the Supplier gives a discount of ₹ 10,000, then:

NPV (in ₹) = 10,000 + 953.68 = 10,953.68

Decision: Option II is worth investing as the net present value is positive and higher as compared to Option I.

48. NavJeevani hospital is considering to purchase a machine for medical projectional radiography which is priced at ₹ 2,00,000. The projected life of the machine is 8 years and has an expected salvage value of ₹ 18,000 at the end of 8th year. The annual operating cost of the machine is ₹ 22,500. It is expected to generate revenues of ₹ 1,20,000 per year for eight years. Presently, the hospital is outsourcing the radiography work to its neighbour Test Center and is earning commission income of ₹ 36,000 per annum, net of taxes.

Required:

ANALYSE whether it would be profitable for the hospital to purchase the machine. Give your recommendation under:

1) Net Present Value method
2) Profitability Index method

Consider tax @30%. PV factors at 10% are given below:

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467

(ICAI SM)

Ans. **Determination of Cash inflows**

Particulars	(₹)
Sales Revenue	1,20,000
Less: Operating Cost	22,500
	97,500
Less: Depreciation (₹ 2,00,000 – ₹ 18,000)/8	22,750
Net Income	74,750
Less: Tax @ 30%	22,425
Earnings after Tax (EAT)	52,325
Add: Depreciation	22,750
Cash inflow after tax per annum	75,075
Less: Loss of Commission Income	36,000
Net Cash inflow after tax per annum	39,075
In 8th Year:	
New Cash inflow after tax	39,075
Add: Salvage Value of Machine	18,000
Net Cash inflow in year 8	57,075

1) Calculation of Net Present Value (NPV)

Year	CFAT (₹)	PV Factor @10%	Present Value of Cash inflows (₹)
1 to 7	39,075	4.867	1,90,178.03
8	57,075	0.467	26,654.03
			2,16,832.06
	Less: Cash Outflows		2,00,000.00
		NPV	16,832.06

2) Calculation of Profitability Index

Profitability Index = $\frac{Sum\ of\ discounted\ cash\ in\ flows}{Present\ value\ of\ cash\ out\ flows} = \frac{2,16,832.06}{2,00,000} = 1.084$

Advise: Since the net present value (NPV) is positive and profitability index is also greater than 1, the hospital may purchase the machine.

49. Xavly Ltd. has a machine which has been in operation for 3 years. The machine has a remaining estimated useful life of 5 years with no salvage value in the end. Its current market value is ₹ 2,00,000. The company is considering a proposal to purchase a new model of machine to replace the existing machine. The relevant information is as follows:

Particulars	Existing Machine	New Machine
Cost of machine	₹ 3,30,000	₹ 10,00,000
Estimated life	8 years	5 years
Salvage value	Nil	₹ 40,000
Annual output	30,000 units	75,000 units
Selling price per unit	₹ 15	₹ 15
Annual operating hours	3,000	3,000
Material cost per unit	₹ 4	₹ 4
Labour cost per hour	₹ 40	₹ 70
Indirect cash cost per annum	₹ 50,000	₹ 65,000

The company uses written down value of depreciation @ 20% and it has several other machines in the block of assets. The Income tax rate is 30 per cent and Xavly Ltd. does not make any investment, if it yields less than 12 per cent.

ADVISE Xavly Ltd. whether the existing machine should be replaced or not.

PV factors @12%:

Year	1	2	3	4	5
PVF	0.893	0.797	0.712	0.636	0.567

(ICAI SM)

Ans. **i) Calculation of Net Initial Cash Outflows:**

Particulars	₹
Cost of new machine	10,00,000
Less: Sale proceeds of existing machine	2,00,000
Net initial cash outflows	8,00,000

ii) Calculation of Base for depreciation

Particulars		₹
WDV of Existing Machine		
Cost of existing machine		3,30,000
Less: Depreciation for year 1	66,000	
Depreciation for Year 2	52,800	
Depreciation for Year 3	42,240	1,61,040
WDV of Existing Machine (i)		**1,68,960**
Depreciation base of New Machine		
Cost of new machine		10,00,000
Add: WDV of existing machine		1,68,960
Less: Sales value of existing machine		2,00,000
Depreciation base of New Machine (ii)		9,68,960
Base for incremental depreciation [(ii) – (i)]		8,00,000

iii) Calculation of annual Profit Before Tax and depreciation

Particulars	Existing machine	New Machine	Differential
(1)	**(2)**	**(3)**	**(4) = (3) – (2)**
Annual output	30,000 units	75,000 units	45,000 units
	₹	₹	₹
A) Sales revenue @ ₹ 15 per unit	4,50,000	11,25,000	6,75,000
B) Less: Cost of Operation			
Material @ ₹ 4 per unit	1,20,000	3,00,000	1,80,000

Labour			
Old = 3,000 × ₹ 40	1,20,000		90,000
New = 3,000 × ₹ 70		2,10,000	
Indirect cash cost	50,000	65,000	15,000
Total Cost (B)	2,90,000	5,75,000	2,85,000
Profit Before Tax and depreciation (PBTD) (A – B)	1,60,000	5,50,000	3,90,000

iv) Calculation of Incremental Net Present Value:

Year	PBTD	Dep. @ 20%	PBT	Tax @ 30%	Net cash flow	PVF @ 12%	PV
(1)	(2)	(3)	(4=2-3)	(5)	(6=4-5+3)	(7)	(8=6 x 7)
1	3,90,000	1,60,000	2,30,000	69,000.00	3,21,000.00	0.893	2,86,653.00
2	3,90,000	1,28,000	2,62,000	78,600.00	3,11,400.00	0.797	2,48,185.80
3	3,90,000	1,02,400	2,87,600	86,280.00	3,03,720.00	0.712	2,16,248.64
4	3,90,000	81,920	3,08,080	92,424.00	2,97,576.00	0.636	1,89,258.34
5	3,90,000	65,536	3,24,464	97,339.20	2,92,660.80	0.567	1,65,938.67
							11,06,284.45
Add: PV of Salvage Value of new machine (₹ 40,000 × 0.567)							22,680.00
Less: Initial Cash Outflow							8,00,000.00
NPV							3,28,964.45

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

50. A & Co. is contemplating whether to replace an existing machine or to spend money on overhauling it. A & Co. currently pays no taxes. The replacement machine costs ₹ 90,000 now and requires maintenance of ₹ 10,000 at the end of every year for eight years. At the end of eight years it would have a salvage value of ₹ 20,000 and would be sold. The existing machine requires increasing amounts of maintenance each year and its salvage value falls each year as follows:

Year	Maintenance (₹)	Salvage (₹)
Present	0	40,000
1	10,000	25,000
2	20,000	15,000
3	30,000	10,000
4	40,000	0

The opportunity cost of capital for A & Co. is 15%.

REQUIRED:

When should the company replace the machine?

(Note: Present value of an annuity of ₹ 1 per period for 8 years at interest rate of 15%: 4.4873; present value of Re. 1 to be received after 8 years at interest rate of 15% : 0.3269).

(ICAI SM)

Ans.

A & Co.

Equivalent cost of (EAC) of new machine

	Particulars	₹
i)	Cost of new machine now	90,000
	Add: PV of annual repairs @ ₹ 10,000 per annum for 8 years (₹ 10,000 × 4.4873)	44,873
		1,34,873

	Less: PV of salvage value at the end of 8 years (₹20,000×0.3269)	6,538
		1,28,335
	Equivalent annual cost (EAC) (₹ 1,28,335/4.4873)	28,600

PV of cost of replacing the old machine in each of 4 years with new machine

Scenario	Year	Cash Flow	PV @ 15%	PV
		(₹)		(₹)
Replace Immediately	0	(28,600)	1.00	(28,600)
		40,000	1.00	40,000
				11,400
Replace in one year	1	(28,600)	0.870	(24,882)
	1	(10,000)	0.870	(8,700)
	1	25,0000	0.870	21,750
				(11,832)
Replace in two years	1	(10,000)	0.870	(8,700)
	2	(28,600)	0.756	(21,622)
	2	(20,000)	0.756	(15,120)
	2	15,000	0.756	11,340
				(34,102)
Replace in three years	1	(10,000)	0.870	(8,700)
	2	(20,000)	0.756	(15,120)
	3	(28,600)	0.658	(18,819)
	3	(30,000)	0.658	(19,740)
	3	10,000	0.658	6,580
				(55,799)
Replace in four years	1	(10,000)	0.870	(8,700)
	2	(20,000)	0.756	(15,120)
	3	(30,000)	0.658	(19,740)
	4	(28,600)	0.572	(16,359)
	4	(40,000)	0.572	(22,880)
				(82,799)

Advice: The company should replace the old machine immediately because the PV of cost of replacing the old machine with new machine is least.

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

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 administrative 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.

There will be no losses in processing, and it is assumed that the total waste processed in a given year will be sold in the same year. Estimates indicate that 50,000 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 50% Tax on its income.
You should consider Present value of Annuity of ₹ 1 per year @ 15% p.a. for 10 years as 5.019.
(ICAI SM)

Ans.

Evaluation of Alternatives:

Savings in disposing off the waste

Particulars	(₹)
Outflow (50,000 × ₹ 1)	50,000
Less: tax savings @ 50%	25,000
Net Outflow per year	**25,000**

Calculation of Annual Cash inflows in Processing of waste Material

Particulars	Amount (₹)	Amount (₹)
Sale value of waste (₹ 10 × 50,000 gallon)		5,00,000
Less: Variable processing cost (₹ 5 × 50,000 gallon)	2,50,000	
Less: Fixed processing cost	30,000	
Less: Advertisement cost	20,000	
Less: Depreciation	60,000	(3,60,000)
Earnings before tax (EBT)		1,40,000
Less: Tax @ 50%		(70,000)
Earnings after tax (EAT)		70,000
Add: Depreciation		60,000
Annual Cash inflows		**1,30,000**

Total Annual Benefits = Annual Cash inflows + Net savings (adjusting tax) in disposal cost
= ₹ 1,30,000 + ₹ 25,000 = ₹ 1,55,000

Calculation of Net Present Value

Year	Particulars	Amount (₹)
0	Investment in new equipment	(6,00,000)
1 to 10	Total Annual benefits × PVAF (10 years, 15%)	
	₹ 1,55,000 × 5.019	7,77,945
	Net Present Value	1,77,945

Recommendation: Processing of waste is a better option as it gives a positive Net Present Value.
Note- Research cost of ₹ 60,000 is not relevant for decision making as it is sunk cost.

52. A firm is in need of a small vehicle to make deliveries. It is intending to choose between two options. One option is to buy a new three-wheeler that would cost ₹1,50,000 and will remain in service for 10 years.
The other alternative is to buy a second-hand vehicle for ₹80,000 that could remain in service for 5 years. Thereafter the firm, can buy another second-hand vehicle for ₹60,000 that will last for another 5 years.
The scrap value of the discarded vehicle will be equal to it written down value (WDV). The firm pays 30% tax and is allowed to claim depreciation on vehicles @ 25% on WDV basis.
The cost of capital of the firm is 12%.
You are required to advise the best option.

Given:

t	1	2	3	4	5	6	7	8	9	10
PVIF (t, 12%)	0.892	0.797	0.711	0.635	0.567	0.506	0.452	0.403	0.360	0.322

(November - 2022)

Ans. **Selection of Investment Decision**

Tax shield on Purchase of New vehicle			
Year	**WDV**	**Dep. @ 25%**	**Tax shield @ 30%**
1	1,50,000	37,500	11,250
2	1,12,500	28,125	8,437
3	84,375	21,094	6,328
4	63,281	15,820	4,746
5	47,461	11,865	3,560
6	35,596	8,899	2,670
7	26,697	6,674	2,002
8	20,023	5,006	1,502
9	15,017	3,754	1,126
10	11,263	2,816	845
11	8,447	Scrap value	

Tax shield on Purchase of Second-hand vehicles

Year	WDV	Dep. @ 25%	Tax shield @ 30%	
1	80,000	20,000	6,000	
2	60,000	15,000	4,500	
3	45,000	11,250	3,375	
4	33,750	8,437	2,531	
5	25,313	6,328	1,898	Scrap value = ₹ 18,985
6	60,000	15,000	4,500	
7	45,000	11,250	3,375	
8	33,750	8,437	2,531	
9	25,313	6,328	1,898	
10	18,985	4,746	1,424	Scrap value = ₹ 14,239

Calculation of PV of Net outflow of New Vehicle

Year	Cash OF/IF	PV Factor	PV of OF/IF
0	1,50,000	1	1,50,000
1	(11,250)	0.892	(10,035)
2	(8,437)	0.797	(6,724)
3	(6,328)	0.711	(4,499)
4	(4,746)	0.635	(3,014)
5	(3,560)	0.567	(2,018)
6	(2,670)	0.506	(1,351)
7	(2,002)	0.452	(905)
8	(1,502)	0.403	(605)
9	(1,126)	0.360	(405)
10	(845 + 8447)	0.322	(2,992)
		PVNOF	1,17,452

Calculation of PV of Net outflow of Second-hand Vehicles

Year	Cash OF/IF	PV Factor	PV of OF/IF
0	80,000	1	80,000
1	(6,000)	0.892	(5,352)
2	(4,500)	0.797	(3,587)
3	(3,375)	0.711	(2,400)
4	(2,531)	0.635	(1,607)
5	(60000 – 18985 – 1898) = 39,117	0.567	22,179
6	(4,500)	0.506	(2,277)
7	(3,375)	0.452	(1,525)
8	(2,531)	0.403	(1,020)
9	(1,898)	0.360	(683)
10	(1424 + 14239) = (15,663)	0.322	(5,043)
		PVNOF	**78,686**

Advise: The PV of net outflow is low in case of buying the second-hand vehicles. Therefore, it is advisable to buy second hand vehicles.

Financial Analysis and Planning Ratio Analysis Assignment

Q. No. 1.

The following figures and ratios are related to a company:

i)	Sales for the year (all credit)	₹ 30,00,000
ii)	Gross Profit ratio	25 percent
iii)	PPE/asset turnover (basis on cost of goods sold)	1.5
iv)	Stock turnover (basis on cost of goods sold)	6
v)	Liquid ratio	1 : 1
vi)	Current ratio	1.5 : 1
vii)	Debtors collection period	2 Months
viii)	Reserve and surplus to Share capital	0.6 : 1
ix)	Capital gearing ratio	0.5
x)	PPE to net worth	1.20 : 1

You are required to prepare:

a) Balance Sheet of the company on the basis of above details.

b) The statement showing Working capital requirement, if the company wants to make a provision for contingencies @ 10 percent of net working capital including such provision.

(May 2010/May 2019 modified/November 2014 modified/November 2016 modified)

Ans.

a) Preparation of Balance sheet of a company working Notes:

i) Cost of goods Sold = Sales – Gross Profit (25% of sales)
= ₹ 30,00,000 - ₹ 7,50,000
= ₹ 22,50,000

ii) Closing stock = Cost of Goods Sold/ Stock Turnover
= ₹ 22,50,000/6
= ₹ 3,75,000

iii) Property plant and equipment = Cost of goods sold/PPE turnover
= ₹ 22,50,000/1.5
= ₹ 15,00,000

iv) Current assets:
Current ratio = 1.5 and liquid Ratio = 1
Stock = 1.5 – 1 = 0.5
Current Assets = Amount of stock × 1.5/0.5
= ₹ 3,75,000 × 1.5/0.5 = ₹ 11,25,000

v) Liquid Assets (Debtors and cash)
= Current Assets – Stock
= ₹ 11,25,000 - ₹ 3,75,000
= ₹ 7,50,000

vi) Debtors = Sales × Debtors collection period/12
= ₹ 30,00,000 × 2/12
= ₹ 5,00,000

vii) Cash = Liquid Assets – Debtors
= ₹ 7,50,000 - ₹ 5,00,000
= ₹ 2,50,000

viii) Net worth $= \frac{\text{PPE}}{1.2}$
= ₹ 15,00,000/1.2 = ₹ 12,50,000

ix) Reserve and surplus

Reserve and surplus to share capital ratio = .6:1 means,
On ₹ 1 of share there is ₹ 60 reserve and surplus

So, Net worth = reserve & surplus + share capital=1+.6
So Net worth = 1.6, so
Reserve and surplus = ₹ 12,50,000 × 0.6/1.6
= ₹ 4,68,750

x) Share capital = Net worth – Reserve and surplus
= ₹ 12,50,000 - ₹ 4,68,750
= ₹ 7,81,250

xi) Current Liabilities = Current Assets/Current Ratio
= ₹ 11,25,000/1.5 = ₹ 7,50,000

xii) Long-term Debts
Capital Gearing Ratio = Long-term Debts/Equity Shareholders Funds

Long-term Debts = ₹ 12,50,000 × 0.5
= ₹ 6,25,000

Balance Sheet of a Company

Particulars	Note No.	Amt. (₹)
Equity and Liabilities		
1) Shareholder's Funds		
a) Equity Share Capital	(W.n.ix)	7,81,250
b) Reserves and Surplus	(w.n.xii)	4,68,750
2) Non-current Liabilities		
a) Long-term Debts	(w.n.v)	6,25,000
3) Current Liabilities		7,50,000
Total		**26,25,000**
Assets		
1) Non-current assets		
PPE and Intangible Assets	(w.n.iii)	
a) Property Plant and Equipment	(w.n.ii)	15,00,000
2) Current Assets		
Inventories/stock	(w.n.vi)	3,75,000
Debtors/Trade Receivables	(w.n.vii)	5,00,000
Cash and Cash equivalent		2,50,000
Total		**26,25,000**

(Note: - statement showing working capital requirement)

A) Current Assets			
Stock		3,75,000	
Debtors		5,00,000	
Cash		2,50,000	11,25,000
B) Current Liabilities			7,50,000
Working Capital before Provision (A-B)			3,75,000
Add:	Provision for Contingencies @ 10% of Working Capital including Provision i.e. 1/9th of Working Capital before Provision: 3,75,0000 x 1/9		41,667
	Working Capital Requirement including Provision		4,16,667

2. Ganpati Limited has furnished the following ratios and information relating to the year ended 31st March, 2XX1.

Sales	₹ 60,00,000
Return on net worth	25%
Rate of income tax	50%
Share capital to reserves	7:3
Current ratio	2

Net profit to sales	6.25%
Inventory turnover (based on cost of goods sold)	12
Cost of goods sold	₹ 18,00,000
Interest on debentures	₹ 60,000
Receivables	₹ 2,00,000
Payables	₹ 2,00,000

You are required to:

a) CALCULATE the operating expenses for the year ended 31st March, 2XX1.

b) PREPARE a balance sheet as on 31st March in the following format:

Balance Sheet as on 31st March, 2XX1

Liabilities	₹	Assets	₹
Share Capital		Fixed Assets	
Reserve and Surplus		Current Assets	
15% Debentures		Stock	
Payables		Receivables	
		Cash	

(Modified ICAI SM 2 ques. / May 2015/July 2021 modified)

Ans.

a) Calculation of Operation Expenses for the year ended 31st March, 2XX1.

		(₹)
Net Profit [@ 6.25% of Sales]		3,75,000
Add: Income Tax (@ 50%)		3,75,000
Profit Before Tax (PBT)		7,50,000
Add: Debenture Interest		60,000
Profit before interest and tax (PBIT)		8,10,000
Sales		60,00,000
Less: Cost of goods sold	18,00,000	
PBIT	8,10,000	26,10,000
Operating Expenses		33,90,000

b) Balance Sheet as on 31st March, 2XX1

Liabilities	₹	Assets	₹
Share Capital	10,50,000	Fixed Assets	17,00,000
Reserve and Surplus	4,50,000	Current Assets:	
15% Debentures	4,00,000	Stock	1,50,000
Payables	2,00,000	Receivables	2,00,000
-	-	Cash	50,000
	21,00,000		21,00,000

Working Notes:

i) Share Capital and Reserves

The return on net worth is 25%. Therefore, the profit after tax of ₹ 3,75,000 should be equivalent to 25% of the net worth.

Net worth x $\frac{25}{100}$ = ₹ 3,75,000

∴ Net worth = $\frac{₹\ 3,75,000 \times 100}{25}$ = ₹ 15,00,000

The ratio of share capital to reserves is 7:3

Share Capital = 15,00,000 × $\frac{7}{10}$ = ₹ 10,50,000

Reserves = 15,00,000 × $\frac{3}{10}$ = ₹ 4,50,000

ii) Debentures

Interest on Debentures @ 15% = ₹ 60,000

∴ Debentures = $\frac{60,000 \times 100}{15}$ = ₹ 4,00,000

iii) Current Assets

Current Ratio = 2

Payables = ₹ 2,00,00

∴ Current Assets = 2 Current Liabilities = 2 × 2,00,00 = ₹ 4,00,000

iv) Fixed Assets

Particulars	₹
Share capital	10,50,000
Reserves	4,50,000
Debentures	4,00,000
Payables	2,00,000
	21,00,000
Less: Current Assets	4,00,000
Fixed Assets	17,00,000

v) Composition of Current Assets

Inventory Turnover = 12

$\frac{\text{Cost of goods sold}}{\text{Closing stock}}$ = 12

Composition	₹
Stock	1,50,000
Receivables	2,00,000
Cash (balancing figure)	50,000
Total Current Assets	4,00,000

Closing stock = $\frac{₹\ 18,00,00}{12}$ = Closing stock = ₹ 1,50,000

3. MNP Limited has made plans for the next year 2XX1-X2. It is estimated that the company will employ total assets of ₹ 25,00,000; 30% of assets being financed by debt at an interest cost of 9% p.a. The direct costs for the year are estimated at ₹ 15,00,000 and all other operating expenses are estimated at ₹ 2,40,000. The sales revenue are estimated at ₹ 22,50,000. Tax rate is assumed to be 40%.

Required to calculate:

i) Net profit margin
ii) Return on Assets
iii) Asset turnover
iv) Return on equity

(November 2010/ November 2022/November 2020 modified/ICAI SM modified)

Ans. **The net profit is computed as follows:**

Particulars	₹
Sales	22,50,000
Less: Direct Costs	15,00,000
Gross Profit	7,50,000
Less: Operating Expense	2,40,000
EBIT	5,10,000
Less: Interest (9% × 7,50,000)	67,500
EBT	4,42,500
Less: Taxes (@40%)	1,77,000
EAT	2,65,000

i) Net profit Margin

Net profit margin = $\frac{\text{EBIT}(1-t)}{\text{Sales}} \times 100 = \frac{5,10,000 \times (1-0.4)}{22,50,000}$

= 13.6%

ii) Return on Assets (ROA)

ROA = EBIT (1-t) ÷ Total Assets

= 5,10,000 (1-0.4) ÷ 25,00,000 = 3,06,000 ÷ 25,00,000

=0.1224 = 12.24%

iii) Asset turnover

Assets turnover = $\frac{\text{Sales}}{\text{Total Assets}} = \frac{22,50,000}{25,00,000} = 0.9$

Assets turnover = 0.9

iv) Return of equity (ROE)

ROE = $\frac{\textbf{EAT}}{\textbf{Equity}} = \frac{\textbf{2,65,500}}{\textbf{17,50,000}} = \textbf{15.17\%}$

ROE = 15.17%

4. Answer the following:

The following information relates to Bata Ltd. for the year ended 31st March 2XX1:

	₹
i) Net Working Capital	12,00,000
ii) PPE to Proprietor's Fund Ratio	0.75
iii) Working Capital Turnover Ratio	5 Times
iv) Return on Equity (ROE)	15%
v) There is no debt capital.	

You are required to calculate:

i) Proprietor's Fund

ii) Property Plant and Equipment (fixed assets)

iii) Net Profit Ratio.

(May 2013/November 2009)

Ans.

i) Calculation of Proprietor's Fund

Since Ratio of PPE to Proprietor's Fund = 0.75

Therefore, PPE = 0.75 Proprietor's Fund

Net Working PPE = (1 – 0.75) 0.25 Proprietor's Fund

12,00,000 = 0.25 Proprietor's Fund

Therefore, Proprietors Fund = $\frac{12,00,000}{0.25}$

= **48,00,000**

ii) Calculation of Property Plant and Equipment

PPE = 0.75 Proprietor's Fund

= 0.75 × 48,00,000

= 36,00,000

iii) Calculation of Net Profit Ratio

Net Working Capital = 0.25 × 48,00,000

= 12,00,000

Working Capital Turnover Ratio = $\frac{\text{Sales}}{\text{Working Capital}}$

∴ Sales = 60,00,000

ROE = $\frac{\text{PAT}}{\text{Equity}}$

0.15 = $\frac{\text{PAT}}{48,00,000}$

PAT = 7,20,000

Net Profit Ratio = $\frac{\text{Net Profit}}{\text{Sales}} \times 100$

= $\frac{7,20,000}{60,00,000} \times 100$

Net Profit Ratio = 12 %

Alternative Treatment:
PPE may be computed alternatively by (Proprietor's fund x PPE to Proprietor's Fund Ratio) and Proprietor's Fund by (PPE + Net Working Capital.)

5. The assets of SONA Ltd. consist of Property Plant and Equipment and current assets, while its current liabilities comprises bank credit and creditors in the ratio of 2:1. You are required to prepare the Balance Sheet of the company as on 31st March 2XX1 with the help of following information:

Share Capital	-	₹ 5,75,000
Working capital (CA-CL)	-	₹ 1,50,000
Gross Margin	-	25%
Inventory Turnover	-	5 times
Average Collection Period	-	1.5 months
Current Ratio	-	1.5:1
Quick Ratio	-	0.8:1
Reserves & Surplus to Bank & Cash	-	4 times

(November 2013/ March 2021 MTP)

Sol.

BALANCE SHEET AS ON 31st March 2XX1

	Particular's as at 31st March	Note	Amount
I	**Equity and Liabilities:**		
1)	Shareholder's Funds:		
	a) Share Capital	(given)	5,75,000
	b) Reserves and Surplus	Note 1	2,60,000
2)	**Current Liabilities:**		
	a) Trade Payables – Creditors	Note 2	1,00,000
	b) Other current liabilities – Bank Credit	Note 2	2,00,000
	Total		**11,35,000**
II	**Assets:**		
1)	**Non-Current Assets:**		
	PPE and Intangible Assets		
	Property Plant and Equipment	(Bal. Fig.)	6,85,000
2)	**Current Assets:**		
	a) Inventories	Note 4	2,10,000
	b) Trade receivables – Debtors	Note 7	1,75,000
	c) Cash & Cash equivalents – Cash & Bank	Note 8	65,000
			11,35,000

Working Note:

1) Current ratio = $\frac{\text{Current Assets}}{\text{Current Liabilites}}$ = 1.5 times.
Therefore, Current Asset = 1.5 × Current Liabilities

2) Net working capital = Current Assets – Current Liabilities
= 1.5 × CL – CL = 1,50,000
= 0.5 CL = 1,50,000
CL = $\frac{1,50,000}{0.5}$ = 3,00,000
Bank Credit & Creditors divided in 2:1 ratio, 2,00,000 & 1,00,000.

3) Current Assets = 1.5 x Current Liabilities = 1.5 × 3,00,000 = 4,50,000.

4) Quick ratio = $\frac{\text{Quick Assets}}{\text{Current Liabilites}}$ = 0.8
∴ $\frac{\text{Current Assets}-\text{Stock}}{\text{Current Liabilites}}$ = 0.8
So, $\frac{4,50,000-\text{Stock}}{3,00,000}$ = 0.8
Stock = ₹ 2,10,000

5) Inventory Turnover = $\frac{\text{COGS}}{\text{Stock}}$ = $\frac{\text{COGS}}{2,10,000}$ = 5 times.
So, COGS = 2,10,000 × 5 = 10,50,000

6) Since Gross Margin is 25 %, COGS constitutes 75% of sales.
So, Sales = $\frac{10,50,000}{75\%}$ = 14,00,000.

7) Debtors = 14,00,000 × $\frac{1.5}{12}$ = 1,75,000.

8) Cash & Bank = Total current assets - stock – debtors
= 4,50,000 - 2,10,000 - 1,75,000 = 65,000.

9) $\frac{\text{Reserves \& Surplus}}{\text{Cash \& Bank}}$ = 4 times so,
Reserve and surplus = cash & bank x 4 times
So, Reserve and surplus = 65,000 × 4 = 2,60,000.

6. NOOR Limited provides the following information for the year ending 31st March, 2XX1:

Equity Share Capital	₹ 25,00,000
Closing Stock	₹ 6,00,000
Stock Turnover Ratio	5 times
Gross Profit Ratio	25%
Net Profit/Sale	20%
Net Profit/Capital	$\frac{1}{4}$

You are required to prepare:
Trading and Profit & Loss Account for the year ending 31st March, 2X14.
(May 2014/November 2017)

Ans.

	Particular's as at 31st March	**Note**	**Figure from current period**
	INCOME		
a)	REVENUE FROM OPERATION	(W.N.2)	31,25,000
b)	OTHER INCOME		------
	Total Income		**31,25,000**
	EXPENSES		
c)	Purchases of stock in trade	(W.N.5)	26,06,250
d)	Changes in inventories		
	a) Inventories	(W.N.4)	(2,62,500)
e)	Other Expenses	(Balance Figure)	1,56,250
		(W.N.1)	
			6,25,000

Working Note:

1) Calculation of Net Profit:

Net profit/capital = ¼
∴ $\frac{NP}{25,00,000}$ = **¼**
∴ 4 NP = 25,00,000
∴ NP = **6,25,000**

2) Calculation of Sales:

Net profit/sales = 20%
Sales = $\frac{NP}{20\%} = \frac{6,25,000}{20\%}$ = **₹ 31,25,000**

3) Calculation of GP:

GP = Sales x 25 % = 31,25,000 x 25% = **₹ 7,81,250**

4) Calculation of Opening Stock:

Stock Turnover Ratio = $\frac{\text{COGS}}{\text{Average Stock}}$

∴ Average Stock = $\frac{23,43,750}{5}$

	∴ Average Stock = 4,68,750 ∴ $\frac{\text{Opening Stock+Closing Stock}}{2}$ = 4,68,750 ∴ $\frac{\text{Opening Stock+6,00,000}}{2}$ = 4,68,750 ∴ Opening Stock = 9,37,500 – 6,00,000 ∴ Opening Stock = **₹ 3,37,500** **5) Calculation of Purchases:** Purchase = COGS + Closing Stock - Opening Stock = 23,43,750 + 6,00,000 – 3,37,500 = **₹ 26,06,250**
7.	Following information has been gathered from the books of Tram Ltd. the equity share of which is trading in the stock market at ₹ 14. **Particulars** / **Amount (₹)** Equity Share Capital (face value ₹ 10) — 10,00,000 10% preference Shares — 2,00,000 Reserves — 8,00,000 10% Debentures — 6,00,000 Profit before Interest and Tax for the year — 4,00,000 Interest — 60,000 Profit after Tax for the year — 2,40,000 Calculate the following i) Return on Capital Employed ii) Earnings per share iii) PE ratio **(November 2019/ November 2021 RTP modified)**
Ans.	Calculation of Return on capital employed (ROCE) Capital employed = Equity Shareholders' funds + Debenture + Preference Shares = ₹ (10,00,000 + 8,00,000 + 6,00,000 + 2,00,000) = ₹26,00,000 Return on capital employed [ROCE-(Pre-tax)] = PBIT/CAPITAL EMPLOYED*100=400000/2600000*100=15.38% Return on capital employed [ROCE-(Post-tax)] = PAT/CAPITAL EMPLOYED*100 = 240000/2600000*100=9.23% Calculation of Earnings per share Earnings per share = Earnings available to equity shareholders/ No of equity shares =PAT-Preference Dividend/ No of equity shares = (240000-20000)/100000=2.20 Calculation of PE ratio PE= Market price per share/earnings per share =14/2.20=6.364
8.	Following information has been provided from the books of Laxmi Pvt. Ltd.for the year ending on 31st March, 2XX1: Net Working Capital — ₹ 4,80,000 Bank overdraft — ₹ 80,000 Fixed Assets to Proprietary ratio — 0.75 Reserves and Surplus — ₹ 3,20,000 Current ratio — 2.5 Liquid ratio (Quick Ratio) — 1.5

You are required to PREPARE a summarised Balance Sheet as at 31st March, 2XX1 assuming that there is no long-term debt.

(ICAI SM/ Nov-2020 RTP)

Ans.

i) Current Assets and Current Liabilities computation:

$\frac{\text{Current assets}}{\text{Current liabilities}} = \frac{2.5}{1}$

Or Current assets = 2.5 Current liabilities

Now, Working capital = Current assets – Current liability

Or ₹ 4,80,000 = 2.5 Current liability - Current liability

Or 1.5 Current liability = ₹ 4,80,000

∴ Current Liabilities = ₹ 3,20,000

So, Current Assets = ₹ 3,20,000 × 2.5 = ₹ 8,00,000

ii) Computation of stock

Liquid ratio $= \frac{\text{Liquid assets}}{\text{Current liabilities}}$

Or 1.5 $= \frac{\text{Current assets} - \text{inventories}}{₹\ 3,20,000}$

Or 1.5 x ₹ 3,20,000 = ₹ 8,00,000 - ₹ 4,80,000

Or Stock = ₹ 3,20,000

iii) Computation of Proprietary fund; Fixed assets; Capital and Sundry creditors

Fixed Asset to Proprietary ratio $= \frac{\text{Fixed assets}}{\text{Proprietary fund}} = 0.75$

∴ Fixed Assets = 0.75 Proprietary fund (PF)

[FA + NWC – Long Term Debt = PF] i.e. FA + NWC = PF as there is no long-term debt.

Or NWC = PF - FA (i.e. 75 PF)

Or Net Working Capital (NWC) = 0.25 Proprietary fund

Or ₹ 4,80,000 / 0.25 = Proprietary fund

Or Proprietary fund = ₹ 19,20,000

and Fixed Assets = 0.75 proprietary fund

= 0.75 x ₹ 19,20,000 = ₹ 14,40,000

Capital = Proprietary fund - Reserves & Surplus

= ₹ 19,20,000 - ₹ 3,20,000 = ₹ 16,00,000

Sundry Creditors = (Current liabilities – Bank overdraft)

= (₹ 3,20,000 - ₹ 80,000) = ₹ 2,40,000

Balance Sheet as at 31st March, 2XX1

Liabilities	₹	Assets	₹
Capital	16,00,000	Fixed Assets	14,40,000
Reserves & Surplus	3,20,000	Stock	3,20,000
Bank overdraft	80,000	Other Current Assets	4,80,000
Sundry creditors	2,40,000		
	22,40,000		22,40,000

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

Property Plant and Equipment	₹ 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	½
Property Plant and Equipment to capital	5/4
PPE/Total current assets	5/7

(May 2016/Modified ICAI SM)

Ans.

Particulars	₹	Particulars	₹
To Opening Stock	80,000	By Sales	32,00,000
To Purchase	27,20,000	By Closing stock	4,00,000
To Gross Profit c/d	8,00,000		
To Sundry expenses (balance figure)	1,60,000	By Gross Profit b/d	8,00,000
	36,00,000		36,00,000
To Net Profit	6,40,000		
	8,00,000		**8,00,000**

Balance Sheet

Liabilities	₹	Assets	₹
Capital	32,00,000	Property Plant and Equipment	40,00,000
		Investment	
Liabilities	64,00,000		
		Current Assets	4,00,000
		Closing Stock	52,00,000
		Other Current Assets	
	96,00,000		**96,00,000**

Working Notes

i) $\frac{\text{Property Plant and Equipment}}{\text{Total Current Asset}} = \frac{5}{7}$

$\frac{40,00,000}{\text{Total Current Asset}} = \frac{5}{7}$

∴ Total Current asset = 56,00,000

ii) $\frac{\text{Property Plant and Equipment}}{\text{Capital}} = \frac{5}{4}$

$\frac{40,00,000}{\text{Capital}} = \frac{5}{4}$

∴ Capital = 32,00,000

iii) $\frac{\text{Capital}}{\text{Total Liabilities}} = \frac{1}{2}$

$\frac{32,00,000}{\text{Total Liabilities}} = \frac{1}{2}$

∴ Total Liabilities = 64,00,000

iv) $\frac{\text{Net Profit}}{\text{Capital}} = \frac{1}{5}$

$\frac{\text{Net Profit}}{32,00,000} = \frac{1}{5}$

∴ Net Profit = 6,40,000

v) Net Profit Ratio $= \frac{\text{Net Profit}}{\text{Sales}} \times 100$

20 $= \frac{6,40,000}{\text{Sales}} \times 100$

∴ Sales = 32,00,000

vi) Gross Profit Ratio $= \frac{\text{Gross Profit}}{\text{Sales}} \times 100$

25 $= \frac{\text{Gross Profit}}{32,00,000} \times 100$

∴ Gross Profit = 8,00,000

vii) Cost of Goods Sold = Sales – Gross Profit

= 32,00,000 – 8,00,000

= 24,00,000

viii) Stock Turn Over Ratio $= \frac{\text{COGS}}{\text{Average Stock}}$

10 $= \frac{24,00,000}{\text{Average Stock}}$

∴ Average Stock = 2,40,000

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

2,40,000 $= \frac{\text{Opening Stock+4,00,000}}{2}$

∴ Opening Stock = 80,000

x) Cost of Goods Sold = Opening Stock + Purchase – Closing Stock

= 80,000 + purchase – 4,00,000

∴ Purchase = 27,20,000

10. The Balance Sheet of X Ltd. as on 31st March, 2XX1 is as follows:

Liabilities	₹	Assets	₹
	(000)		(000)
Equity share capital	6,000	Property Plant and	
		Equipment (at cost) 16,250	
8% Preference share capital	3,250	Less: Depreciation written off 5,200	11,050
Reserve & Surplus	1,400	Stock	1,950
10% Debentures	1,950	Sundry debtors	2,600
Sundry Creditors	3,250	Cash	250
Total	15,850	Total	15,850

The following additional information is available:

i) The stock turnover ratio based on cost of goods sold would be 6 times.
ii) The cost of PPE to sales ratio would be 1.4.
iii) PPE costing ₹ 30,00,000 to be installed on 1st April, 2XX1, payment would be made on March 31, 2XX2.
iv) In March, 2XX2, a dividend of 7 percent on equity capital would be paid.
v) ₹ 5,50,000, 11% Debentures would be issued on 1st April, 2XX1.
vi) ₹ 30,00,000, Equity shares would be issued on 31st March, 2XX2.
vii) Creditors would be 25% of materials consumed.
viii) Debtors would be 10% of sales.
ix) The cost of goods sold would be 90 percent of sales include material 40 percent and depreciation 5 percent of sales.
x) The profit is subject to debenture interest and taxation @ 30 percent.

Required:

i) Prepare the projected Balance Sheet on 31st March, 2XX2.
ii) Prepare projected Cash Flow Statement in accordance with AS-3.

(November 2007)

Ans.

X Ltd. Projected Balance Sheet (as on 31st March 20X2)

	Particulars	Notes	Amount
I	**Equity & Liabilities**		
	1) Shareholder's funds		
	a) Share capital	(1)	12,250.00
	b) Reserves & Surplus.	(2)	1,503.65
	2) Non-current liabilities		
	Long Term Borrowings	(3)	2,50.00
	3) Current liabilities		
	a) Trade payables		1,375.00
	b) Short-term provision		335.85
			17,964.50
II	**Assets**		
	1) Non-current Assets		
	Property, Plant and equipment	(4)	13,362.50

	2) Current Assets		
	a) Inventories		2,175.00
	b) Trade Receivables		1,375.00
	c) Cash and cash equivalents (b/f)		1,052.00
			17,964.50

II) Cash Flow Statement

X Ltd. Projected cash flow statements
(Indirect Method)

	Particulars	**Amount**
A)	Cash flow from Operating Activities	
	Profit after tax (WN8)	783.65
	Add: Depreciation (WN4)	687.50
	Add: Provision for taxation (WN8)	335.85
		1,807.00
	Changes in current assets & current liabilities	
	Debtors (2,600–1,375)	1,225.00
	Stock (1,950–2,175)	(225.00)
	Creditors (3,250–1,375)	(1,875.00)
	Net cash flow from Operating Activities	**932.00**
B)	Cash flow from Investing Activities	
	Purchase of PPE	(3,000.00)
	Net cash flow from Investing Activities	**(3,000.00)**
C)	Cash flow from financing Activities	
	Issue of Deb @ 11%	550.00
	Issue of shares	3,00.00
	Equity Dividend – 420	
	Preference Dividend –260	(680.00)
	Net cash flow from Financing Act.	**2870.00**
	Net Increase/Decrease in Cash flow	802.00
	Opening cash and cash equivalent	250.00
	Closing cash and cash equivalent.	**1052.00**

Notes

1)	**Share Capital**	
	Ordinary share capital	6,000
	+ 8% preference share capital	3,250
	+ New issue – ordinary share capital	3,000
		12,250
2)	**Reserves and surplus**	
	Opening Balance	1,400.00
	+ Retained Earnings (WN 8)	103.65
		1,503.65
3)	**Long Term Borrowings**	
	10% Debentures	1950.00
	11% Debentures (New)	550.00
		2500.00

4)	**Property, Plant & Equipment**		
	Existing Machine		16,250.00
	+ New Machine		3,000.00
			19,250.00
	– Depreciation		
	Opening Balance	(5,200.00)	
	Current Year's Depreciation	(687.50)	
			(5,887.00)
	Net Balance		**13,362.50**

Working Note

1) Calculation of sales

PPE = (Existing PPE + New PPE)

= 16,250 + 3,000

= 19,250

PPE to sales ratio = 1.4

$1.4 = \frac{\text{PPE}}{\text{Sales}}$

$\therefore$ Sales $= \frac{\text{PPE}}{1.4}$

$= \frac{19,250}{1.4}$

= 13,750.

2) Cost of goods sold = Sales × 90%

= 13,750 × 90%

= 12,375

$\therefore$ Net profit = 1,375.

3) Material consumed = Sales × 40%

= 13,750 × 40%

= 5,500.

4) Depreciation = Sales × 5%

= 13,750 × 5%

= 687.50

5) Creditors = Material consumed × 25%

= 5,500× 25%

= 1,375

6) Calculation of closing stock

Stock turnover ratio = 6 times

$6 \text{ times} = \frac{\text{COGS}}{\text{Average inventory}}$

Average inventory $= \frac{13,750 \times 90\%}{6}$

$= \frac{12,375}{6}$

=2,062.50

Now, Average inventory = 2,062.50

$\frac{\text{Opening inventory+closing inventory}}{2}$ = 2,062.50.

1,950 + closing inventory = 2,062.50 × 2

Closing inventory = 4,125 – 1,950

= 2,175.

7) Debtors = Sales × 10%

= 13,750 × 10%

= 1,375

8) Calculation of Provision for Taxation

Net Profit		1375.00
Less: Debenture interest		
1,950×10% = 195		
550×11% = 60.5		
		(255.50)
Profit before tax		1119.50
Tax @ 30%		(335.85)
PAT		783.65
Equity Div. (6,000 × 7%)	420	
Preference Div. (3,250×8%)	260	(680.00)
Retained Earnings.		103.65

11. The financial statements of a company contain the following information for the year ending 31st March, 2XX1:

Particulars	₹
Cash	1,60,000
Sundry Debtors	4,00,000
Short-term Investment	3,20,000
Stock	21,60,000
Prepaid Expenses	10,000
Total Current Assets	30,50,000
Current Liabilities	10,00,000
10% Debentures	16,00,000
Equity Share Capital	20,00,000
Retained Earnings	8,00,000
Statement of Profit for the year ended 31st March, 2XX1	
Sales (20% cash sales)	40,00,000
Less: Cost of goods sold	28,00,000
Profit before Interest & Tax	12,00,000
Less: Interest	1,60,000
Profit Before Tax	10,40,000
Less: Tax 30%	3,12,000
Profit After Tax	7,28,000

You are required to calculate:

i) Quick Ratio

ii) Debt-equity Ratio

iii) Return on Capital Employed, and

iv) Average collection period (Assuming 360 days in a year).

(November 2011 RTP)

Ans.

i) **Quick ratio** = $\frac{\text{Quick Assets}}{\text{Current Liabilities}}$

Quick Assets = Current Assets – Stock – Prepaid Expenses

= 30,50,000 – 21,60,000 – 10,000

Quick Assets = 8,80,000/10,00,000

Quick Ratio = 0.88:1

ii) **Debt-Equity Ratio** = $\frac{\text{Long–term debt}}{\text{Shareholders Funds}}$

= $\frac{16,00,000}{(20,00,000+8,00,000)}$

= **0.57:1**

iii) **Return on Capital Employed (ROCE)**

ROCE = $\frac{\text{PBIT}}{\text{Capital Employed}} \times 100$

= $\frac{12,00,000}{44,00,000} \times 100$ = **27.27%**

iv) **Average Collection Period**

= $\frac{\text{Sundry Debtors}}{\text{Credit Sales}} \times 360$

= $\frac{4,00,000}{32,00,000} \times 360$

= **45 days**

12. The following accounting information and financial ratios of M Limited relate to the year ended 31st March, 2XX1:

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 ₹ 30,00,000; cash sales 25% of credit sales; cash purchase = ₹ 2,30,000; working capital ₹ 2,80,000; closing inventory is ₹ 80,000 more than opening inventory.

You are required to calculate:

i) Average Inventory
ii) Purchases
iii) Average Debtors
iv) Average Creditors
v) Average Payment Period
vi) Average Collection Period
vii) Current Assets
viii) Current Liabilities

(November 2012)

Ans.

i) Computation of Average Inventory

Gross Profit = 25% of 30,00,000

Gross Profit = 7,50,000

Cost of goods sold (COGS) = 30,00,000 – 7,50,000

COGS = 22,50,000

Inventory Turnover Ratio = $\frac{\text{COGS}}{\text{Average Inventory}}$

6 = $\frac{22,50,000}{\text{Average Inventory}}$

Average inventory = **3,75,000**

ii) Computation of Purchases

Purchases = COGS + Increase in Stock

= 22,50,000 + 80,000

Purchases = **23,30,000**

iii) Computation of Average Debtors

Let Credit Sales be ₹ 100

∴ Cash sales = $\frac{25}{100} \times 100$

= ₹25

∴ Total Sales = 100 + 25

= 125

Then If

Total Sales = Credit Sales

125 = 100

30,00,000 = $\frac{30,00,000}{125} \times 100$

= 24,00,000

Credit Sales = 24,00,000

∴ Cash Sales = 6,00,000

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

= 8

Or Debtor Turnover Ratio = $\frac{24,00,000}{\text{Average debtors}}$

= 8

Or Average Debtors = $\frac{24,00,000}{8}$

∴ Average Debtors = **3,00,000**

iv) Computation of Average Creditors

Credit Purchases = Purchases – Cash Purchases

= 23,30,000 – 2,30,000

= 21,00,000

Now Creditors Turnover Ratio = $\frac{\text{Credit Purchases}}{\text{Average Creditors}}$

∴ 10 = $\frac{21,00,000}{\text{Average Creditors}}$

Or Average Creditor = **2,10,000**

v) Computation of Average Payment Period

Average Payment Period = 365 / Creditors Turnover Ratio

= $\frac{365}{10}$

= 36.5 days

∴ Average payment period = **36.5 days**

vi) Computation of Average Collection Period

Average collection period = 365 / Debtors Turnover Ratio

= $\frac{365}{8}$ = 45.625 days

∴ Average collections period = **45.625 days**

vii) Computation of Current Assets

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

or 2.4 = $\frac{\text{Current Assets}}{\text{Current Liabilities}}$

or CL = $\frac{\text{Current Assets}}{2.4}$

Working capital = Current Assets – Current liabilities

2,80,000 = $\frac{1.4 \text{ Current Assets}}{2.4}$

or Current Assets = **4,80,000**

viii) Computation of Current Liabilities

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

Current liabilities = $\frac{4,80,000}{2.4}$ = **2,00,000**

13. VRA Limited has provided the following information for the year ending 31st March, 2XX1.

Debt Equity Ratio	2 : 1
14% long term debt	₹ 50,00,000
Gross Profit Ratio	30%
Return on equity	50%
Income Tax Rate	35%
Capital Turnover Ratio	1.2 times
Opening Stock	₹ 4,50,000
Closing Stock	8% of sales

You are required to prepare Trading and Profit and Loss Account for the year ending 31st March, 2XX1. **(November 2015)**

Ans.

Trading Profit & Loss A/c
(for the year ending 31st March 2XX1)

Particulars	₹	Particulars	₹
To Opening Stock	4,50,000	By Sales	90,00,000
To Purchases (Balancing figure)	65,70,000	By Closing Stock	7,20,000
To Gross Profit c/d	27,00,000		
	97,20,000		**97,20,000**
To Interest on Long term debt @ 14%	7,00,000	By Gross Profit b/d	27,00,000
To Miscellaneous Expenses (Balancing figure)	76,923		
To Income Tax	6,73,077		
To Net Profit	12,50,000		
	27,00,000		**27,00,000**

Working Note:

Debt Equity Ratio = 2:1; $\frac{\text{Debt}}{\text{Equity}} = \frac{2}{1}$

Equity = $\frac{₹50,00,000}{2}$ = ₹ 25,00,000

Return on Equity = $\frac{\text{Net Profit after tax (PAT)}}{\text{Equity}}$ = 50%

Or, Net Profit after tax (PAT) = ₹ 25,00,000 × 50% = ₹ 12,50,000

Net Profit before tax = ₹ 12,50,000 × $\frac{100}{65}$ = ₹ 19,23,077

Tax = ₹ 19,23,077 - ₹ 12,50,000
= ₹ 6,73,077

Capital Turnover Ratio = $\frac{\text{Sales}}{\text{Capital}}$
= 1.2
Or, $\frac{\text{Sales}}{(₹ 25,00,000 + ₹ 50,00,000)}$ = 1.2

So, Sales = ₹ 75,00,000 × 1.2 = ₹ 90,00,000

Closing Stock = ₹ 90,00,000 × 8% = ₹ 7,20,000

Gross Profit = ₹ 90,00,000 × 30% = ₹ 27,00,000

14. Following information relate to a concern:

Debtors Velocity	3 months
Creditors Velocity	2 months
Stock Turnover Ratio	1.5
Gross Profit Ratio	25%
Bills Receivables	₹ 25,000
Bills Payables	₹ 10,000
Gross Profit	₹ 4,00,000
PPE to turnover Ratio	4

Closing stock of the period is ₹ 10,000 above the opening stock.
Find out:
i) Sales and cost of goods sold
ii) Sundry Debtors
iii) Sundry Creditors
iv) Closing Stock
v) Property Plant and Equipment **(Modified ICAI SM/ May 2017)**

Ans.

1) Sales and COGS:

$$\text{G.P. Ratio} = \frac{\text{Gross Profit}}{\text{Sales}} \times 100$$

$$25 = \frac{4,00,000}{\text{Sales}} \times 100$$

$$\text{Sales} = \frac{4,00,000 \times 100}{25}$$

∴ **Sales** = 16,00,000

COGS = Sales – Gross Profit
= 16,00,000 – 4,00,000

∴ **COGS** = 12,00,000

2) Sundry Debtors:

$$\textbf{Debtors Velocity} = \frac{\text{Debtors}}{\text{Sales}} \times 100$$

$$3 = \frac{\text{Debtors}}{16,00,000} \times 12$$

$$\text{Debtors} = \frac{16,00,000 \times 3}{12}$$

∴ Debtors = 4,00,000
Sundry Debtors + BR = 4,00,000
∴ Sundry Debtors = 4,00,000 – 25,000
= 3,75,000

3) Sundry Creditors

COGS = Opening Stock + Purchase – Closing Stock
12,00,000 = 7,95,000 + Purchase – 8,05,000
∴ **Purchase** = 12,10,000

$$\textbf{Creditors Velocity} = \frac{\text{Creditors}}{\text{Purchase}} \times 12$$

$$2 = \frac{\text{Creditors}}{12,10,000} \times 12$$

$$\textbf{Creditors} = \frac{12,10,000 \times 2}{12}$$

∴ **Creditors** = 2,01,667

Now Sundry Creditors + BP = 2,01,667
∴ Sundry Creditors = 2,01,667 – 10,000
= 1,91,667

4) Closing Stock

$$\textbf{Stock Turnover Ratio} = \frac{\text{COGS}}{\text{Average Stock}}$$

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

Average Stock = 8,00,000

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

$$8,00,000 = \frac{\text{Opening Stock} + (\text{Closing Stock} + 10,000)}{2}$$

16,00,000 = 2 Opening Stock + 10,000
Opening Stock = 7,95,000
Closing Stock = Opening Stock + 10,000
= 7,95,000 + 10,000

∴ **Closing Stock** = 8,05,000

5) Property Plant and Equipment

PPE TR $= \frac{\text{COGS}}{\text{Property Plant Equipment}}$

4 $= \frac{12,00,000}{\text{Property Plant Equipment}}$

∴ **Property Plant and Equipment** = 3,00,000

15. The accountant of Moon Ltd. has reported the following data:

Gross Profit	₹ 60,000
Gross Profit Margin	20 per cent
Total Assets Turnover	0.30:1
Net Worth to Total Assets	0.90:1
Current Ratio	1.5:1
Liquid Assets to Current Liability	1:1
Credit Sales to Total Sales	0.80:1
Average Collection Period	60 days

Balance Sheet of Moon Ltd.

Liabilities	₹	Assets	₹
Net Worth		PPE	
Current Liabilities		Stock	
		Debtors	
		Cash	
Total Liabilities		Total Assets	

(May 2018)

Ans.

Liabilities	₹	Assets	₹
Net Worth	9,00,000	PPE	8,50,000
Current Liabilities	1,00,000	Stock	50,000
		Debtors	40,000
		Cash	60,000
Total Liabilities	10,00,000	Total Assets	10,00,000

Sales = Gross Profit/Gross Profit Margin
= 60,000 / 0.2 = ₹ 3,00,000

Total Assets = Sales/Total Asset Turnover
= 3,00,000/0.3 = ₹ 10,00,000

Net Worth = 0.9 x Total Assets
= 0.9 × ₹ 10,00,000 = ₹ 9,00,000

Current Assets = 1.5 × Current Liability
= 1.5 × ₹ 1,00,000 = ₹ 1,50,000

Stock = Current Assets – Liquid Assets
= Current Assets – (Liquid Assets/Current Liabilities = 1)
= 1,50,000 – (Liabilities Assets/1,00,000 = 1) = ₹ 50,000

Debtors = Average Collection Period x Credit Sales/360
= 60 x 0.8 × 3,00,000/360 = ₹ 40,000

Cash = Current Assets – Debtors – Stock
= ₹ 1,50,000 - ₹ 40,000 - ₹ 50,000
= ₹ 60,000

PPE = Total Assets – Current Assets
= ₹ 10,00,000 - ₹ 1,50,000
= 8,50,000

16. The following is the information of XML Ltd. relate to the year ended 31-03-2XX2:

Gross Profit	20% of Sales
Net Profit	10% of Sales

Inventory Holding period	3 months
Receivable collection period	3 months
Non-Current Assets to Sales	1:4
Non-Current Assets to Current Assets	1:2
Current Ratio	2:1
Non-Current Liabilities to Current Liabilities	1:1
Share Capital to Reserve and Surplus	4:1
Non-current Assets as on 31st March, 2XX2	₹ 50,00,000

Assume that:

i) No change in Non-Current Assets during the year 2XX1-X2.

ii) No depreciation charged on Non-Current Assets during the year 2XX1-X2.

iii) Ignoring Tax.

You are required to Calculate cost of goods sold, Net profit, Inventory, Receivables and Cash for the year ended on 31st March, 2XX2. **(November 2018)**

Sol.

Non-Current Assets to Sale = 1:4

Non-Current Assets = ₹ 50,00,000

Sales = ₹ 50,00,000 × 4

: . Sales = ₹ 2,00,00,000

Net Profit = 10% of Sales

= 10% of ₹ 2,00,00,000

= ₹ 20,00,000

Cost of goods sold = Sales – Gross Profit

= 2,00,00,000 – 20% of 2,00,00,000

= 1,60,00,000

Raw material consumption = 80% of Sales

= 80% of ₹ 2,00,00,000

= ₹ 1,60,00,000

Inventory = ₹ $1,60,00,000 \times \frac{3}{12}$

= ₹ 40,00,000

Receivables = ₹ $2,00,00,000 \times \frac{3}{12}$

= ₹ 50,00,000

Cash = Current Asset – Inventory – Receivables

= ₹ 1,00,00,000 - ₹ 40,00,000 - ₹ 50,00,000

= ₹ 10,00,000

Note: It is assumed that all sales are credit sales.

17. From the following information, complete the Balance Sheet given below:

i) Equity Share Capital : ₹ 2,00,000

ii) Total debt to owner's equity : 0.75

iii) Total Assets turnover : 2 times

iv) Inventory turnover : 8 times

v) Fixed Assets (PPE) to owner's equity : 0.60

vi) Current debt to total debt : 0.40

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity Shares Capital	200000	PPE	?
Long term Debt	?	**Current Assets:**	?
Current Debt		Inventory	?
		Cash	?

(January 2021)

Sol.

Balance Sheet of XYZ Co.
as on March 31, 2XX1

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity Share Capital	2,00,000	Fixed Assets (PPE)	1,20,000
Long-term Debt	90,000	**Current Assets**	
Current Debt	60,000	Inventory	87,500

		Cash (balancing figure)	1,42,500
3,50,000			**3,50,000**

Working Notes

1) Total Debt = 0.75 x Equity Share Capital = 0.75 × ₹ 2,00,000 = ₹ 1,50,000
   Further, Current Debt to Total Debt = 0.40
   So, Current Debt = 0.40 × ₹ 1,50,000 = ₹ 60,000
   Long term Debt = ₹ 1,50,000 - ₹ 60,000 = ₹ 90,000
2) Fixed Assets (PPE) = 0.60 x Equity Share Capital = 0.60 × ₹ 2,00,000 = ₹ 1,20,000
3) Total Assets to Turnover = 2 times; Inventory Turnover = 8 times
   Hence, Inventory / Total Assets = 2/8 = 1/4
   Further, Total Assets = ₹ 2,00,000 + ₹ 1,50,000 = ₹ 3,50,000
   Therefore, Inventory = Total Assets – Fixed Assets (PPE) – Inventory
   = ₹ 3,50,000 - ₹ 1,20,000 - ₹ 87,500 = ₹ 1,42,500

18. In a meeting held at Solan towards the end of 2XX1, the Directors of M/s HPCL Ltd.have taken a decision to diversify. At present HPCL Ltd. sells all finished goods from its own warehouse. The company issued debentures on 01.01.2XX2 and purchasedfixed assets on the same day. The purchase prices have remained stable during the concerned period. Following information is provided to you:

INCOME STATEMENTS

Particulars	**2XX1 (₹)**		**2XX2 (₹)**	
Cash Sales	30,000		32,000	
Credit Sales	2,70,000	3,00,000	3,42,000	3,74,000
Less: Cost of goods sold		2,36,000		2,98,000
Gross profit		64,000		76,000
Less: Operating Expenses				
Warehousing	13,000		14,000	
Transport	6,000		10,000	
Administrative	19,000		19,000	
Selling	11,000		14,000	
		49,000		57,000
Net Profit		15,000		19,000

BALANCE SHEET

Assets & Liabilities	**2XX1 (₹)**		**2XX2 (₹)**	
Fixed Assets (Net Block)	-	30,000	-	40,000
Receivables	50,000		82,000	
Cash at Bank	10,000		7,000	
Stock	60,000		94,000	
Total Current Assets (CA)	1,20,000		1,83,000	
Payables	50,000		76,000	
Total Current Liabilities (CL)	50,000		76,000	
Working Capital (CA - CL)		70,000		1,07,000
Net Assets		1,00,000		1,47,000
Represented by:				
Share Capital		75,000		75,000
Reserve and Surplus		25,000		42,000
Debentures		-		30,000
		1,00,000		1,47,000

You are required to CALCULATE the following ratios for the years 2XX1 and 2XX2.

i) Gross Profit Ratio
ii) Operating Expenses to Sales Ratio.

iii) Operating Profit Ratio
iv) Capital Turnover Ratio
v) Stock Turnover Ratio
vi) Net Profit to Net Worth Ratio, and
vii) Receivables Collection Period.

Ratio relating to capital employed should be based on the capital at the end of theyear. Give the reasons for change in the ratios for 2 years. Assume opening stock of ₹40,000 for the year 2XX1. Ignore Taxation. **(ICAI SM)**

Ans.

Ratio	2XX1(₹)	2XX2 (₹)
1) Gross profit ration (Gross profit/sales)	$\frac{64,000 \times 100}{3,00,000} = 21.3\%$	$\frac{76,000 \times 100}{3,74,000} = 20.3\%$
2) Operating expense to sales ratio (Operating exp/Total sales)	$\frac{49,000 \times 100}{3,00,000} = 16.3\%$	$\frac{57,000 \times 100}{3,74,000} = 15.2\%$
3) Operating profit ratio (operating profit / Total sales)	$\frac{15,000 \times 100}{3,00,000} = 5\%$	$\frac{19,000 \times 100}{3,74,000} = 5.08\%$
4) Capital turnover ratio (sales / capital employed)	$\frac{3,00,000}{1,00,000} = 3$	$\frac{3,74,000}{1,47,000} = 2.54$
5) Stock turnover ratio (COGS / Average stock)	$\frac{2,36,000 \times 100}{50,000} = 4.72$	$\frac{2,98,000}{77,000} = 3.87$
6) Net Profit to Net worth (Net profit / Net worth)	$\frac{15,000 \times 100}{1,00,000} = 15\%$	$\frac{19,000 \times 100}{1,17,000} = 16.24\%$
7) Receivables collections period (Average receivables/Average daily credit sales) (Refer to working note)	$\frac{50,000}{739.73} = 67.6$ days	$\frac{82,000}{936.99} = 87.5$ days
Working not: Average daily sales = Credit sales /365	$\frac{2,70,000}{365} = 739.73$	$\frac{3,42,000}{365} = 936.99$

Analysis: The decline in the Gross profit ratio could be either due to a reduction e selling price or increase in the direct expenses (since the purchase price has remained the same). In this case, cost of goods sold have increased more than proportion of increment in sales & hence impacting gross profit ratio.

Similarly, there is a decline in the ratio of operating expenses to sales. Further analysis reveals that in comparison to increase in sales, there has a lesser proportionate increase in operating expenses. As a result, even the operating profit ratio has remained the same approximately in spite of a decline in the Gross profit ratio.

The company has not been able to deploy its capital efficiently. This is indicatedby a decline in the Capital turnover ratio from 3 to 2.54 times.

The decline in stock turnover ratio implies that the company has increased its investment in stock. Net Profit to Net worth ratio has increased indicating that the company's Net worth or Shareholders' capital is efficient in generating profits.

The increase in the Receivables collection period indicates that the company has become liberal in extending credit on sales. There is a corresponding increase in the receivables also due to such credit policy.

19. Following is the abridged Balance Sheet of Alpha Ltd.:-

Liabilities	₹	Assets	₹	₹
Share Capital	1,00,000	Land and Buildings		80,000
Profit and Loss Account	17,000	Plant and Machineries	50,000	
Current Liabilities	40,000	Less: Depreciation	15,000	35,000
				1,15,000
		Stock	21,000	
		Receivables	20,000	
		Bank	1,000	42,000
Total	1,57,000	Total		1,57,000

With the help of the additional information furnished below, you are required to PREPARE Trading and Profit & Loss Account and a Balance Sheet as at 31st March, 2XX1:

The company went in for reorganisation of capital structure, with share capital remaining the same as follows:

Share capital	50%
Other Shareholders' funds	15%
5% Debentures	10%
Payables	25%

Debentures were issued on 1st April, interest being paid annually on 31st March.

a) Land and Buildings remained unchanged. Additional plant and machinery has been bought and a further ₹ 5,000 depreciation written off.
(The total fixed assets then constituted 60% of total fixed and current assets.)
b) Working capital ratio was 8 : 5.
c) Quick assets ratio was 1 : 1.
d) The receivables (four-fifth of the quick assets) to sales ratio revealed a credit period of 2 months. There were no cash sales.
e) Return on net worth was 10%.
f) Gross profit was at the rate of 15% of selling price.
g) Stock turnover was eight times for the year.Ignore Taxation. **(ICAI SM)**

Ans.

Particulars	%	(₹)
Share capital (given to be same)	50%	1,00,000
Other shareholders funds	15%	30,000
5% Debentures	10%	20,000
Payables	25%	50,000
Total (1,00,000 / 50%)	100%	2,00,000

Land and Buildings

Total liabilities = Total Assets
₹2,00,000 = Total Assets
Fixed Assets = 60% of total fixed assets and current assets
= ₹2,00,000 x 60/100 = ₹1,20,000

Calculation of additions to Plant & Machinery

Particulars	₹
Total fixed assets	1,20,000
Less: Land & Buildings	80,000
Plant and Machinery (after providing depreciation)	40,000
Less: Existing Plant & Machinery (after extra depreciation of ₹ 5,000) i.e. 50,000 – 20,000	30,000
Addition to the Plant & Machinery	10,000

Current assets = Total assets – Fixed assets
= ₹2,00,000 – ₹ 1,20,000 = ₹ 80,000

Calculation of stock

Quick ratio = $\frac{\text{Current assets} - \text{Stock}}{\text{Current liabilities}} = 1$

= $\frac{₹80,000 - \text{stock}}{₹50,000} = 1$

₹50,000 = ₹80,000 – Stock

Stock = ₹80,000 – 50,000

= ₹30,000

Receivables = 4/5th of quick assets

= (₹80,000 - ₹30,000) × 4/5

= ₹40,000

Receivables turnover ratio

= $\frac{\text{Receivables}}{\text{Credit Sales}} \times 12 \text{ months} = 2 \text{ months}$

= $\frac{40,000 \times 12}{\text{Credit Sales}} = 2 \text{ months}$

2 x credit sales = 4,80,000

Credit sales = 4,80,000/2

= ₹2,40,000 = Total Sales (As there were no cash sales)

Gross profit (15% of sales)

₹2,40,000 x 15/100 = ₹36,000

Return on net worth (net profit)

Net worth = ₹1,00,000 + ₹ 30,000

= ₹1,30,000

Net profit = ₹1,30,000 × 10/100 = ₹ 13,000

Debenture interest = ₹ 20,000 × 5/100 = ₹ 1,000

Projected profit and loss account for the year ended 31-03-2XX1

To cost of goods sold	2,04,000	By sales	2,40,000
To gross profit	36,000		
	2,40,000		2,40,000
To debenture interest	1,000	By gross profit	36,000
To administration and other expenses (bal. fig)	22,000		
To net profit	13,000		
	36,000		36,000

Projected Balance Sheet as at 31st March, 2XX1

Liabilities	₹	Assets	₹	₹
Share capital	1,00,000	Fixed assets		
Profit and loss A/c	30,000	Land & buildings		80,000
(17,000+13,000)		Plant & machinery	60,000	
5% Debentures	20,000	Less: Depreciation	20,000	40,000
Current liabilities		Current assets		
		Stock	30,000	
Trade creditors	50,000	Receivables	40,000	
	_	Bank	10,000	80,000
	2,00,000			2,00,000

20. ABC Company sells plumbing fixtures on terms of 2/10, net 30. Its financial statements over the last 3 years are as follows:

Particulars	2XX1	2XX2	2XX3
	₹	₹	₹
Cash	30,000	20,000	5,000
Accounts receivable	2,00,000	2,60,000	2,90,000
Inventory	4,00,000	4,80,000	6,00,000
Net fixed assets	8,00,000	8,00,000	8,00,000
	14,30,000	15,60,000	16,95,000
	₹	₹	₹
Accounts payable	2,30,000	3,00,000	3,80,000
Accruals	2,00,000	2,10,000	2,25,000
Bank loan, short-term	1,00,000	1,00,000	1,40,000
Long-term debt	3,00,000	3,00,000	3,00,000
Common stock	1,00,000	1,00,000	1,00,000
Retained earnings	5,00,000	5,50,000	5,50,000
	14,30,000	15,60,000	16,95,000
	₹	₹	₹
Sales	40,00,000	43,00,000	38,00,000
Cost of goods sold	32,00,000	36,00,000	33,00,000
Net profit	3,00,000	2,00,000	1,00,000

ANALYSE the company's financial condition and performance over the last 3 years. Are there any problems? **(ICAI SM)**

Ans.

Ratios	2XX1	2XX2	2XX3
Current ratio	1.19	1.25	1.20
Acid-test ratio	0.43	0.46	0.40
Average collection period	18	22	27
Inventory turnover	NA*	8.2	6.1
Total debt to net worth	1.38	1.40	1.61
Long-term debt to total capitalization	0.33	0.32	0.32
Gross profit margin	0.200	0.163	0.132
Net profit margin	0.075	0.047	0.026
Asset turnover	2.80	2.76	2.24
Return on assets	0.21	0.13	0.06

Analysis: The company's profitability has declined steadily over the period. As only ₹ 50,000 is added to retained earnings, the company must be paying substantial dividends. Receivables are growing slower, although the average collection period is still very reasonable relative to the terms given. Inventory turnover is slowing as well, indicating a relative build-up in inventories. The increase in receivables and inventories, coupled with the fact that net worth has increased very little, has resulted in the total debt-to-worth ratio increasing to what would have to be regarded on an absolute basis as a high level.

The current and acid-test ratios have fluctuated, but the current ratio is not particularly inspiring. The lack of deterioration in these ratios is clouded by the relative build up in both receivables and inventories, evidencing deterioration inthe liquidity of these two assets. Both the gross profit and net profit margins have declined substantially. The relationship between the two suggests that thecompany has reduced relative expenses in 2019 in particular. The build-up in inventories and receivables has resulted in a decline in the asset turnover ratio, and this, coupled with the decline in profitability, has resulted in a sharp decrease in the return on assets ratio.

21. Following information are available for Navya Ltd. along with various ratio relevant to the particulars industry it belongs to. APPRAISE your comments on strength and weakness of Navya Ltd. comparing its ratios with the given industry norms.

Navya Ltd.

BALANCE SHEET AS AT 31.3.2XX1

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity Share Capital	48,00,000	Fixed Assets	24,20,000
10% Debentures	9,20,0000	Cash	8,80,000
Sundry Creditors	6,60,000	Sundry debtors	11,00,000
Bills Payable	8,80,000	Stock	33,00,000
Other current Liabilities	4,40,000		-
Total	77,00,000	Total	77,00,000

STATEMENT OF PROFITABILITY
FOR THE YEAR ENDING 31.3.2XX1

Particulars	Amount (₹)	Amount (₹)
Sales		1,10,00,000
Less: Cost of goods sold:	-	-
Material	41,80,000	-
Wages	26,40,000	-
Factory Overhead	12,98,000	81,18,000
Gross Profit	-	28,82,000
Less: Selling and Distribution Cost	11,00,000	-
Administrative Cost	12,28,000	23,28,000
Earnings before Interest and Taxes	-	5,54,000
Less: Interest Charges	-	92,000
Earning before Tax	-	4,62,000
Less: Taxes @ 50%	-	2,31,000
Net Profit (PAT)		2,31,000

INDUSTRY NORMS

Ratios	Norm
Current Ratio	2.5
Receivables Turnover Ratio	8.0
Inventory Turnover Ratio (based on Sales)	9.0
Total Assets Turnover Ratio	2.0
Net Profit Ratio	3.5%
Return on Total Assets	7.0%
Return on Net worth (Based on Net profit)	10.5%
Total Debt/Total Assets	60.0%

(ICAI SM)

Ans.

Ratios	Navya Ltd.	Industry Norms
1) Current Ratio = $\frac{\text{Current Assets}}{\text{Current Liabilities}}$	$\frac{52,80,000}{19,80,000} = 2.67$	2.50
2) Receivable Turnover Ratio = $\frac{\text{Sales}}{\text{Debtors}}$	$\frac{1,10,00,000}{11,00,000} = 10.0$	8.00
3) Inventory turnover ratio = $\frac{\text{Sales}}{\text{Stock}}$	$\frac{1,10,00,000}{33,00,000} = 3.33$	9.00
4) Total Asset Turnover ratio = $\frac{\text{Sales}}{\text{Total Assets}}$	$\frac{1,10,00,000}{77,00,000} = 1.43$	2.00
5) Net Profit Ratio = $\frac{\text{Net Profit}}{\text{Sales}}$	$\frac{2,31,000}{1,10,00,000} = 2.10\%$	3.50%
6) Return on Total Asset = $\frac{\text{Net Profit}}{\text{Total Assets}}$	$\frac{2,31,000}{1,10,00,000} = 3.00\%$	7%
7) Return on Net worth (Based on Net profit) = $\frac{\text{Net Profit}}{\text{Net Worth}}$	$\frac{2,31,000}{48,00,000} = 4.81\%$	10.5%
8) $\frac{\text{Total Debt}}{\text{Total Assets}}$	$\frac{29,00,000}{77,00,000} = 37.66\%$	60%

Comments:

1) The position of Navya Ltd. is better than the industry norm with respect to Current Ratios and the Sales to Debtors Ratio.
2) However, the position of sales to stock and sales to total assets is poor comparing to industry norm.
3) The firm also has its net profit ratios, net profit to total assets and net profit to total worth ratio much lower than the industry norm.
4) Total debt to total assets ratio suggest that, the firm is geared at lower level and debt are used to Asset.

22. The total sales (all credit) of a firm are ₹ 6,40,000. It has a gross profit margin of 15 per cent and a current ratio of 2.5. The firm's current liabilities are ₹ 96,000; inventories ₹48,000 and cash ₹ 16,000.

a) DETERMINE the average inventory to be carried by the firm, if aninventory turnover of 5 times is expected? (Assume a 360-day year).

b) DETERMINE the average collection period if the opening balance ofdebtors is intended to be of ₹ 80,000? (Assume a 360-day year). **(ICAI SM)**

Ans.

a) Inventory turnover = $\frac{\text{Cost of goods sold}}{\text{Average inventory}}$

Since gross profit margin is 15 percent, the cost of goods sold should be 85 percent of the sales.

Cost of goods sold = 0.85 × ₹ 0.85 × ₹ 6,40,000 = ₹ 5,44,000.

Thus = $\frac{₹5,44,000}{\text{Average inventory}}$ = 5

Average inventory = $\frac{₹5,44,000}{5}$ = ₹1,08,800

b) Average collection period = $\frac{\text{Average Receivables}}{\text{Credit Sales}}$ × 360 days

Average Receivables = $\frac{(\text{Opening Receivables} + \text{Closing Receivables})}{2}$

Closing balance of receivables is found as follows:

	₹	₹
Current assets (2.5 of current liabilities)		2,40,000

Less: Inventories		48,000	
Cash		16,000	64,000
∴Receivables			1,76,000

Average Receivables $= \frac{₹1,76,000+₹80,000}{2}$

₹2,56,000 ÷ 2 = ₹1,28,000

Average collection period $= \frac{₹1,28,000}{₹6,40,000} \times 360 = 72$ days

23. The capital structure of Beta Limited is as follows:

Equity share capital of ₹ 10 each	8,00,000
9% preference share capital of ₹ 10 each	3,00,000
	11,00,000

Additional information: Profit (after tax at 35 per cent), ₹ 2,70,000; Depreciation, ₹ 60,000; Equity dividend paid, 20 per cent; Market price of equity shares, ₹ 40.

You are required to COMPUTE the following, showing the necessary workings:

a) Dividend yield on the equity shares

b) Cover for the preference and equity dividends

c) Earnings per shares

d) Price-earnings ratio.

(ICAI SM)

Ans.

a) Dividend yield on the equity shares

$= \frac{\text{Dividend per share}}{\text{Market price per share}} \times 100 = \frac{₹2\ (0.20 \times ₹10)}{₹40} \times 100 = 5\%$

b) Dividend coverage ratio

i) Preference $= \frac{\text{profit after taxes}}{\text{Dividend payable to preference shareholders}}$

$= \frac{₹\ 2,70,00}{₹\ 27,000\ (0.09 \times ₹\ 3,00,000)} = 10$ times

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

$= \frac{₹2,70,000 - ₹\ 27,000}{₹1,60,000\ (80,000\ \text{shares x}\ ₹2)} = 1.52$ times

c) Earnings per equity share $= \frac{\text{Earnings available to equity shareholders}}{\text{Numeber of equity shares outstanding}}$

$= \frac{₹2,43,000}{80,000} = ₹3.04$ per share

d) Price-earning (P/E) ratio $= \frac{\text{Market price per share}}{\text{Earnings per share}} = \frac{₹\ 40}{₹\ 3.04} = 13.2$ times

24. The following accounting information and financial ratios of PQR Ltd. relate to the year ended 31st March, 2XX2

1	Accounting Information:	
	Gross Profit	15% of Sales
	Net profit	8% of sales
	Raw materials consumed	20% of works cost
	Direct wages	10% of works cost
	Stock of raw materials	3 months' usage
	Stock of finished goods	6% of works cost
	Debt collection period	60 days
	All sales are on credit	
2	Financial Ratios:	
	Fixed assets to sales	1 : 3
	Fixed assets to Current assets	13 : 11
	Current ratio	2 : 1

	Long-term loans to Current liabilities	2 : 1
	Capital to Reserves and Surplus	1 : 4

If value of Fixed Assets as on 31st March, 2XX1 amounted to ₹ 26 lakhs, PREPARE a summarised Profit and Loss Account of the company for the year ended 31st March, 2XX2 and also the Balance Sheet as on 31st March, 2XX2.

(ICAI SM)

Ans.

a) Working Notes:

i) Calculation of Sales $= \frac{\text{Fixed Aseets}}{\text{Sales}} - \frac{1}{3}$

$\therefore \frac{26,00,000}{\text{Sales}} = \frac{1}{3} \Longrightarrow$ Sales = ₹ 78,00,000

ii) Calculation of Current Assets

$\frac{\text{Fixed Assets}}{\text{Current Assets}} - \frac{13}{11}$

$\therefore \frac{26,00,000}{\text{Current Assets}} = \frac{13}{11} \Longrightarrow$ Current Assets = ₹ 22,00,000

iii) Calculation of Raw Material Consumption and Direct Wages

Particulars	₹
Sales	78,00,000
Less: Gross Profit	11,70,000
Works Cost	66,30,000

Raw Material Consumption (20% of Works cost) ₹ 13,26,000

Direct Wages (10% of Works Cost) ₹ 6,63,000

iv) Calculation of Stock of Raw Materials (= 3 months usage)

$= 13,26,000 \times \frac{3}{12} = ₹ 3,31,500$

v) Calculation of Stock of Finished Goods (= 6% of Works Cost)

$= 66,30,000 \times \frac{6}{100} = ₹ 3,97,800$

vi) Calculation of Current Liabilities

$\frac{\text{Current Assets}}{\text{Current Liabilities}} = 2$

$\therefore \frac{22,00,000}{\text{Current Liabilities}} = 2 \Longrightarrow$ Current Liabilities = ₹ 11,00,000

vii) Calculation of Receivables

Average collection period $= \frac{\text{Receivables}}{\text{Credit Sales}} \times 365$

$\frac{\text{Receivables}}{78,00,000} \times 365 = 60 \Longrightarrow$ Receivables = ₹ 12,82,191.78 or ₹ 12,82,192

viii) Calculation of Long-term Loan

$\frac{\text{Long term Loan}}{\text{Current Liabilities}} = \frac{2}{1}$

$\frac{\text{Long term Loan}}{11,00,000} = \frac{2}{1} \Longrightarrow$ Long term loan = ₹ 22,00,000

ix) Calculation of Cash Balance

Particulars		₹
Current assets		22,00,000
Less: Receivable	12,82,192	
Raw materials stock	3,31,500	
Finished goods stock	3,97,800	20,11,492
Cash balance		1,88,508

x) Calculation of Net worth

Fixed Assets		26,00,000
Current Assets		22,00,000
Total Assets		48,00,000
Less: Long term Loan	22,00,000	
Current Liabilities	11,00,000	33,00,000
Net worth		15,00,000

Net worth = Share capital + Reserves = 15,00,000

$= \frac{\text{Capital}}{\text{Reserves and Surplus}} = \frac{1}{4} \Longrightarrow$ Share Capital

$= 15,00,000 \times \frac{1}{5} = ₹\,3,00,000$

Reserves and Surplus = $15,00,000 \times \frac{4}{5} = ₹\,12,00,000$

Profit and Loss Account of PQR Ltd.
For the year ended 31st March, 2XX2

Particulars	₹	Particulars	₹
To Direct Materials	13,26,000	By Sales	78,00,000
To Direct Wages	6,63,000		
To Works (Overhead)Balancing figure	46,41,000		
To Gross Profit c/d (15% of Sales)	11,70,000		_
	78,00,000		78,00,000
To Selling andDistribution Expenses (Balancing figure)	5,46,000	By Gross Profit b/d	11,70,000
To Net Profit (8% ofSales)	6,24,000		_
	11,70,000		11,70,000

Balance Sheet of PQR Ltd.
as at 31st March, 2XX2

Liabilities	₹	Assets	₹
Share Capital	3,00,000	Fixed Assets	26,00,000
Reserves and Surplus	12,00,000	Current Assets:	
Long term loans	22,00,000	Stock of Raw Material	3,31,500
Current liabilities	11,00,000	Stock of Finished Goods	3,97,800
		Receivables	12,82,192
		Cash	1,88,508
	48,00,000		48,00,000

25. Using the following information, PREPARE the balance sheet:

	₹		₹
Cash	_____	Notes and payables	1,00,000
Accounts receivable	_____	Long-term debt	_____
Inventory	_____	Common stock	1,00,000
Plant and equipment	_____	Retained earnings	1,00,000
Total assets	_____	Total liabilities and equity	_____

Long-term debt to net worth	0.5 to 1
Total asset turnover	2.5
Average collection period*	18 days
Inventory turnover	9
Gross profit margin	10%
Acid-test ratio	1 to 1

*Assume a 360-day year and all sales on credit. **(ICAI SM)**

Ans.

$\frac{\text{Long–term debt}}{\text{Net worth}} = 0.5 = \frac{\text{Long–term debt}}{2,00,000}$

Long-term debt = ₹ 1,00,000

Total liabilities and net worth = ₹ 4,00,000

Total assets = ₹ 4,00,000

$\frac{\text{Sales}}{\text{Total assets}} = 2.5 = \frac{\text{Sales}}{₹\ 4,00,000} = \text{Sales} = ₹\ 10,00,000$

Cost of good sold = (0.9) (₹ 10,00,000) = ₹ 9,00,000.

$\frac{\text{Cost of goods sold}}{\text{Inventory}} = \frac{9,00,000}{\text{Inventory}} = 9 = \text{Inventory} = ₹\ 1,00,000$

$\frac{\text{Receivables x 360}}{10,00,000} = 18 \text{ days}$

Receivables = ₹ 50,000

$\frac{\text{Cash+50,000}}{1,00,000} = 1$

Cash = ₹ 50,000

Plant and equipment = ₹ 2,00,000.

Balance Sheet

Particulars	₹	Particulars	₹
Cash	50,000	Notes and payables	1,00,000
Accounts receivable	50,000	Long-term debt	1,00,000
Inventory	1,00,000	Common stock	1,00,000
Plant and equipment	2,00,000	Retained earnings	1,00,000
Total assets	4,00,000	Total liabilities and equity	4,00,000

26. Manan Pvt. Ltd. gives you the following information relating to the year ending31st March, 2XX1:

1) Current Ratio 2.5 : 1
2) Debt-Equity Ratio 1 : 1.5
3) Return on Total Assets (After Tax) 15%

4) Total Assets Turnover Ratio	2
5) Gross Profit Ratio	20%
6) Stock Turnover Ratio	7
7) Net Working Capital	₹ 13,50,000
8) Fixed Assets	₹ 30,00,000
9) 1,80,000 Equity Shares of	₹ 10 each
10) 60,000, 9% Preference Shares of	₹ 10 each
11) Opening Stock	₹ 11,40,000

You are required to CALCULATE:

a) Quick Ratio
b) Fixed Assets Turnover Ratio
c) Proprietary Ratio
d) Earnings per Share **(ICAI SM)**

Ans.

Workings Notes:

i) Net Working Capital = Current Assets – Current Liabilities
= 2.5 – 1 = 1.5

Thus, Current Assets $= \frac{\text{Net Working} \times 2.5}{1.5}$
$= \frac{₹\ 13,50,000 \times 25}{1.5} = ₹\ 22,50,000$

Current Liabilities = ₹ 22,50,00 - ₹ 13,50,000 = ₹ 9,00,000

ii) Sales = Total Assets Turnover × Total Assets
= 2 × (Fixed Assets + Current Assets)
= 2 × (₹ 30,00,000 + ₹ 22,50,000) = ₹ 1,05,00,000

iii) Cost of Goods Sold = 100% - 20% = 80% of Sales
= 80% of ₹ 1,05,00,000 = ₹ 84,00,000

iv) Average Stock $= \frac{\text{Cost of Good Sold}}{\text{Stock Turnover Ratio}} - \frac{₹\ 84,00,000}{7}$
= ₹ 12,00,000

Closing Stock = (Average Stock × 2) – Opening Stock
= (₹ 12,00,000 × 2) - ₹ 11,40,000 = ₹ 12,60,000

Quick Assets = Current Assets - Closing Stock
= ₹ 22,50,000 - ₹ 12,60,000 = ₹ 9,90,000

$\frac{\text{Debt}}{\text{Equity (here Proprietary fund)}} - \frac{1}{1.5}$, Or Proprietary fund = 1.5 Debt

Total Asset = Proprietary Fund (Equity) + Debt
Or 52,50,000 = 1.5 Debt + Debt
Or Debt $= \frac{₹\ 52,50,000}{2.5} = ₹\ 21,00,000$
Proprietary fund = 21,00,000 × 1.5 = ₹ 31,50,000
$= \frac{₹\ 52,50,000 \times 1.5}{2.5} = ₹\ 31,50,000$

v) Profit after tax (PAT) = Total Assets x Return on Total Assets
= ₹ 52,50,000 × 15% = ₹ 7,87,500

a) Calculation of Quick Ratio

Quick Ratio $= \frac{\text{Quick Assets}}{\text{Current Liabilities}} = \frac{₹\ 9,90,000}{₹\ 9,00,000} = 1.1:1$

b) Calculation of Fixed Assets Turnover Ratio

Fixed Assets Turnover Ratio $= \frac{\text{Sales}}{\text{Fixed Assets}} = \frac{₹\ 1,05,00,000}{₹\ 30,00,000} = 3.5$

c) Calculation of Proprietary Ratio

Proprietary Ratio $= \frac{\text{Proprietary fund}}{\text{Total Assets}} - \frac{₹\ 31,50,000}{₹\ 52,50,000} = 0.6:1$

d) Calculation of Earnings per Equity Share (EPS)

Earnings per Equity Share (EPS) $= \frac{\text{PAT} - \text{Preference Share Dividend}}{\text{Number of Equity Shares}}$
$= \frac{₹\ 7,87,500 - ₹\ 54,000\ (9\%\ \text{of}\ ₹\ 6,00,000)}{₹\ 1,80,000}$
= ₹ 4.075 per share

27. XYZ Ltd. has Owner's equity of ₹ 2,00,000 and the ratios of the company are as follows:

Current debt to total debt	0.3
Total debt to Owner's equity	0.5
Fixed assets to Owner's equity	0.6
Total assets turnover	2 times
Inventory turnover	10 times

COMPLETE the following Balance Sheet from the information given above:

Liabilities	(₹)	Assets	(₹)
Current Debt	-	Cash	-
Long-term Debt	-	Inventory	-
Total Debt	-	Total Current Assets	-
Owner's Equity	-	Fixed Assets	-

(April 2021 MTP)

Ans.

Balance Sheet

Liabilities	(₹)	Assets	(₹)
Current debt	30,000	Cash (balancing figure)	1,20,000
Long term debt	70,000	Inventory	60,000
Total Debt	1,00,000	Total Current Assets	1,80,000
Owner's Equity	2,00,000	Fixed Assets	1,20,000
Total liabilities	3,00,000	Total Assets	3,00,000

Workings:

1) Total debt = 0.50 x Owner's Equity = 0.50 × ₹ 2,00,000 = ₹ 1,00,000
Further, Current debt to Total debt = 0.30
So, Current debt = 0.30 × ₹ 1,00,000 = ₹ 30,000
Long term debt = ₹ 1,00,000 - ₹ 30,000 = ₹ 70,000

2) Fixed assets = 0.60 × Owner's Equity = 0.60 × ₹ 2,00,000 =₹ 1,20,000

3) Total Liabilities = Total Debt + Owner's Equity
= ₹ 1,00,000 + ₹ 2,00,000 = ₹ 3,00,000
Total Assets = Total Liabilities = ₹ 3,00,000
Total assets to turnover = 2 Times; Inventory turnover = 10 Times
Hence, Inventory /Total assets = 2/10=1/5,
Therefore Inventory = ₹ 3,00,000/5 = ₹ 60,000

28. MT Limited has the following Balance Sheet as on March 31, 2XX1 and March 31, 2XX2:

Balance Sheet

	₹in lakhs	
	March 31, 2XX1	**March 31, 2XX2**
Sources of Funds:		
Shareholders' Funds	2,500	2,500
Loan Funds	3,500	3,000
	6,000	5,500
Applications of Funds:		
Fixed Assets	3,500	3,000
Cash and bank	450	400
Receivables	1,400	1,100
Inventories	2,500	2,000
Other Current Assets	1,500	1,000
Less: Current Liabilities	(1,850)	(2,000)
	6,000	5,500

The Income Statement of the MT Ltd. for the year ended is as follows:

	₹in lakhs	
	March 31, 2XX1	**March 31, 2XX2**
Sales	22,500	23,800
Less: Cost of Goods sold	(20,860)	(21,100)
Gross Profit	1,640	2,700

	Less: Selling, General and Administrative expenses	(1,100)	(1,750)
	Earnings before Interest and Tax (EBIT)	540	950
	Less: Interest Expense	(350)	(300)
	Earnings before Tax (EBT)	190	650
	Less: Tax	(57)	(195)
	Profits after Tax (PAT)	133	455

Required:

CALCULATE for the year 2XX1-X2

a) Inventory turnover ratio

b) Financial Leverage

c) Return on Capital Employed (ROCE)

d) Return on Equity (ROE)

e) Average Collection period. [Take 1 year = 365 days] **(May 2020 RTP)**

Ans.

Ratios for the year 2019-2020

a) Inventory turnover ratio

$$= \frac{\text{COGS}}{\text{Average Inventory}} = \frac{₹\ 21,100}{\frac{₹\ (2,500+2,000)}{2}} = 9.4$$

b) Financial leverage

$$= \frac{\text{EBIT}}{\text{EBIT}} = ₹\frac{950}{650} = 1.46$$

C) ROCE

$$= \frac{\text{EBIT}\ (1-t)}{\text{Average Capital Employed}} = \frac{₹\ 950(1-0.3)}{₹\left(\frac{6,000+5,500}{2}\right)} = \frac{₹\ 665}{₹\ 5,750} \times 100 = 11.56\%$$

[Here Return on Capital Employed (ROCE) is calculated after Tax]

d) ROE

$$= \frac{\text{Profit after tax}}{\text{Average shareholder's fudns}} = \frac{₹\ 455}{₹\ 2,500} \times 100 = 18.2\%$$

e) Average Collection Period

$$\text{Average Sales per day} = \frac{₹\ 23,800}{365} = ₹\ 65.20 \text{ lakhs}$$

$$\text{Average collection period} = \frac{\text{Average Receivables}}{\text{Average sales per day}}$$

$$= \frac{\frac{₹(1,400+1,100)}{2}}{₹\ 65.2} = \frac{₹\ 1,250}{₹\ 65.2} = 19.17 \text{ days}$$

29. Given below are the estimations for the next year by Niti Ltd.:

Particulars	(₹ in crores)
Fixed Assets	5.20
Current Liabilities	4.68
Current Assets	7.80
Sales	23.00
EBIT	2.30

The company will issue equity funds of ₹ 5 crores in the next year. It is also considering the debt alternatives of ₹ 3.32 crores for financing the assets. The company wants to adopt one of the policies given below: **(₹in crores)**

Financing Policy	Short term debt @ 12%	Long term debt @ 16%	Total
Conservative	1.08	2.24	3.32
Moderate	2.00	1.32	3.32
Aggressive	3.00	0.32	3.32

Assuming corporate tax rate at 30%, CALCULATE the following for each of the financing policy:

i) Return on total assets
ii) Return on owner's equity
iii) Net Working capital
iv) Current Ratio
Also advise which Financing policy should be adopted if the company wants high returns.

(May 2021 RTP)

Ans.

i) Return on total assets

$$\text{Return on total assets} = \frac{\text{EBIT}\ (1-T)}{\text{Total assets (FA+CA)}}$$

$$= \frac{₹\ 2.30\ \text{crores}\ (1-0.3)}{₹\ 5.20\ \text{crores} + ₹\ 7.80\ \text{crores}}$$

$$= \frac{₹\ 1.61\ \text{crores}}{₹\ 13\ \text{crores}} = 0.1238 \text{ or } 12.38\%$$

ii) Return on owner's equity

(₹ in crores)

	Financing policy (₹)		
	Conservative	**Moderate**	**Aggressive**
Expected EBIT	2,30,00,000	2,30,00,000	2,30,00,000
Less: Interest			
Short term Debt @ 12%	12,96,000	24,00,000	36,00,000
Long term Debt @ 16%	35,84,000	21,12,000	5,12,000
Earnings before tax (EBT)	1,81,20,000	1,84,88,000	1,88,88,000
Less: Tax @ 30%	54,36,000	55,46,400	56,66,400
Earnings after Tax (EAT)	1,26,84,000	1,29,41,600	1,32,21,600
Owner's Equity	5,00,00,000	5,00,000	5,00,000
Return on owner's equity $= \frac{\text{Net Profit after taxes (EAT)}}{\text{Owner's equity}}$	$= \frac{1,26,84,000}{5,00,00,000}$ = 0.2537 or 25.37%	$= \frac{1,29,41,600}{5,00,00,000}$ = 0.2588 or 25.88%	$= \frac{1,32,21,600}{5,00,00,000}$ = 0.2644 or 26.44

iii) Net Working capital

(₹ in crores)

	Financing policy		
	Conservative	**Moderate**	**Aggressive**
Current Liabilities (Excluding Short Term Debt)	4.68	4.68	4.68
Short term Debt	1.08	2.00	3.00
Total Current Liabilities	5.76	6.68	7.68
Current Assets	7.80	7.80	7.80
Net Working capital = Current Assets - Current Liabilities	7.80 - 5.76 = 2.04	7.80 - 6.68 = 1.12	7.80 - 7.68 = 0.12

iv) Current ratio

(₹ in crores)

	Financing policy		
	Conservative	**Moderate**	**Aggressive**
Current Ratio $= \frac{\text{Current Assets}}{\text{Current Liabilities}}$	$= \frac{7.80}{5.76} = 1.35$	$= \frac{7.80}{6.68} = 1.17$	$= \frac{7.80}{7.68} = 1.02$

Advise: It is advisable to adopt aggressive financial policy, if the company wants high return as the return on owner's equity is maximum in this policy i.e. 26.44%.

30. FM Ltd. is in a competitive market where every company offers credit. To maintain the competition, FM Ltd. sold all its goods on credit and simultaneously received the goods on credit. The company provides the following information relating to current financial year:

Debtors Velocity	3 months
Creditors Velocity	2 months
Stock Turnover Ratio (on Cost of Goods Sold)	1.5
Fixed Assets turnover Ratio (on Cost of Goods Sold)	4
Gross Profit Ratio	25%
Bills Receivables	₹ 75,000
Bills Payables	₹ 30,000
Gross Profit	₹ 12,00,000

FM Ltd. has the tendency of maintaining extra stock of ₹30,000 at the end of the period than that at the beginning.

Determine:

1) Sales and cost of goods sold
2) Sundry Debtors
3) Closing Stock
4) Sundry Creditors
5) Fixed Assets

(May 2022 RTP)

Ans.

i) Determination of Sales and Cost of goods sold:

Gross Profit Ratio = $\frac{Gross\ Profit}{Sales} \times 100$

Or, $\frac{25}{100} = \frac{₹12,00,000}{Sales}$

Or, Sales $= \frac{₹12,00,000}{25} = ₹48,00,000$

Cost of Goods Sold = Sales – Gross Profit

= ₹48,00,000 – ₹12,00,000 = ₹36,00,000

ii) Determination of Sundry Debtors:

Debtors' velocity is 3 months or Debtors' collection period is 3 months,

So, Debtors' turnover ratio $= \frac{12\ months}{3\ months} = 4$

Debtor's turnover ratio $= \frac{Credit\ Sales}{Average\ Accounts\ Receivable}$

$= \frac{₹48,00,000}{Bills\ Receivable + Sundry\ Debtors} = 4$

Or, Sundry Debtors + Bills receivable = ₹12,00,000

Sundry Debtors = ₹12,00,000 – ₹75,000 = ₹11,25,000

iii) Determination of Closing Stock

Stock Turnover Ratio = $\frac{Cost\ of\ Goods\ Sold}{Average\ Stock} = \frac{₹36,00,000}{Average\ Stock} = 1.5$

So, Average Stock = ₹ 24,00,000

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

Or $\frac{Opening\ Stock + (Opening\ Stock + ₹30,000)}{2}$ = ₹24,00,000

Or 2 Opening Stock + ₹ 30,000= ₹48,00,000

Or 2 Opening Stock = ₹47,70,000

Or, Opening Stock = ₹ 23,85,000

So, Closing Stock = ₹ 23,85,000 + ₹ 30,000 = ₹ 24,15,000

iv) Determination of Sundry Creditors:

Creditors' velocity of 2 months or credit payment period is 2 months.

So, Creditors' turnover ratio = $\frac{12\ months}{2\ months} = 6$

Creditors turnover ratio = $\frac{Credit\ Purchase*}{Average\ Accounts\ Payables}$

= $\frac{₹36,30,000}{Sundry\ Creditors+Bills\ Payable} = 6$

So, Sundry Creditors + Bills Payable = ₹ 6,05,000

Or, Sundry Creditors + ₹ 30,000 = ₹ 6,05,000

Or, Sundry Creditors = ₹ 5,75,000

v) Determination of Fixed Assets

Fixed Assets Turnover Ratio = $\frac{Cost\ of\ Goods\ Sold}{Fixed\ Assets} = 4$

Or, $\frac{₹36,00,000}{Fixed\ Assets} = 4$

Or, Fixed Asset = ₹9,00,000

Workings:

***Calculation of Credit purchases:**

Cost of goods sold = Opening stock + Purchases – Closing stock

₹ 36,00,000 = ₹ 23,85,000 + Purchases – ₹ 24,15,000

Purchases (credit) = ₹ 36,30,000

Calculation of credit purchase also can be done as below:

Or Credit Purchases =Cost of goods sold +Difference in Opening Stock

Or Credit Purchases =36,00,000 +30,000=₹ 36,30,000

Financial management

Cash Budget

Question: 1

Prepare monthly cash budget for six months beginning from April 2017 on the basis of the following information.

i) Estimated monthly sales are as follows: -

	₹		₹
January	1,00,000	June	80,000
February	1,20,000	July	1,00,000
March	1,40,000	August	80,000
April	80,000	September	60,000
May	60,000	October	1,00,000

ii) Wages and salaries are estimated to be payable as follows: -

	₹		₹
April	9,000	July	10,000
May	8,000	August	9,000
June	10,000	September	9,000

iii) Of the sales, 80% is on credit and 20% for cash. 75% of the credit sales are collected within one month and the balance in two months. There are no bad debt losses.

iv) Purchases amount to 80% of sales and are made on credit and paid for in the month preceding the sales.

v) The firm has 10% debentures of ₹1,20,000. Interest on these has to be paid quarterly in January, April and so on.

vi) The firm is to make an advance payment of tax of ₹5,000 in July, 2017.

vii) The firm had a cash balance of ₹20,000 on April 1, 2017 which is the minimum desired level of cash balance. Any cash surplus/deficit above/below this level is made up by temporary investments/liquidation of temporary investments or temporary borrowings at the end of each month (interest on these to be ignored).

Question: 2

From the following information relating to a departmental store, you are required to PREPARE for the three months ending 31st March, 2019: -

a) Month-wise cash budget on receipts and payments basis; and

b) Statement of Sources and uses of funds for the three months period.

It is anticipated that the working capital at 1st January, 2019 will be as follows: -

			₹ in '000's
Cash in hand and at bank			545
Short term investments			300
Debtors			2,570
Stock			1,300

Trade creditors			2,110
Other creditors			200
Dividends payable			485
Tax due			320
Plant			800
Budgeted Profit Statement:			**₹ in '000's**
	January	**February**	**March**
Sales	2,100	1,800	1,700
Cost of Sales	1,635	1,405	1,330
Gross Profit	465	395	370
Administrative, Selling and Distribution Expenses	315	270	255
Net Profit before tax	150	125	115

Budgeted balances at the end of each months:	**₹ in '000's**		
	31st January	**28th February**	**31st March**
Short term investments	700	---	200
Debtors	2,600	2,500	2,350
Stock	1,200	1,100	1,000
Trade Creditors	2,000	1,950	1,900
Other Creditors	200	200	200
Dividends Payable	485	--	--
Tax due	320	320	320
Plant (depreciation ignored)	800	1,600	1,550

Depreciation amount of ₹60,000 is included in the budgeted expenditure for each month.

Question: 3

You are given below the Profit & Loss Accounts for two years for a company:

Profit and Loss Account

	Year 1	**Year 2**		**Year 1**	**Year 2**
	₹	**₹**		**₹**	**₹**
To Opening Stock	80,00,000	1,00,00,000	By Sales	8,00,00,000	10,00,00,000
To Raw materials	3,00,00,000	4,00,00,000	By Closing stock	1,00,00,000	1,50,00,000
To Stores	1,00,00,000	1,20,00,000	By Misc. Income	10,00,000	10,00,000
To Manufacturing Expenses	1,00,00,000	1,60,00,000			
To Other Expenses	1,00,00,000	1,00,00,000			
To Depreciation	1,00,00,000	1,00,00,000			
To Net Profit	1,30,00,000	1,80,00,000		-	-
	9,10,00,000	**11,60,00,000**		**9,10,00,000**	**11,60,00,000**

Sales are expected to be ₹12,00,00,000 in year 3.

As a result, other expenses will increase by ₹50,00,000 besides other charges. Only raw materials are in stock. Assume sales and purchases are in cash terms and the closing stock expected to go up by the same amount as between year 1 and 2. You may assume that no dividend is being paid.

The Company can use 75% of the cash generated to service a loan. COMPUTE how much cash from operations will be available in year 3 for the purpose? Ignore income tax.

Question: 4

Prachi Ltd. is a manufacturing company producing and selling a range of cleaning products to wholesale customers. It has three suppliers and two customers. Prachi Ltd. relies on its cleared funds forecast to manage its cash.

You are an accounting technician for the company and have been asked to prepare a cleared funds forecast for the period Monday 7 August to Friday 11 August 2019 inclusive. You have been provided with following information:

1) Receipts from Customers

	Credit terms	Payment method	7 August 2019 Sales	7 July 2019 Sales
W Ltd.	1 calendar month	BACS	₹1,50,000	₹1,30,000
X Ltd.	None	Cheque	₹1,80,000	₹1,60,000

a) Receipt of money by BACS (Bankers' Automated Clearing Services) is instantaneous.

b) X Ltd.'s cheque will be paid into Prachi Ltd.'s bank account on the same day as the sale is made and will clear on the third day following this (excluding day of payment).

2) Payment to Suppliers

Supplier Name	Credit terms	Payment method	7 August 2019 Purchases	7 July 2019 Purchases	7 June 2019 Purchases
A Ltd.	1 calendar month	Standing order	₹65,000	₹55,000	₹45,000
B Ltd.	2 calendar months	Cheque	₹85,000	₹80,000	₹75,000
C Ltd.	None	Cheque	₹95,000	₹90,000	₹85,000

a) Prachi Ltd. has set up a standing order for ₹45,000 a month to pay for supplies from A Ltd. This leave Prachi's bank account on 7 August.

Every few months, an adjustment is made to reflect the actual cost of supplies purchased (you do NOT need to make this adjustment).

b) Prachi Ltd. will send out, by post, cheques to B Ltd. and C Ltd. on 7 August. The amounts will leave its bank account on the second day following this (excluding the day of posting).

3) Wages and Salaries

	July 2019	August 2019
Weekly wages	₹12,000	₹13,000

Monthly salaries	₹56,000	₹59,000

a) Factory workers are paid cash wages (weekly). They will be paid one week's wages, on 11 August, for the last week's work done in July (i.e. they work a week in hand).

b) All the office workers are paid salaries (monthly) by BACS. Salaries for July will be paid on 7 August.

4) Other miscellaneous payment

a) Every Monday morning, the petty cashier withdraws ₹200 from the company bank account for the petty cash. The money leaves Prachi's bank account straight away.

b) The room cleaner is paid ₹30 from petty cash every Wednesday morning.

c) Office stationery will be ordered by telephone on Tuesday 8 August to the value of ₹300. This is paid for by company debit card. Such payments are generally seen to leave the company account on the next working day.

d) Five new softwares will be ordered over the Internet on 10 August at a total cost of ₹6,500. A cheque will be sent out on the same day. The amount will leave Prachi Ltd's bank account on the second day following this (excluding the day of posting).

5) Other information

The balance on Prachi's bank account will be ₹2,00,000 on 7 August 2019. This represents both the book balance and the cleared funds.

PREPARE a cleared funds forecast for the period Monday 7 August to Friday 7 August 2019 inclusive using the information provided. Show clearly the uncleared funds float each day.

Management of Working Capital
Assignment
Unit - I

Q. No.	Question and Solutions
1.	The following information is profited by the DPS Limited for the year ending 31st March, 20X1.

Raw material storage period	55 days
Work-in-progress conversion period	18 days
Finished Goods storage period	22 days
Debt collection period	45 days
Creditor's payment period	60 days
Annual Operating cost	₹ 21,00,000
(Including depreciation of ₹2,10,000)	
(1 year = 360 days)	

You are required to calculate:

i) Operating Cycle period.

ii) Number of Operating Cycle in a year.

iii) Amount of working capital required for the company on cash cost basis.

iv) The company is market leader in its product, there is virtually no competitor in the market. Based on market research it is planning to discontinue sales on credit and deliver products based on pre-payments. Thereby, it can reduce its working capital requirement substantially.

What would be the reduction in working capital requirement due to such decision?

(May 2013/ May 2015 RTP modified/January 2021 modified)

Ans.

i) Computation of Operating Cycle Period

Operating Cycle = Raw material period + Work in progress period +Finished goods period + Debtor Collection Period – Creditor Payment period

= 55+18+22+45-60

= **80 Days**

ii) Number of Operating Cycle in a year

$$= \frac{360}{\text{Operating Cycle Period}}$$

$$= \frac{360}{80} = 4.5$$

iii) Amount of Working Capital Required

$$= \frac{\text{Annual OperatingCost}}{\text{Number of Operating Cycle}}$$

$$= \frac{18,90,000}{4.5} = \mathbf{4,20,000}$$

iv) Reduction in Working Capital

Operating Cycle Period = R + W + F – C

= 55 + 18 + 22–60

= **35**

Amount of Working Capital Required $= \frac{18,90,000 \times 35}{360}$

$= 1,83,750$

Reduction in Working Capital = 4,20,000 – 1,83,750

= **2,36,250**

2. The Management of MNP Company Ltd. Is planning to expand its business and consult you to prepare an estimated working capital statement. The records of the company reveals the following annual information:

Sales-Domestic at one month's credit	24,00,000
Export at three month's credit (Sales price 10% below domestic price)	10,80,000
Material used (suppliers extend two months credit)	9,00,000
Lag payment of wages- 1/2 month	7,20,000
Lag in payment of manufacturing expenses (cash) – 1 month	10.80.000
Lag in payment of Adm. Expenses – 1 month	2,40,000
Sales promotion expenses payable quarterly in advance	1,50,000
Income tax payable in four instalments of which one falls in the next financial year	2,25,0000
Rate of gross profit is 20%	
Ignore work-in-progress and depreciation.	

The company keeps one month's stock of raw materials and finished goods (each) and believes in keeping ₹2,250,000 available to it including the overdraft limit of ₹75,000 not yet utilized by the company.

The management is also of the opinion to make 12% margin for contingencies on computed figure. You are required to prepare the estimated working capital statement for the next year.

(May 2011/November 2021 RTP modified/Modified May 2017)

Ans.

Preparation of Statement of Working Capital requirement for MNP Company Ltd.

Estimated working Capital Statement

A)	**Current Assets in terms of Cash Costs**	**₹**
	Debtors: Domestic Sales $1 \times \frac{19,20,000}{12}$	1,60,000
	Exports Sales $3 \times \frac{9,60,000}{12}$	2,40,000
	Prepaid Sales promotion expenses	37,500
	Stock Raw materials $1 \times \frac{9,00,000}{12}$	1,75,000
	Stock Finished goods $1 \times \frac{28,80,000}{12}$	2,40,000
	Cash at Bank and in Hand	1,75,000
	Total Current Assets	**9,27,500**
B)	**Current Liabilities in terms of Cash Costs**	**₹**
	Creditors for:	
	Material $\frac{2}{12} \times 9,00,000$	1,50,000
	Wages $\frac{1}{24} \times 7,20,000$	30,000
	Manufacturing expenses $\frac{1}{12} \times 10,80,000$	90,000
	Administrative expenses $\frac{1}{12} \times 2,40,000$	20,000
	Income Tax Payable	56,250
	Total Current Liabilities	3,46,250
C)		**₹**
	Net Current Assets (A-B)	5,81,250

	Add: 12% margin for contingencies	69,750
	Required working Capital	6,51,000

Working Note:

Cost of Sales	₹	₹
Domestic Sales	24,00,000	
Less: Gross profit @ 20%	4,80,000	19,20,000
Export Sales	10,80,000	
₹ $\frac{10,80,000 \times 100}{90}$ 12,00,000 @ 10%	1,20,000	9,60,000
		28,80,000

3. A newly formed company has applied to the commercial Bank of the first time for Financing its working capital requirements. The following information is available about the projections for the current year:

Elements of cost:	Per unit ₹
Raw material	40
Direct labour	15
Overhead	30
Total cost	85
Profit	15
Sales	100

Other information:

Raw material in stock: average 4 weeks consumption, Work in progress (completion stage, 50 percent, on an average half a month Finished goods in stock: on an average, one month.

Credit allowed by suppliers is one month.

Credit allowed to debtors is two months.

Average time lag in payment or wages is 1½ weeks and 4 weeks in overhead expenses.

Cash in hand at bank is desired to be maintained at ₹ 50,000.

Required:

i) Prepare statement showing estimate of working capital needed to finance an activity level of 96,000 units of production. Assume that production is carried on evenly throughout the year, and wages and overhead accrue similarly. For the calculation purpose 4 weeks may be taken as equivalent to a month and 52 weeks in a year.

ii) From the above information calculate the maximum permissible bank finance by all the three methods for working capital as per Tondon Committee norms; assume the core current assets constitute 25% of the current assets.

(November 2007/ ICAI SM Modified)

Ans. **i) Estimation of Net Working Capital**

A) Current Assets:

i)	Raw material in stock = $\left(96,000 \times 40 \times \frac{4}{52}\right)$	2,95,385
ii)	Work in progress for ½ month or 2 weeks	
	✓ Raw material=$\left(96,000 \times 40 \times \frac{2}{52}\right) = 0.50$	73,846
	✓ Labour = $\left(96,000 \times 15 \times \frac{2}{52}\right) = 0.50$	27,692

	✓ Overhead = $\left(96{,}000 \times 30 \times \frac{2}{52}\right) = 0.50$	55,385
iii)	Finished Goods = $\left(96{,}000 \times 85 \times \frac{4}{52}\right)$	6,27,692
iv)	Debtors for 2 months= $\left(96{,}000 \times 85 \times \frac{8}{52}\right)$	12,55,385
v)	Cash at Bank	50,000
	Total Investment in Current Assets =	**23,85,385**

B) Current Liabilities

i)	Creditors = $\left(96{,}000 \times 40 \times \frac{4}{52}\right)$	2,95,385
ii)	Lag in payment of wages= $\left(96{,}000 \times ₹\ 15 \times \frac{1.5}{52}\right)$	41,538
iii)	Lag in payment of Overhead = $\left(96{,}000 \times 30 \times \frac{4}{52}\right)$	2,21,538

Total Current Liabilities

Net working Capital = Current Assets – Current Liabilities
= 23,85,385 – 5,58,461
= 18,26,924

ii) Maximum permissible bank Finance

1) Method I: - 1.75 (CA-CL)
75(18,26,924)
= ₹ 13,70,193

2) Method II: - 75 CA-CL
75 × 23,85,385 - 5,58,461
17,89,038.75 – 5,58,461
= ₹ 12,30,577.75

3) Method III: - 75(CA-CCA)-CL
[75(23,85,385-5,96,346-5,58461]
=₹ 7,83,318

4. The following figures and ratios are related to a company:

i)	Sales for the year (all credit)	₹90,00,000
ii)	Gross Profit ratio	35 percent
iii)	Fixed assets turnover (based on cost of goods sold)	1.5
iv)	Stock turnover (based on cost of goods sold)	6
v)	Liquid ratio	1.5:1
vi)	Current ratio	2.5:1
vii)	Receivables (Debtors) collection period	1 month
viii)	Reserves and surplus to Share capital	1:1.5
ix)	Capital gearing ratio	0.7875
x)	Fixed assets to net worth	1.3: 1

You are required to PREPARE:
Balance Sheet of the company on the basis of above details.

	The statement showing working capital requirement, if the company wants to make a provision for contingencies @15 percent of net working capital. **(ICAI SM/November 2020 RTP)**
Ans.	**Working Notes:** i) Cost of Goods Sold = Sales – Gross Profit (35% of Sales) = ₹90,00,000 – ₹31,50,000 = ₹58,50,000 ii) Closing Stock = Cost of Goods Sold / Stock Turnover = ₹58,50,000/6 = ₹9,75,000 iii) Fixed Assets = Cost of Goods Sold / Fixed Assets Turnover = ₹58,50,000/1.5 = ₹39,00,000 iv) Current Assets: Current Ratio = 2.5, Liquid Ratio = 1.5 Inventories (Stock) = 2.5 – 1.5 = 1 Current Assets = Amount of Inventories (Stock) × 2.5/1 = ₹9,75,000 × 2.5/1 = ₹24,37,500 **Or** Current Ratio / Quick Ratio = Current Assets / Quick Assets 2.5 / 1.5 = Current Assets / (Current Assets – Inventory) 2.5/1.5 Current Assets – 2.5/1.5 × ₹9,75,000 = Current Assets Hence, Current Assets = ₹24,37,500 v) Liquid Assets (Receivables and Cash) = Current Assets – Inventories (Stock) = ₹24,37,500 – ₹9,75,000 = ₹14,62,500 vi) Receivables (Debtors) = Sales × Debtors Collection period /12 = ₹90,00,000 × 1/12 = ₹7,50,000 vii) Cash = Liquid Assets – Receivables (Debtors) = ₹14,62,500 – ₹7,50,000 = ₹7,12,500 viii) Net worth = Fixed Assets /1.3 = ₹39,00,000/1.3 = ₹30,00,000 ix) Reserves and Surplus Reserves and Share Capital = Net worth Net worth = 1 + 1.5 = 2.5 Reserves and Surplus = ₹30,00,000 × 1/2.5 = ₹12,00,000 x) Share Capital = Net worth – Reserves and Surplus = ₹30,00,000 – ₹12,00,000 = ₹18,00,000 xi) Current Liabilities = Current Assets/ Current Ratio = ₹24,37,500/2.5 = ₹9,75,000

xii) Long-term Debts

Capital Gearing Ratio = Long-term Debts / Equity Shareholders' Fund

Long-term Debts = ₹30,00,000 × 0.7875 = ₹23,62,500

a) Balance Sheet of the Company

Particulars	Figures as the end of 31-03-20X2 (₹)	Figures as the end of 31-03-20X1 (₹)
I) EQUITY AND LIABILITIES		
Shareholders' funds		
a) Share capital	18,00,000	-
b) Reserves and surplus	12,00,000	-
Non-current liabilities		
a) Long-term borrowings	23,62,500	-
Current liabilities	9,75,000	-
TOTAL	**63,37,500**	**-**
II) ASSETS		
Non-current assets		
Fixed assets	39,00,000	-
Current assets		
Inventories	9,75,000	-
Trade receivables	7,50,000	-
Cash and cash equivalents	7,12,500	-
TOTAL	**63,37,500**	**-**

b) Statement Showing Working Capital Requirement

Particulars	(₹)	(₹)
A) Current Assets		
i) Inventories (Stocks)		9,75,000
ii) Receivables (Debtors)		7,50,000
iii) Cash in hand & at bank		7,12,500
Total Current Assets		24,37,500
B) Current Liabilities:		
Total Current Liabilities		9,75,000
Net Working Capital (A – B)		14,62,500
Add: Provision for contingencies (15% of Net Working Capital)		2,19,375
Working capital requirement		16,81,875

5.

Day Ltd. A newly formed company has applied to the Private Bank for the first time for financing its Working Capital Requirements. The following information's are available about the projections for the current year:

Estimated Level Activity	Completed Units of Production 31200 plus Units of Work in Progress 12000
Raw Material Cost	₹40 per unit

Direct Wages Cost	₹15 per unit
Overhead	₹ 40 per unit (inclusive of Depreciation ₹ 10 per unit
Selling Price	₹130 per unit
Raw Material in Stock	Average 30 days consumption
Work in Progress Stock	Material 100% and Conversion Cost 50%
Finished Goods Stock	2400 units
Credit Allowed by the Suppliers	30 days
Credit Allowed to Purchasers	60 days
Direct Wages (Lag in payment)	15 days
Expected Cash Balance	₹ 2,00,000

Assume that production is carried on evenly throughout the year (360 days) and wages and overheads accrue similarly. All Sales are on the credit basis. You are required to calculate the Net Working Capital Requirement on Cash Cost Basis.

(May 2018/May 2020 RTP)

Ans. **Calculation of Net Working Capital requirement**

Particulars	₹	₹
A) Current Assets:		
Inventories:		
Raw material stock (Refer to Working Note-3)	1,44,000	
Working in progress stock (Refer to Working Note-2)	7,50,000	
Finished Goods Stock (Refer to Working Note-4)	20,40,000	
Receivable (Debtors) (Refer to Working Note-5)	1,02,000	
Cash and Bank Balance I	2,00,000	
Gross Working Capital	32,36,000	32,36,000
B) Current Liabilities:		
Creditors for Raw materials (Refer to Working Note-6)	1,56,000	
Creditors for Wages (Refer to Working Note-7)	23,250	
	1,79,250	**1,79,250**
Net Working (A-B)		**30,56,750**

Working Notes:

1) Annual Cost of Production

Particulars	₹
Raw material requirements {(31,200 unit × ₹ 40) + ₹ 4,80,000}	17,28,000
Direct Wages {(31,2000 units × ₹ 15) + 90,000}	5,58,000
Overheads {exclusive of depreciation} {(31,200 units × ₹ 30) + 1,80,000}	11,16,000
Gross Factory Cost	34,02,000
Less: Closing WIP	(7,50,000)
Cost of goods Produced	26,52,000
Less: Closing stock of finished goods (26,52,000 × 24,000/31,200)	(20,40,000)
Total Cash Cost of Sales	**6,12,000**

2) Work in Progress stock

Particulars	₹
Raw material requirements (12,000 units × ₹40)	4,80,000
Direct Wages (50% × 12,000 units × ₹15)	90,000
Overheads (50% × 12,000 units × ₹30)	1,80,000
	7,50,000

3) Raw Material Stock

It is given that raw material in stock is average 30 days consumption Since, the company is newly formed, the raw material requirement for production and work in progress will be issued and consumed during the year.

Hence, the raw material consumption for the year (360 days) is as follows:

Particulars	₹
For Finished goods (31,200× ₹ 40)	12,48,000
For work in progress (12,000 × ₹ 40)	4,80,000
	17,28,000

Raw material stock $= \frac{₹\ 17,20,000}{360\ days} \times 30\ days$

$= ₹\ 1,44,000$

4) Finished Goods stock = 24,000 units @ ₹ 85 per unit

= ₹ 20,40,000

5) Debtors for sale $= 6,12,000 \times \frac{60}{360}$

= ₹ 1,02,000

6) Creditors for raw material:

Material consumed (₹ 12,48,000 + ₹ 4,80,000) ₹ 17,28,000

Add: Closing stock of raw material ₹ 1,44,000

₹ 18,72,000

Credit allowed by Suppliers $= \frac{₹\ 18,72,000}{360\ days} \times 30\ days$

= ₹ 1,56,000

7) Creditors for Wages:

Outstanding wage payment $= \frac{₹\ 5,58,000}{360\ days} \times 15\ days$

= ₹ 23,250

6. Following information is forecasted by R Limited for the year ending 31st March, 20X1:

Particulars	Balance as at 31st March, 20X2 (₹ in lakh)	Balance as at 31st March, 20X1 (₹ in lakh)
Raw Material	65	45
Work-in-progress	51	35
Finished goods	70	60
Receivables	135	112
Payables	71	68
Annual purchases of raw material (all	400	

	credit)		
	Annual cost of production	450	
	Annual cost of goods sold	525	
	Annual operating cost	325	
	Annual sales (all credit)	585	

You may take one year as equal to 365 days.
You are required to CALCULATE:
i) Net operating cycle period.
ii) Number of operating cycles in the year.
iii) Amount of working capital requirement.

(ICAI SM Modified/RTP)

Ans.

Working Notes:

1) Raw Material Storage Period (R)

$$= \frac{\text{Average Stock of Raw Material}}{\text{Annual Consumption of Raw Material}} \times 365$$

$$= \frac{\frac{₹45+₹65}{2}}{₹380} \times 365 = 52.83 \text{ or } 53 \text{ days}$$

Annual Consumption of Raw Material = Opening Stock + Purchases -Closing Stock
= ₹45 + ₹400 – ₹65 = ₹380 lakh

2) Work – in - Progress (WIP) Conversion Period (W)

$$\text{WIP Conversion Period} = \frac{\text{Avearge Stock of WIP}}{\text{Annual Cost of Production}} \times 365$$

$$= \frac{\frac{₹35+₹51}{2}}{₹450} \times 365 = 34.87 \text{ or } 35 \text{ days}$$

3) Finished Stock Storage Period (F)

$$= \frac{\text{Average Stock of Finished Goods}}{\text{Cost of Goods Sold}} \times 365$$

$$= \frac{\frac{₹60+₹70}{2}}{₹525} \times 365 = 45.19 \text{ or } 45 \text{ days}$$

4) Receivables (Debtors) Collection Period (D)

$$= \frac{\text{Average receivables}}{\text{Annual Credit Sales}} \times 365$$

$$= \frac{\frac{₹112+₹135}{2}}{₹585} \times 365 = 77.05 \text{ or } 77 \text{ days}$$

5) Payables (Creditors) Payment Period (C)

$$= \frac{\text{Average Payables for material}}{\text{Annual Credit purchases}} \times 365$$

$$= \frac{\frac{₹68+₹71}{2}}{₹400} \times 365 = 63.41 \text{ or } 64 \text{ days}$$

i) Net Operating Cycle Period

= R + W + F + D - C

= 53 + 35 + 45 + 77 - 64

= 146 days

ii) Number of Operating Cycles in the Year

$= \frac{365}{\text{Operating Cycle Period}} \times \frac{365}{146} = 2.5 \text{ times}$

iii) Amount of Working Capital Required

$= \frac{\text{Annual Operating Cost}}{\text{Number of Operating Cycles}} - \frac{325}{2.48} = ₹130 \text{ lakh}$

7. PK Ltd. manufacturing company, provides the following information:

Particulars	(₹)
Sales	1,08,00,000
Raw Material Consumed	27,00,000
Labour Paid	21,60,000
Manufacturing Overhead (including Depreciation for the year ₹3,60,000)	32,40,000
Administrative & Selling Overhead	10,80,000

Additional Information:

i) Receivables are allowed 3 months' credit.

ii) Raw Material Supplier extends 3 months' credit.

iii) Lag in payment of Labour is 1 month.

iv) Manufacturing Overhead are paid one month in arrear.

v) Administrative & Selling Overhead is paid 1 month advance.

vi) Inventory holding period of Raw Material & Finished Goods are of 3 months.

vii) Work-in-Progress is Nil.

viii) PK Ltd. sells goods at Cost plus $33\frac{1}{3}\%$.

ix) Cash Balance ₹3,00,000.

x) Safety Margin 10%.

You are required to compute the Working Capital Requirements of PK Ltd. on Cash Cost basis.

(November 2020/Modified ICAI SM)

Ans. **Statement showing cash costs Based working capital:**

Material		27,00,000
Add: Labour		21,60,000
	Prime Cost	48,60,000
Manufacturing cost [32,40,000 – 3,60,000]		28,80,000
	Cash COGS	77,40,000
Add: Admin Exp.		10,80,000
	Total cash cost of credit sales	88,20,000
Current Assets:		
Inventory of Raw Material (27,00,000 × 3/12)		6,75,000
Inventory of finished Goods (77,40,000 × 3/12)		19,35,000
Drs (88,20,000 × 3/12)		22,05,000

Cash (Given)		3,00,000
Advance Admin & selling (10,80,000 × 1/12)		96,000
	(A)	52,05,000
COGS For purchase (27,00,000 × 3/12)		6,75,000
O/s Labour (21,60,000 × 1/12)		1,80,000
O/s Manufacturing O/H (32,40,000 – 3,60,000 × 1/12)		2,40,000
	(B)	10,95,000
Cash cost of WC (Excl. Safety margin)	(A) – (B)	41,10,000
Add: Safety margin @ 10% of cost		4,11,000
Cash cost of Net WC (Incl. Safety margin)		45,21,000

8. M.A. Limited is commencing a new project for manufacture of a plastic component. The following cost information has been ascertained for annual production of 12,000 units which is the full capacity:

Particulars	Costs per unit (₹)
Materials	40.00
Direct labour and variable expenses	20.00
Fixed manufacturing expenses	6.00
Depreciation	10.00
Fixed administration expenses	4.00
	80.00

The selling price per unit is expected to be ₹96 and the selling expenses ₹5 per unit, 80% of which is variable.

In the first two years of operations, production and sales are expected to beas follows:

Year	Production (No. of units)	Sales (No. of units)
1	6,000	5,000
2	9,000	8,500

To assess the working capital requirements, the following additional information is available:

a)	Stock of materials	2.25 months' average consumption
b)	Work-in-process	Nil
c)	Debtors	1 month's average sales.
d)	Cash balance	₹10,000
e)	Creditors for supply of materials	1 month's average purchase during the year.
f)	Creditors for expenses	1 month's average of all expenses during the year.

PREPARE, for the two years:

i) A projected statement of Profit/Loss (Ignoring taxation); and

ii) A projected statement of working capital requirements.

(ICAI SM/ Modified Nov 2008)

Ans.

M.A. Limited
Projected Statement of Profit / Loss
(Ignoring Taxation)

Particulars	Year 1	Year 2
Production (Units)	6,000	9,000
Sales (Units)	5,000	8,500
	(₹)	**(₹)**
Sales revenue (A) (Sales unit × ₹96)	4,80,000	8,16,000
Cost of production:		
Materials cost (Units produced × ₹40)	2,40,000	3,60,000
Direct labour and variable expenses (Units produced × ₹20)	1,20,000	1,80,000
Fixed manufacturing expenses (Production Capacity: 12,000 units × ₹6)	72,000	72,000
Depreciation (Production Capacity: 12,000 units × ₹10)	1,20,000	1,20,000
Fixed administration expenses (Production Capacity: 12,000 units × ₹4)	48,000	48,000
Total Costs of Production	6,00,000	,80,000
Add: Opening stock of finished goods (Year 1: Nil; Year 2: 1,000 units)	---	1,00,000
Cost of Goods available for sale (Year 1: 6,000 units; Year 2: 10,000 units)	6,00,000	8,80,000
Less: Closing stock of finished goods at average cost (year 1: 1000 units, year 2: 1500 units) (Cost of Production × Closing stock/ units produced)	(1,00,000)	(1,32,000)
Cost of Goods Sold	5,00,000	7,48,000
Add: Selling expenses – Variable (Sales unit × ₹ 4)	20,000	34,000
Add: Selling expenses -Fixed (12,000 units × ₹1)	12,000	12,000
Cost of Sales: (B)	5,32,000	7,94,000
Profit (+) / Loss (-): (A - B)	(-) 52,000	(+) 22,000

Working Notes:

1) Calculation of creditors for supply of materials:

2) Creditor for expense:

Particulars	Year 1 (₹)	Year 2 (₹)
Materials consumed during the year	2,40,000	3,60,000
Add: Closing stock (2.25 month's average consumption)	45,000	67,500
	2,85,000	4,27,500
Less: Opening Stock	---	45,000
Purchases during the year	2,85,000	3,82,500
Average purchases per month (Creditors)	23,750	31,875

3) Projected Statement of Working Capital requirements

Particulars	Year 1 (₹)	Year 2 (₹)
Current Assets:		
Inventories:		
- Stock of materials (2.25 month's average consumption)	45,000	67,500
Finished goods	1,00,000	1,32,000
Debtors (1 month's average sales) (including profit)	40,000	68,000
Cash	10,000	10,000
Total Current Assets/ Gross working capital (A)	1,95,000	2,77,500
Current Liabilities:		
Creditors for supply of materials (Refer to working note 1)	23,750	31,875
Creditors for expenses (Refer to working note 2)	22,667	28,833
Total Current Liabilities: (B)	46,417	60,708
Estimated Working Capital Requirements: (A-B)	1,48,583	2,16,792

Projected Statement of Working Capital Requirement
(Cash Cost Basis)

Particulars	Year 1 (₹)	Year 2 (₹)
A) Current Assets		
Inventories:		
- Stock of Raw Material (6,000 units × ₹40 × 2.25/12);(9,000 units × ₹40 × 2.25 /12)	45,000	67,000
- Finished Goods (Refer working not 3)	80,000	1,11,000
Receivables (Debtors) (Refer working note 4)	36,000	56,250
Minimum Cash balance	10,000	10,000
Total Current Assets/ Gross working capital (A)	1,71,000	2,44,750
B) Current Liabilities		
Creditors for raw material (Refer working note 1)	23,750	31,875
Creditors for Expenses (Refer working note 2)	22,667	28,833
Total Current Liabilities	46,417	60,708
Net Working Capital (A – B)	1,24,583	1,84,042

Working Note:

1) Cash Cost of Production:

Particulars	Year 1 (₹)	Year 2 (₹)
Cost of Production as per projected Statement of P&L	6,00,000	7,80,000
Less: Depreciation	1,20,000	1,20,000
Cash Cost of Production	4,80,000	6,60,000
Add: Opening Stock at Average Cost:	--	80,000
Cash Cost of Goods Available for sale	4,80,000	7,40,000
Less: Closing Stock at Avg. Cost $\left(\frac{₹\ 4,80,000\times1,000}{6,000}\right) \times \left(\frac{₹\ 7,40,000\times1,500}{10,000}\right)$	(80,000)	(1,11,000)
Cash Cost of Goods Sold	4,00,000	6,29,000

2) Receivables (Debtors)

	Year 1 (₹)	Year 2 (₹)
Cash Cost of Goods Sold	4,00,000	6,29,000
Add: Variable Expenses @ ₹4	20,000	34,000
Add: Total Fixed Selling expenses (12,000 units × ₹1)	12,000	12,000
Cash Cost of Debtors	4,32,000	6,75,000
Average Debtors	36,000	56,250

9. While applying for financing of working capital requirements to a commercial bank, TN Industries Ltd. projected the following information for the next year:

Cost Element	Per unit (₹)	Per unit (₹)
Raw materials		
X	30	
Y	7	
Z	6	43
Direct Labour		25
Manufacturing and administration overheads (excluding depreciation)		20
Depreciation		10
Selling overheads		15
		113

Additional Information:

i) Raw Materials are purchased from different suppliers leading to different credit period allowed as follows:
X – 2 months; Y– 1 months; Z – ½ month

ii) Production cycle is of ½ month. Production process requires full unit of X and Y in the beginning of the production. Z is required only to the extent of half unit in the beginning and the remaining half unit is needed at a uniform rate during the production process.

iii) X is required to be stored for 2 months and other materials for 1 month.

iv) Finished goods are held for 1 month.

v) 25% of the total sales is on cash basis and remaining on credit basis. The credit allowed by debtors is 2 months.

vi) Average time lag in payment of all overheads is 1 months and ½ months for direct labour.

vii) Minimum cash balance of ₹ 8,00,000 is to be maintained.

CALCULATE the estimated working capital required by the company on cash cost basis if the budgeted level of activity is 1,50,000 units for the next year. The company also intends to increase the estimated working capital requirement by 10% to meet the contingencies. (You may assume that production is carried on evenly throughout the year and direct labour and other overheads accrue similarly.) **(May 2021 RTP)**

Ans.

Particulars	Amount in (₹)	Amount in (₹)
A) Current Assets		
i) Inventories:		
Raw material		

X ($\frac{1,50,000 \text{ units} \times ₹ 30}{12 \text{ months}} \times 2$ months)	7,50,000	
Y $\left(\frac{1,50,000 \text{ units} \times ₹ 7}{12 \text{ months}} \times 1 \text{ month}\right)$	87,500	
Z $\left(\frac{1,50,000 \text{ units} \times ₹ 6}{12 \text{ months}} \times 1 \text{ month}\right)$	75,000	
WIP $\left(\frac{1,50,000 \text{ units} \times ₹ 64}{12 \text{ months}} \times 0.5 \text{ month}\right)$	4,00,000	
Finished goods $\left(\frac{1,50,000 \text{ units} \times ₹ 88}{12 \text{ months}} \times 1 \text{ month}\right)$	11,00,000	24,12,500
ii) Receivables (Debtors) $(\frac{1,50,000 \text{ units} \times ₹ 103}{12 \text{ months}} \times 2 \text{ months}) \times 0.75$		19,31,250
iii) Cash and bank balance		8,000
Total Current Assets		**51,43,750**
B) Current Liabilities:		
i) Payables (Creditors) for Raw materials		
X $\left(\frac{1,50,000 \text{ units} \times ₹ 30}{12 \text{ months}} \times 2 \text{ months}\right)$	7,50,000	
Y $\left(\frac{1,50,000 \text{ units} \times ₹ 7}{12 \text{ months}} \times 1 \text{ month}\right)$	87,500	
Z $\left(\frac{1,50,000 \text{ units} \times ₹ 6}{12 \text{ months}} \times 0.5 \text{ month}\right)$	37,500	8,75,000
ii) Outstanding Direct Labour $\left(\frac{1,50,000 \text{ units} \times ₹ 25}{12 \text{ months}} \times 0.5 \text{ month}\right)$		1,56,250
iii) Outstanding Manufacturing and administration overheads $\left(\frac{1,50,000 \text{ units} \times ₹ 20}{12 \text{ months}} \times 1 \text{ month}\right)$		2,50,000
iv) Outstanding Selling overheads Z $\left(\frac{1,50,000 \text{ units} \times ₹ 15}{12 \text{ months}} \times 1 \text{ month}\right)$		1,87,500
Total Current Liabilities		**14,68,750**
Net Working Capital Needs (A-B)		**36,75,000**
Add: Provision for contingencies @ 10%		3,67,500
Working capital requirement		**40,42,500**

Workings:

1)

i) Computation of Cash Cost of Production	**Per unit (₹)**
Raw Material consumed	43
Direct Labour	25
Manufacturing and administration overheads	20
Cash cost of production	88
ii) Computation of Cash Cost of Sales	**Per unit (₹)**
Cash cost of production as in (i) above	88
Selling overheads	15
Cash cost of sales	103

2) Calculation of cost of WIP

Particulars	Per unit (₹)
Raw material (added at the beginning):	
X	30
Y	7
Z (₹ 6 ×50%)	3
Cost during the year:	
Z {(₹ 6 × 50%) × 50%}	1.5
Direct Labour (₹ 25 × 50%)	12.5
Manufacturing and administration overheads (₹ 20 × 50%)	10
	64

10. The Trading and Profit and Loss Account of Beta Ltd. For the year ended 31st March, 20X1 is given below:

Particulars		Amount (₹)	Particulars		Amount (₹)
To Opening Stock:					
Raw materials	1,80,000		By Sales (Credit)		20,00,000
	60,000		By Closing Stock:		
Finished Goods	2,60,000	5,00,000	Raw materials	2,00,000	
To Purchases (Credit)		11,00,000		1,00,000	
To Wages		3,00,000		3,00,000	6,00,000
To Production Expenses		2,00,000			
To Gross Profit c/d		5,00,000			
		26,00,000			**26,00,000**

To Administration Expenses	1,75,000	By Gross Profit b/d	5,00,000
To Selling Expenses	75,000		
	2,50,000		
	5,00,000		5,00,000

The opening and closing balances of debtors were ₹ 1,50,000 and ₹ 2,00,000 respectively whereas opening and closing creditors were ₹ 2,00,000 and ₹ 2,40,000 respectively.

You are required to ascertain the working capital requirement by operating cycle method.

(November 2011)

Ans. **Computation of operating Cycle**

1) Raw material Storage period (R)

$$= \frac{\text{Average Stock of Raw Material}}{\text{Daily Average Consumption of Raw Material}}$$

$$= \frac{(1,80,000+2,00,000)/2}{10,80,000/360}$$

= 63.33 days

Raw Material Consumed = Opening Stock +Purchases –Closing Stock
= 1,80,000+11,00,000-2,00,000=₹ 10,80,000

2) Conversion/Work-in-Process Period (W)

$$\text{Conversion/Processing Period} = \frac{\text{Average Stock of WIP}}{\text{Daily Average Production Cost}}$$

$$= \frac{(60{,}000+1{,}00{,}000)/2}{15{,}40{,}000/360} = 18.7 \text{ days}$$

Production Cost:

Opening Stock of WIP	=	60,000
Add: Raw material Consumed	=	10,80,000
Add: Wages	=	3,00,000
Add: Production Expenses	=	2,00,000
		16,40,000
Less: Closing Stock of WIP	=	1,00,000
Production Cost		15,40,000

3) Finished Goods Storage Period(F)

$$\text{Finished Goods Storage Period (F)} = \frac{\text{Average Stock of Finished Goods}}{\text{Daily Average Cost of Good Sold}}$$

$$= \frac{(2{,}60{,}000+3{,}00{,}000)/2}{15{,}00{,}000/360}$$

$$= 67.19 \text{ days}$$

Cost of Goods Sold	**₹**
Opening Stock of Finished Goods	2,60,000
Add: Production Cost	15,40,000
	18,00,000
Less: Closing Stock of Finished Goods	3,00,000
	15,00,000

4) Debtors Collection Period (D)

$$\text{Debtors Collection Period} = \frac{\text{Average Debtors}}{\text{Daily Average Sales}}$$

$$= \frac{(1.50.000+2{,}00{,}000)/2}{20{,}00{,}000/360}$$

$$= 31.5 \text{ days}$$

5) Creditors Payment Period (C)

$$\text{Creditors Payment Period} = \frac{\text{Average Creditors}}{\text{Daily Average Purchase}}$$

$$= \frac{(2{,}00{,}000+2{,}40{,}000)/2}{11{,}00{,}000/360} = 72 \text{ days}$$

6) Duration of Operating Cycle(O)

O = R+W+F+D-C
= 63.33 + 18.7 + 67.19 + 31.5 – 72
= 108.72 days

Computation of Working Capital

i) Number of Operation Cycles per Year

= 360/Duration Operating Cycle = 360/108.72 = 3.311

ii) Total Operating Expenses

	₹
Total Cost of Goods Sold	15,00,000
Add: Administration Expenses	1,75,000
Selling Expenses	75,000
	17,50,000

iii) Working Capital Required

Working Capital Required = $\frac{\text{Total Operating Expenses}}{\text{Number of Operating Cycles per year}}$

= $\frac{17,50,000}{3,311}$ = ₹5,28,541

Assumption: No. of days in a year = 360 days

11. STN Ltd. Is as readymade garment manufacturing company. Its production cycle indicates that materials are introduced in the beginning of the production phase; wages and overhead accrue evenly throughout the period of cycle. The following figures for the 12 months ending 31st December 20X1 are given.

Production of shirts	54,000 units
Selling Price for unit	₹ 200
Duration of the production cycle	1 month
Raw material inventory held	2 month's consumptions
Finished goods stock held for	1 month

Credit allowed to debtors is 1.5 months and credit allowed by creditors is 1 month.
Wages are paid in the next month following the month of accrual.
In the work-in-progress 50% of wage and overheads are supposed to be conversation costs.
The ratios of cost to sales price are – raw materials 60% direct wages 10% and overheads 20%.
Cash is to be held to the extent of 40% of current liabilities and safely margin of 15% will be maintained.
Calculate amount of working capital required for the company on a cash cost basis.

(May 2012)

Ans. **Computation of Amount of Working Capital required on a Cash Cost basis**

Working Notes:

1) Raw material inventory: The cost of materials for the whole year is 60% of the Sales value. Hence, it is 54,000 units × ₹ 200 × $\frac{60}{100}$ = ₹ 64,80,000. The monthly consumption of raw material would be ₹ 5,40,000. Raw material requirements would be for two months; hence raw materials in stock would be ₹ 10,80,000.

2) Debtors: Total Cash Cost of Sales = 97,20,000 × $\frac{1.5}{12}$ = ₹ 12,15,000.

3) Work-in-process: (Each unit of production is expected to be in process for one month).

	Particulars	Amt. (₹)
a)	Raw materials in work-in-process (being one month's raw material requirements)	5,40,000
b)	Labour costs in work-in-process (Its is stated that it accrues evenly during the month. Thus, on the first day of each month it would be zero and on the last day of month the work-in-process would include one month's labour costs. On an	45,000

	average therefore, it would be equivalent to ½ of the month's labour cost)	
c)	Overheads	90,000
	(For ½ month as explained above) Total work-in-process	6,75,000

4) Finished goods inventory:

	Particulars	Amt. (₹)
	(1 month's cost of production)	
	Raw materials	5,40,000
	Labour	90,000
	Overheads	1,80,000
		8,10,000

5) Creditors: Supplies allow a one month's credit period. Hence, the average amount of creditors would be ₹5,40,000 being one month's purchase of raw materials. 8,10,000.

6) Direct Wages payable: The direct wages for the whole year is 54,000 units × ₹200 × 10% =10,80,000. The monthly direct wages would be 90,000 (10,80,000÷12). Hence, wages payable would be ₹90,000.

Statement of Working Capital Required

Current Assets	Amt. (₹)	Amt. (₹)
Raw materials inventory (Refer to working note 1)	10,80,000	
Debtors (Refer to working note 2)	12,15,000	
Working-in-process (Refer to working note 3)	6,75,000	
Finished goods inventory (Refer to working note 4)	8,10,000	
Cash	2,52,000	40,32,000
Current Liabilities		
Creditors (Refer to working note 5)	5,40,000	
Direct wages payable (Refer to working note 6)	90,000	6,30,000
Estimated working capital requirements (before safely margin of 15%)		34,02,000
Add: Safety margin of 15%		5,10,300
Estimated Working Capital Requirements		39,12,300

12. Bita Limited manufactures used in the steel industry. The following information regarding the company is given for your consideration.

i) Expected level of production 9000 units per annum.
ii) Raw materials are expected to remain in store for an average of two months before issue to production.
iii) Work-in progress (50 percent complete as to conversion cost) will approximate to 1/2 month's production.
iv) Finished goods remain in warehouse on an average for one month.
v) Credit allowed by suppliers is one month.
vi) Two month's credit is normally allowed to debtors.
vii) A minimum cash balance of ₹67,500 is expected to be maintained.
viii) Cash sales are 75 percent less than the credit sales.

ix) Safety margin of 20 percent to cover unforeseen contingencies.
x) The Production pattern is assumed to be even during the year.
xi) The cost structure for Bita Limited's product is as follows:

	₹
Raw Materials	80 per unit
Direct Labour	20 per unit
Overheads (including depreciation ₹20)	80 per unit
Total Cost	180 per unit
Profit	20 per unit
Selling Price	200 per unit

You are required to estimate the working capital requirement of Bita Limited.

(May 2019)

Ans.

Particulars	₹	₹
A) Current Assets		
i) Inventories		
Raw Materials (W.N.1)	1,20,000	
Work-in-Progress (W.N.2)		
Materials	30,000	
Labour	3,750	
Overheads	11,250	
Finished Goods (W.N.3)	1,20,000	2,85,000
ii) Receivables (W.N.4)		1,92,000
iii) Cash in hand		67,500
Total Current Assets A		**5,44,500**
B) Current Liabilities		
i) Payment to Supplier (W.N.5)		60,000
Total Current Liabilities B		**60,000**
Net Working Capital (A-B)		4,84,500
Add: Safety Margin (20% of net working capital)		96,900
Working Capital Requirements		**5,81,400**

Working Notes:

1) Raw materials = (9,000 units × ₹ 80 × 2/12) = ₹ 1,20,000
2) Work in Progress:
   Raw Materials = (9,000 units × ₹ 80 × 0.5/12) = ₹ 30,000
   Labour= (9,000 units × ₹ 20 × 0.5/12) × 50% =₹ 3,750
   Overheads (excluding depreciation)
   = (9,000 units × ₹ 160 × 0.5/12) × 50% = ₹ 11,250
3) Finished Goods (excluding depreciation)
   = (9,000 units × ₹ 160 × 1/12) = ₹ 1,20,000
4) Receivables = (9,000 units × ₹ 160 × 2/12) 80% = ₹ 1,92,000
   Credit Sales = 80%
   i.e., Cash Sales are 75% less than credit sales
   So, if credit sales = ₹100

Less 75% = ₹ 75
Cash Sale = ₹ 25
So, Total Sales = 100 + 25 = 125
Credit Sales = $\frac{100}{125} \times 100$ = 80%

5) Payment to Supplier = (9,000 units × ₹ 80 × 1/12) = ₹ 60,000

13. PQ Ltd., a company newly commencing business in 20X1 has the following projected Profit and Loss Account:

Particulars	(₹)	(₹)
Sales		2,10,000
Cost of goods sold		1,53,000
Gross Profit		57,000
Administrative Expenses	14,000	
Selling Expenses	13,000	27,000
Profit before tax		30,000
Provision for taxation		10,000
Profit after tax		20,000
The cost of goods sold has been arrived at as under:		
Materials used	84,000	
Wages and manufacturing Expenses	62,500	
Depreciation	23,500	
	1,70,000	
Less: Stock of Finished goods (10% of goods produced not yet sold)	17,000	
	1,53,000	

The figure given above relate only to finished goods and not to work-in- progress. Goods equal to 15% of the year's production (in terms of physical units) will be in process on the average requiring full materials but only 40% of the other expenses. The company believes in keeping materials equal to two months' consumption in stock.

All expenses will be paid one month in advance. Suppliers of materials will extend 1-1/2 months credit. Sales will be 20% for cash and the rest at two months' credit. 70% of the Income tax will be paid in advance in quarterly instalments. The company wishes to keep ₹8,000 in cash. 10% has to be added to the estimated figure for unforeseen contingencies.

PREPARE an estimate of working capital.

Note: All workings should form part of the answer. **(ICAI SM)**

Ans. **Statement showing the requirements of Working Capital**

Particulars	(₹)	(₹)
A) Current Assets:		
Inventory:		
Stock of Raw material (₹96,600 × 2/12)	16,100	
Stock of Work-in-progress (As per Working Note)	16,350	
Stock of Finished goods (₹1,46,500 × 10/100)	14,650	
Receivables (Debtors) (₹1,27,080 × 2/12)	21,180	
Cash in Hand	8,000	

Prepaid Expenses:		
Wages & Mfg. Expenses (₹ 66,250 × 1/12)	5,521	
Administrative expenses (₹ 14,000 × 1/12)	1,167	
Selling & Distribution Expenses (₹13,000 × 1/12)	1,083	
Advance taxes paid {(70% of ₹10,000) × 3/12}	1,750	
Gross Working Capital	85,801	85,801
B) Current Liabilities:		
Payables for Raw materials (₹1,12,700 × 1.5/12)	14,088	
Provision for Taxation (Net of Advance Tax) (₹10,000 × 30/100)	3,000	
Total Current Liabilities	17,088	17,088
C) Excess of CA over CL		68,713
Add: 10% for unforeseen contingencies		6,871
Net Working Capital requirements		75,584

Working Notes:

i) Calculation of Stock of Work-in-progress

Particulars	(₹)
Raw Material (₹84,000 × 15%)	12,600
Wages & Mfg. Expenses (₹62,500 × 15% × 40%)	3,750
Total	16,350

ii) Calculation of Stock of Finished Goods and Cost of Sales

Particulars	(₹)
Direct material Cost [₹84,000 + ₹12,600]	96,600
Wages & Mfg. Expenses [₹62,500 + ₹3,750]	66,250
Depreciation	0
Gross Factory Cost	1,62,850
Less: Closing W. I. P	(16,350)
Cost of goods produced	1,46,500
Add: Administrative Expenses	14,000
	1,60,500
Less: Closing stock	(14,650)
Cost of Goods Sold	1,45,850
Add: Selling and Distribution Expenses	13,000
Total Cash Cost of Sales	1,58,850
Debtors (80% of cash cost of sales)	1,27,080

iii) Calculation of Credit Purchase

Particulars	(₹)
Raw material consumed	96,600
Add: Closing Stock	16,100
Less: Opening Stock	-
Purchases	1,12,700

14. A firm has the following data for the year ending 31st March, 20X1:

Particulars	(₹)
Sales (1,00,000 @ ₹20)	20,00,000
Earnings before Interest and Taxes	2,00,000
Fixed Assets	5,00,000

The three possible current assets holdings of the firm are ₹ 5,00,000, ₹4,00,000 and ₹3,00,000. It is assumed that fixed assets level is constant and profits do not vary with current assets levels. ANALYSE the effect of the three alternative current assets policies.

(ICAI SM)

Ans. Effect of Alternative Working Capital Policies

Working Capital Policy	Conservative (₹)	Moderate(₹)	Aggressive(₹)
Sales	20,00,000	20,00,000	20,00,000

Earnings before Interest and Taxes (EBIT)	2,00,000	2,00,000	2,00,000
Current Assets	5,00,000	4,00,000	3,00,000
Fixed Assets	5,00,000	5,00,000	5,00,000
Total Assets	10,00,000	9,00,000	8,00,000
Return on Total Assets (EBIT÷ Total Assets)	20%	22.22%	25%
Current Assets/Fixed Assets	1.00	0.80	0.60

15. On 1st January, the Managing Director of Naureen Ltd. wishes to know the amount of working capital that will be required during the year. From the following information PREPARE the working capital requirements forecast.

Production during the previous year was 60,000 units. It is planned that this level of activity would be maintained during the present year.

The expected ratios of the cost to selling prices are Raw materials 60%, Direct wages 10% and Overheads 20%.

Raw materials are expected to remain in store for an average of 2 months before issue to production.

Each unit is expected to be in process for one month, the raw materials being fed into the pipeline immediately and the labour and overhead costs accruing evenly during the month.

Finished goods will stay in the warehouse awaiting dispatch to customers for approximately 3 months.

Credit allowed by creditors is 2 months from the date of delivery of raw material. Credit allowed to debtors is 3 months from the date of dispatch.

Selling price is ₹5 per unit.

There is a regular production and sales cycle.

Wages and overheads are paid on the 1st of each month for the previous month.The company normally keeps cash in hand to the extent of ₹ 20,000.

(ICAI SM)

Ans. **Working Notes:**

1) Raw material inventory: The cost of materials for the whole year is 60% of the Sales value.

Hence it is 60,000 units × ₹ 5 × 60 =₹1,80,000.

8. 0

The monthly consumption of raw material would be ₹ 15,000. Raw material requirements would be for two months; hence raw materials in stock would be ₹ 30,000.

2) Work-in-process: (Students may give special attention to this point). It is stated that each unit of production is expected to be in process for one month).

	Particulars	**(₹)**
a)	Raw materials in work-in-process (being one month's raw material requirements)	15,000
b)	Labour costs in work-in-process (It is stated that it accrues evenly during the month. Thus, on the first day of each month it would be zero and onthe last day of month the work-in-process would include one month's labour costs. On an average therefore, it would be equivalent to ½ of the month's labour costs) $(\frac{10\% \text{ of } (60{,}000 \times ' 5)}{12 \text{ months}} \times 05 \text{ months})$	1,250
c)	Overheads (For ½ month as explained above) $(\frac{\boldsymbol{20\% \, of \, (60{,}000 \times ' 5)}}{\boldsymbol{12 \, months}} \times \boldsymbol{05 \, months})$	2,500
	Total work-in-process	18,750

3) Finished goods inventory: (3 month's cost of production)

Raw materials $\left(\frac{\boldsymbol{60\% \, of \, (60{,}000 \, x \, ₹5)}}{\boldsymbol{12 \, months}}\right) \boldsymbol{x \, 3 \, months}$	45,000
Labour $\left(\frac{\boldsymbol{10\% \, of \, (60{,}000 \, x \, ₹5)}}{\boldsymbol{12 \, months}}\right) \boldsymbol{x \, 3 \, months}$	7,500
Overheads $\left(\frac{\boldsymbol{20\% \, of \, (60{,}000 \, x \, ₹5)}}{\boldsymbol{12 \, months}}\right) \boldsymbol{x \, 3 \, months}$	15,000
	67,500
Alternatively, (60,000 × 5 × 90%) × 3/12	67,500

4) Debtors: The total cost of sales = 2,70,000. Therefore, debtors = ₹2,70,000 × $\frac{3}{12}$ = ₹ 67,500

Total Cost of Sales = RM + Wages + Overheads + Opening Finished goods inventory – Closing finished goods inventory.

= ₹1,80,000 + ₹30,000 + ₹60,000 + ₹67,500 – ₹67,500 = ₹2,70,000.

5) Creditors: Suppliers allow a two months' credit period. Hence, the average amount of creditors would be two months consumption of raw materials i.e.

$\left(\frac{60\% \text{ of } (60{,}000 \times ₹ 5)}{12 \text{ months}} \times 2 \text{ months}\right) \times ₹ 30{,}000$

6) Direct Wages payable: $\left(\frac{10\% \text{ of } (60{,}000 \times ₹\,5)}{12 \text{ months}} \times 1 \text{ month}\right) \times ₹\,25{,}000$

7) Overheads Payable: $\left(\frac{20\% \text{ of } (60{,}000 \times ₹\,5)}{12 \text{ months}} \times 1 \text{ month}\right) \times ₹\,5{,}000$

Here it has been assumed that inventory level is uniform throughout the year, therefore opening inventory equals closing inventory.

Statement of Working Capital Required:

Particulars	(₹)	(₹)
Current Assets or Gross Working Capital:		
Raw materials inventory (Refer to working note 1)	30,000	
Working–in-process (Refer to working note 2)	18,750	
Finished goods inventory (Refer to working note 3)	67,500	
Debtors (Refer to working note 4)	67,500	
Cash	20,000	2,03,750
Current Liabilities:		
Creditors (Refer to working note 5)	30,000	
Direct wages payable (Refer to working note 6)	2,500	
Overheads payable (Refer to working note 7)	5,000	(37,500)
Estimated working capital requirements		1,66,250

16. Samreen Enterprises has been operating its manufacturing facilities till 31.3.20X2 on a single shift working with the following cost structure:

Particulars	Per unit (₹)
Cost of Materials	6.00
Wages (out of which 40% fixed)	5.00
Overheads (out of which 80% fixed)	5.00
Profit	2.00
Selling Price	18.00
Sales during 20X1-20X2 – ₹4,32,000.	

As at 31.3.20X2 the company held:

Particulars	(₹)
Stock of raw materials (at cost)	36,000
Work-in-progress (valued at prime cost)	22,000
Finished goods (valued at total cost)	72,000
Sundry debtors	1,08,000

In view of increased market demand, it is proposed to double production by working an extra shift. It is expected that a 10% discount will be available from suppliers ofraw materials in view of increased volume of business. Selling price will remain the same. The credit period allowed to customers will remain unaltered. Credit availed of from suppliers will continue to remain at the present level i.e., 2 months. Lag in payment of wages and expenses will continue to remain half a month.

You are required to PREPARE the additional working capital requirements, if the policy to increase output is implemented.

(ICAI SM)

Ans. This question can be solved using two approaches:

To assess the impact of double shift for long term as a matter of production policy.

To assess the impact of double shift to mitigate the immediate demand fornext year only.

The first approach is more appropriate and fulfilling the requirement of the question.

Assessment of impact of double shift for long term as a matter of production policy:

Comparative Statement of Working Capital Requirement

Particulars	Single Shift (24,000)			Double Shift (48,000)		
	Unit	Rate (₹)	Amount (₹)	Unit	Rate (₹)	Amount (₹)
Current Assets						
Inventories:						
Raw Materials	6,000	6.00	36,000	12,000	5.40	64,800
Work-in-Progress	2,000	11.00	22,000	2,000	9.40	18,800
Finished Goods	4,500	16.00	72,000	9,000	12.40	1 11,600
Sundry De tors	6,000	16.00	96,000	12,000	12.40	1,48,800
Total Current Assets: (A)			2,26,000			3,44,000
Current Liabilities						
Creditors for Materials	4,000	6.00	24,000	8,000	5.40	43,200
Creditors for Wages	1,000	5.00	5,000	2,000	4.00	8,000
Creditors for Expenses	1,000	5.00	5,000	2,000	3.00	6,000
Total Current Liabilities: (B)			34,000			57,200
Working Capital: (A) – (B)			1,92,000			2,86,800

Additional Working Capital requirement =2,86,800 – 1,92,000 = 94,800

Workings:

1) Statement of cost at single shift and double shift working

Particulars	24,000 units		48,000 Units	
	Per unit (₹)	Total (₹)	Per unit (₹)	Total (₹)
Raw materials	6.00	1,44,000	5.40	2,59,200
Wages - Variable	3.00	72,000	3.00	1,44,000
Fixed	2.00	48,000	1.00	48,000
Overheads - Variable	1.00	24,000	1.00	48,000
Fixed	4.00	96,000	2.00	96,000
Total cost	16.00	3,84,000	12.40	5,95,200
Profit	2.00	48,000	5.60	2,68,800
	18.00	4,32,000	18.00	8,64,000

Sales in units 20X1-20X2 = Sales= ₹ 4,32,000 =24,000 units Unit selling price ₹18

i) Stock of Raw Materials in units on 31.3.20X2 =

Value of stock = ₹ 36,000 Cost per unit 6 = 6,000 units

ii) Stock of work-in-progress in units on 31.3.20X2

= Value of work-in-progress= ₹ 22,000 =2,000units Prime Cost per unit (₹ 6+₹ 5)

iii) Stock of finished goods in units 20X1-20X2

= Value of stock = ₹ 72,000 = 4,500 units.

Total Cost per unit₹16

2) Assessment of the impact of double shift to mitigate the immediate demand for next year only & not as part of policy implementation.

In this approach, working capital shall be computed as if we are calculating the same for the next / second year with double production. Whereas, in the first approach to implement double-shift as part of policy implementation, we calculated comparative analysis of working capital requirement for single & double shift within the same year.

Working

1) Calculation of no. of units to be sold:

No. of units to be Produced	48,000
Add: Opening stock of finished goods	4,500
Less: Closing stock of finished goods	(9,000)
No. of units to be Sold	43,500

2) Calculation of Material to be consumed and materials to be purchased in units:

No. of units Produced	48,000
Add: Closing stock of WIP	2,000
Less: Opening stock of finished goods	(2,000)
Raw Materials to be consumed in units	48,000
Add: Closing stock of Raw material	12,000
Less: Opening stock of Raw material	(6,000)
Raw Materials to be purchased (in units)	54,000

3) Credit allowed by suppliers:

No. of units to purchased× Cost per unit ×2months = 54,000×₹ 5.40 ×2 months

=₹48,600

12months

12months

Comparative Statement of Working Capital Requirement

Particulars	**Single Shift (Current Year – 24,000 units)**			**Double Shift (Next Year – 48,000 units)**		
	Unit	**Rate (₹)**	**Amount (₹)**	**Unit**	**Rate (₹)**	**Amount (₹)**
Current Assets						
Inventories:						
Raw Materials	6,000	6.00	36,000	12,000	5.40	64,800
Work-in-Progress	2,000	11.00	22,000	2,000	9.40	18,800
Finished Goods	4,500	16.00	72,000	9,000	12.40	1,11,600
Sundry De tors	6,000	16.00	96,000	12,000	12.40	1,48,800

	Total Current Assets: (A)			2,26,000			3,44,000
	Current Liabilities						
	Creditors for Materials	4,000	6.00	24,000	9,000	5.40	48,600
	Creditors for Wages	1,000	5.00	5,000	2,000	4.00	8,000
	Creditors for Expenses	1,000	5.00	5,000	2,000	3.00	6,000
	Total Current Liabilities: (B)			34,000			62,600
	Working Capital: (A) – (B)			1,92,000			2,81,400

Additional Working Capital requirement = ₹ 2,81,400 – ₹ 1,92,000 = ₹ 89,400

Notes:

i) The quantity of material in process will not change due to double shift working since work started in the first shift will be completed in the second shift.

ii) It is given in the question that the WIP is valued at prime cost hence, it is assumed that the WIP is 100% complete in respect of material and labour.

iii) In absence of any information on proportion of credit sales to total sales, debtors Quantity has been doubled for double shift. Hence, the units have been taken as 12,000 only.

iv) It is assumed that all purchases are on credit.
The valuation of work-in-progress based on prime cost (i.e., material & labour) as per the policy of the company is as under.

Particulars	**Single shift (₹)**	**Double shift (₹)**
Materials	6.00	5.40
Wages – Variable	3.00	3.00
Fixed	2.00	1.00
Total	11.00	9.40

17. A company is considering its working capital investment and financial policies for the next year. Estimated fixed assets and current liabilities for the next year are ₹ 2.60 crores and ₹ 2.34 crores respectively. Estimated Sales and EBIT depend on current assets investment, particularly inventories and book-debts. The Financial Controller of the company is examining the following alternative Working Capital Policies:

(₹ in crore)

Working Capital Policy	**Investment in Current Assets**	**Estimated Sales**	**EBIT**
Conservative	4.50	12.30	1.23
Moderate	3.90	11.50	1.15
Aggressive	2.60	10.00	1.00

After evaluating the working capital policy, the Financial Controller has advised the adoption of the moderate working capital policy. The company is now examining the use of long-term and short-term borrowings for financing its assets. The company will use ₹ 2.50 crores of the equity funds. The corporate tax rate is 35%. The company is considering the following debt alternatives.

(₹ in crore)

Financing Policy	**Short-term Debt**	**Long-term Debt**
Conservative	0.54	1.12
Moderate	1.00	0.66

Aggressive	1.50	0.16
Interest rate-Average	12%	16%

You are required to CALCULATE the following:

i) Working Capital Investment for each policy:

a) Net Working Capital position

b) Rate of Return

c) Current ratio

ii) Financing for each policy:

a) Net Working Capital position.

b) Rate of Return on Shareholders' equity.

c) Current ratio.

(May 2019 RTP)

Ans.

i) Statement showing Working Capital Investment for each policy

(₹ in crore)

Particulars	Working Capital Policy		
	Conservative	Moderate	Aggressive
Current Assets: (i)	4.50	3.90	2.60
Fixed Assets: (ii)	2.60	2.60	2.60
Total Assets: (iii)	7.10	6.50	5.20
Current liabilities: (iv)	2.34	2.34	2.34
Net Worth: (v) = (iii) - (iv)	4.76	4.16	2.86
Total liabilities: (iv) + (v)	7.10	6.50	5.20
Estimated Sales: (vi)	12.30	11.50	10.00
EBIT: (vii)	1.23	1.15	1.00
a) Net working capital position: (i) - (iv)	2.16	1.56	0.26
b) Rate of return: (vii) /(iii)	17.32%	17.69%	19.23%
c) Current ratio: (i)/ (iv)	1.92	1.67	1.11

ii) Statement Showing Effect of Alternative Financing Policy

(₹ in crore)

Financing Policy	Conservative	Moderate	Aggressive
Current Assets (i)	3.90	3.90	3.90
Fixed Assets (ii)	2.60	2.60	2.60
Total Assets (iii)	6.50	6.50	6.50
Current Liabilities (iv)	2.34	2.34	2.34
Short term Debt (v)	0.54	1.00	1.50
Total current liabilities	2.88	3.34	3.84
(vi) = (iv) + (v)			
Long term Debt (vii)	1.12	0.66	0.16
Equity Capital (viii)	2.50	2.50	2.50
Total liabilities (ix) = (vi)+(vii)+(viii)	6.50	6.50	6.50
Forecasted Sales	11.50	11.50	11.50
EBIT (x)	1.15	1.15	1.15
Less: Interest on short-term debt	0.06	0.12	0.18

	(12% of ₹0.54)	(12% of ₹ 1)	(12% of ₹ 1.5)
Interest on long term debt	0.18 (16% of ₹1.12)	0.11 (16% of ₹0.66)	0.03 (16% of ₹0.16)
Earnings before tax (EBT) (xi)	0.91	0.92	0.94
Taxes @ 35% (xii)	0.32	0.32	0.33
Earnings after tax: (xiii) = (xi) – (xii)	0.59	0.60	0.61
a) Net Working Capital Position: (i) - [(iv) + (v)]	1.02	0.56	0.06
b) Rate of return on shareholders Equity capital: (xiii)/ (viii)	23.6%	24.0%	24.4%
c) Current Ratio (i) / (vi)	1.35	1.17	1.02

Unit II
Treasury & Cash Management

18. VK Co. Ltd. has total cash disbursement amount in ₹ 22,50,000 in the year 20X1 and maintains a separate account for cash disbursements. Company has an administrative and transaction cost on transferring cash to disbursement account ₹ 15 per transfer. The yield on marketable securities is 12% per annum.

You are required to determine optimum cash balance according to William J. Baumol Model.

(May 2017/ICAI SM/ Modified May 2009)

Ans.

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

Where,

A=Annual Cash disbursements

T= Transaction Cost (fixed cost) per annum

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

Optimum Cash Balance = $\sqrt{\frac{2\times 22,50,000\times 15}{0.12}}$ = $\sqrt{56,25,00,000}$

Optimum Cash Balance = ₹ 23,717,

Thus, Optimum Cash Balance according to William J. Boumol Model is ₹ 23,717

19. PREPARE monthly cash budget for the first six months of 20X2 on the basis of the following information:

i) Actual and estimated monthly sales are as follows:

Actual	(₹)	Estimated	(₹)
October 20X1	2,00,000	January 20X2	60,000
November 20X1	2,20,000	February 20X2	80,000
December 20X1	2,40,000	March 20X2	1,00,000
		April 20X2	1,20,000
		May 20X2	80,000
		June 20X2	60,000
		July 20X2	1,20,000

ii) Operating Expenses (including salary & wages) are estimated to be payable as follows:

Month	(₹)	Month	(₹)
January 20X2	22,000	April 20X2	30,000
February 20X2	25,000	May 20X2	25,000
March 20X2	30,000	June 20X2	24,000

i) Of the sales, 75% is on credit and 25% for cash. 60% of the credit sales are collected after one month, 30% after two months and 10% after three months.

ii) Purchases amount to 80% of sales and are made on credit and paid for in the month preceding the sales.

iii) The firm has 12% debentures of ₹1,00,000. Interest on these has to be paid quarterly in January, April and so on.

iv) The firm is to make an advance payment of tax of ₹ 5,000 in April.

v) The firm had a cash balance of ₹40,000 at 31st Dec. 20X1, which is the minimum desired level of cash balance. Any cash surplus/deficit above/below this level is made up by temporary investments/liquidation of temporary investments or temporary borrowings at the end of each month (interest on these to be ignored). **(March 2021 MTP/ICAI SM)**

Ans. **Monthly Cash Budget for first six months of 2XX**

(Amount in ₹)

Particulars	Jan.	Feb.	Mar.	April	May	June
Opening balance	40,000	40,000	40,000	40,000	40,000	40,000
Receipts:						
Cash sales	15,000	20,000	25,000	30,000	20,000	15,000
Collection from debtors	1,72,500	97,500	67,500	67,500	82,500	70,500
Total cash available (A)	2,27,500	1,57,500	1,32,500	1,37,500	1,42,500	1,25,500
Payments:						
Purchases	64,000	80,000	96,000	64,000	48,000	96,000
Operating Expenses	22,000	25,000	30,000	30,000	25,000	24,000
Interest on debentures	3,000	-	-	3,000	-	-
Tax payment	-	-	-	5,000	-	-
Total payments (B)	89,000	1,05,000	1,26,000	1,02,000	73,000	1,20,000
Minimum cash balance desired	40,000	40,000	40,000	40,000	40,000	40,000
Total cash needed (C)	1,29,000	1,45,000	1,66,000	1,42,000	1,13,000	1,60,000
Surplus/(deficit) (A - C)	98,500	12,500	(33,500)	(4,500)	29,500	(34,500)
Investment/financing						
Temporary Investments	(98,500)	(12,500)	-	-	(29,500)	-
Liquidation of temporary investments or temporary borrowings			33,500	4,500	-	34,500
Total effect of investment/financing (D)	(98,500)	(12,500)	33,500	4,500	(29,500)	34,500
Closing cash balance (A + D - B)	40,000	40,000	40,000	40,000	40,000	40,000

Workings:

1) Collection from debtors:

Particulars	Year 20X1			Year 20X2					
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June
Total sales	2,00,000	2,20,000	2,40,000	60,000	80,000	1,00,000	1,20,000	80,000	60,000
Credit sales (75% of total sales)	1,50,000	1,65,000	1,80,000	45,000	60,000	75,000	90,000	60,000	45,000
Collections:									
One month		90,000	99,000	1,08,000	27,000	36,000	45,000	54,000	36,000
Two months			45,000	49,500	54,000	13,500	18,000	22,500	27,000
Three months				15,000	16,500	18,000	4,500	6,000	7,500
Total collections				1,72,500	97,500	67,500	67,500	82,500	70,500

2) Payment to Creditors: **(Amount in ₹)**

Particulars	Year 20X2						
	Jan	Feb	Mar	Apr	May	Jun	Jul
Total sales	60,000	80,000	1,00,000	1,20,000	80,000	60,000	1,20,000
Purchases (80% of total sales)	48,000	64,000	80,000	96,000	64,000	48,000	96,000
Payment:	64,000	80,000	96,000	64,000	48,000	96,000	

20. The following details are forecasted by a company for the purpose of effective utilisation and management of cash:

i) Estimated sales and manufacturing costs:

Year and month 20X1	Sales ₹	Materials ₹	Wages ₹	Overheads ₹
April	4,20,000	2,00,000	1,60,000	45,000
May	4,50,000	2,10,000	1,60,000	40,000
June	5,00,000	2,60,000	1,65,000	38,000
July	4,90,000	2,82,000	1,65,000	37,500
August	5,40,000	2,80,000	1,65,000	60,800
September	6,10,000	3,10,000	1,70,000	52,000

ii) Credit terms:

- ✓ Sales-20 percent sales are on cash, 50 percent of the credit sales are collected next month and the balance in the following month.
- ✓ Credit allowed by suppliers is 2 months.
- ✓ Delay in payment of wages is ½ (one-half) month and of overheads is 1 (one) month.

iii) Interest on 12 percent debentures of ₹ 5,00,000 is to be paid half yearly in June and December.

iv) Dividends on investments amounting to ₹ 25,000 are expected to be received in Jun, 20X1.

v) A new machinery will be installed in June, 20X1 at a cost of ₹ 4,00,000 which is payable in 20 monthly instalments from July, 20X1 onwards.

vi) Advance income-tax to be paid in August, 20X1 is ₹ 15,000

vii)	Cash balance on 1st June, 20X1 is expected to be ₹ 45,000 and the company wants to keep it at the end of every month around this figure, the excess cash (in multiple of thousand rupees) being put in fixed deposit.
	You are required to prepare monthly Cash budget on the basis of above information for four months beginning from June, 20X1.

(May 2010)

Ans.

Preparation of monthly Cash Budget

Cash Budget for four months from June, 20X1 to September, 20X1

Particulars	June (₹)	July (₹)	August (₹)	September (₹)
Opening Balance	45,000	45,500	45,500	45,000
Receipts:				
Cash Sales	1,00,000	98,000	1,08,000	1,22,000
Collection from debtors	3,48,000	3,80,000	3,96,000	4,12,000
Dividends	25,000	-	-	-
Total (A)	5,18,000	5,23,500	5,49,500	5,79,000
Payments:				
Creditors for Materials	2,00,000	2,10,000	2,60,000	2,82,000
Wages	1,62,500	1,65,000	1,65,000	1,67,500
Overheads	40,000	38,000	37,500	60,800
Installment for Machine	-	20,000	20,000	20,000
Interest on Debentures	30,000	-	-	-
Advance Tax	-	-	-	-
Total (B)	4,32,500	4,33,000	4,97,500	5,30,300
Surplus (A-B)	85,500	90,500	52,000	48,700
Fixed Deposits	40,000	45,000	7,000	3,000
Closing Balance	45,000	45,500	45,000	45,700

Working Notes:

1) Cash Sale and Collection from Debtors:

Month	Total Sales (₹)	Cash Sales (₹)	Credit Sales (₹)	Collection from Debtors			
				June (₹)	July (₹)	Aug. (₹)	Sept. (₹)
April, 2010	4,20,000	84,000	3,36,000	1,68,000	-	-	-
May, 2010	4,50,000	90,000	3,60,000	1,80,000	1,80,000	-	-
June, 2010	5,00,000	1,00,000	4,00,000	-	2,00,000	2,00,000	-
July, 2010	4,90,000	98,000	3,92,000	-	-	1,96,000	1,96,000
Aug., 2010	5,40,000	1,08,000	4,32,000	-	-	-	2,16,000
Sept., 2010	6,10,000	1,22,000	4,88,000	-	-	-	-
			Total	3,48,000	3,80,000	3,96,000	4,12,000

2) Payment of Wages:

June = 80,000 + 82,500 = 1,62,500;
July = 82,500 + 82,500 = 1,65,000;
Aug. = 82,500 + 82,500 = 1,65,000; and
Sept. = 82,500 + 85,000 = 1,67,500;

(**Notes:** Is has been assumed that the company wants to keep minimum Cash balance of ₹ 45,000 at the end of every month.)

21. Slide Ltd. is preparing a cash flow forecast for the three months period from January the end of March. The following sales volumes have been forecasted;

Month	December	January	February	March	April
Sales (units)	1800	1875	1950	2100	2250

Selling price per unit is ₹ 600. Sales are all on one month credit. Production of goods for sale takes place one month before sales. Each unit produced requires two units of raw materials costing ₹ 150 per unit. No. raw material inventory is held. Raw materials purchases are on one month credit. Variable overheads and wages equal to ₹100 per unit are incurred during production and paid in the month of production. The opening cash balance on 1st January is expected to be ₹ 35,000. A long-term loan of ₹ 2,00,000 is expected to be received in the month of March. A machine costing ₹ 3,00,000 will be purchased in March.

a) Prepare a cash budget for the months of January, February and March and calculate the cash balance at the end of each month in the three months period.
b) Calculate the forecast current ratio at the end of the three months period.

(November 2019)

Ans. **Working Note:**

1) Sales Receipts

Month	December	January	February	March
Sales (units)	1,800	1,875	1,950	2,100
Sales × ₹600	10,80,000	11,25,000	11,70,000	12,60,000
Debtors Pay 1 Month credit	-	10,80,000	11,25,000	11,70,000

2) Payment for raw material

Month	December	January	February	March
Production (Sales × 2)	3,750	3,900	4,200	4,500
Raw material cost per × ₹ 150	5,62,500	5,85,000	6,30,000	6,75,000

3) Variable cost & Wages Cost:

Month	January	February	March
₹ Units	1,950	2,100	2,250
Variable & Wages (Unit × 100)	1,95,000	2,10,000	2,25,000

a) Preparation of Cash Budget

Particulars	January (₹)	February (₹)	March (₹)
Opening Balance	35,000	3,57,500	6,87,500
Receipts:			
Collection from Trade Receivables (Debtors)	10,80,000	10,80,000	11,70,000
Receipt of Long-Term Loan			2,00,000
Total (A)	11,15,000	11,15,000	20,57,500
Payments:			
Trade Payables (Creditors) for	5,62,500	5,85,000	6,30,000
Materials	1,95,000	2,10,000	2,25,000
Variable Overheads and Wages			3,00,000
Purchase of Machinery	7,57,500	7,95,000	11,55,000
Total (B)			
Closing Balance (A−B)	**3,57,500**	**6,87,500**	**9,02,500**

b) Calculation of Current Ratio

Particulars	March (₹)
Output Inventory (i.e. units produced in March) [(2,250 units × 2 units of raw material per unit of output × ₹ 150 per unit of raw material) + 2,250 units × ₹ 100 For variable overheads and wages] Or, [6,75,000 + 2,25,000] from Working Notes 2 and 3	9,00,000
Trade Receivables (Debtors)	12,60,000
Cash Balance	9,02,500
Current Assets	30,62,500
Trade Payables (Creditors)	6,75,000
Current Liabilities	6,75,000
Current Ratio (Current Assets/Current Liabilities)	**4.537 approx.**

22. Consider the balance sheet of Maya Limited as on 31 December, 20X1. The company has received a large order and anticipates the need to go to its bank to increase its borrowings. As a result, it has to forecast its cash requirements for January, February and March, 20X2. Typically, the company collects 20 per cent of its sales in the month of sale, 70 per cent in the subsequent month, and 10 per cent in the second month after the sale. All sales are credit sales.

Equity & liabilities	Amount (₹ in '000)	Assets	Amount (₹ in '000)
Equity shares capital	100	Net fixed assets	1,836
Retained earnings	1,439	Inventories	545
Long-term borrowings	450	Accounts receivables	530
Accounts Payables	360	Cash and bank	50
Loan from banks	400		
Other liabilities	212		
	2,961		2,961

Purchases of raw materials are made in the month prior to the sale and amounts to 60 per cent of sales. Payments for these purchases occur in the month after the purchase. Labour costs, including overtime, are expected to be ₹ 1,50,000 in January, ₹ 2,00,000 in February, and ₹ 1,60,000 in March. Selling, administrative, taxes, and other cash expenses are expected to be ₹ 1,00,000 per month for January through March. Actual sales in November and December and projected sales for January through April are as follows (in thousands):

On the basis of this information:

i) PREPARE a cash budget and DETERMINE the amount of additional bank borrowings necessary, to maintain a cash balance of ₹ 50,000 at all times for the months of January, February, and March.

ii) PREPARE a pro forma balance sheet for March 31. **(ICAI SM)**

Ans. **i)** **Cash Budget**

(₹ in thousands)

Particulars	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**
	₹	**₹**	**₹**	**₹**	**₹**
Opening Balance **(A)**			**50**	**50**	**50**
Sales	500	600	600	1,000	650
Receipts:					
Collections, current month's sales			120	200	130
Collections, previous month's sales			420	420	700
Collections, previous 2 month's sales			50	60	60
Total (B)			590	680	890
Purchases		360	600	390	450
Payments:					
Payment for purchases			360	600	390
Labour costs			150	200	160
Other expenses			100	100	100
Total (E)			610	900	650
Surplus/Deficit (D) = (A + B– C)			30	(170)	290
Minimum cash balance (E)			50	50	50
Additional borrowings (F) = (E – D)			20	220	(240)

Particulars	**Jan.** **₹**	**Feb.** **₹**	**Mar.** **₹**
Additional borrowings	20	220	(240)
Cumulative borrowings (Opening balance of 400)	420	640	400

The amount of financing peaks in February owing to the need to pay for purchases made the previous month and higher labour costs. In March, substantial collections are made on the prior month's billings, causing large net cash inflow sufficient to pay off the additional borrowings.

ii) Pro forma Balance Sheet, 31st March, 20X2

Equity & liabilities	Amount (₹ in '000)	Assets	Amount (₹ in '000)
Equity shares capital	100	Net fixed assets	1,836
Retained earnings	1,529	Inventories	635
Long-term borrowings	450	Accounts receivables	620
Accounts payables	450	Cash and bank	50
Loan from banks	400		
Other liabilities	212		
	3,141		3,141

Accounts receivable = Sales in March × 0.8 + Sales in February × 0.1
Inventories = ₹545 + Total purchases from January to March - Total sales from January to March × 0.6
Accounts payable = Purchases in March
Retained earnings = ₹1,439 + Sales – Payment for purchases – Labour costs and – Other expenses, all for January to March

23. The following information relates to Zeta Limited, a publishing company:
The selling price of a book is ₹15, and sales are made on credit through a book club and invoiced on the last day of the month.
Variable costs of production per book are materials (₹5), labour (₹4), and overhead (₹2)
The sales manager has forecasted the following volumes:

Month	No. of Books
November	1,000
December	1,000
January	1,000
February	1,250
March	1,500
April	2,000
May	1,900
June	2,200
July	2,200
August	2,300

Customers are expected to pay as follows:

One month after the sale	40%
Two months after the sale	60%

The company produces the books two months before they are sold and the creditors for materials are paid two months after production.
Variable overheads are paid in the month following production and are expected to increase by 25% in April; 75% of wages are paid in the month of production and 25% in the following month.
A wage increase of 12.5% will take place on 1st March.

The company is going through a restructuring and will sell one of its freehold properties in May for ₹25,000, but it is also planning to buy a new printing press in May for ₹10,000. Depreciation is currently ₹1,000 per month, and will rise to ₹1,500 after the purchase of the new machine.
The company's corporation tax (of ₹10,000) is due for payment in March.
The company presently has a cash balance at bank on 31st December 20X1, of ₹1,500.
You are required to PREPARE a cash budget for the six months from January to June, 20X2.

(ICAI SM)

Ans.

Workings:

1) Sale receipts

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Forecast sales (S)	1,000	1,000	1,000	1,250	1,500	2,000	1,900	2,200
	₹	₹	₹	₹	₹	₹	₹	₹
S×15	15,000	15,000	15,000	18,750	22,500	30,000	28,500	33,000
Debtors pay:								
1 month 40%		6,000	6,000	6,000	7,500	9,000	12,000	11,400
2 months 60%		-	9,000	9,000	9,000	11,250	13,500	18,000
	-	-	15,000	15,000	16,500	20,250	25,500	20,400

2) Payment for materials – books produced two months before sale

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty produced (Q)	1,000	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹	₹
Materials (Q×5)	5,000	6,250	7,500	10,000	9,500	11,000	11,000	11,500
Paid (2 months after)	-	-	5,000	6,250	7,500	10,000	9,500	11,000

3) Variable overheads

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty. produced (Q)	1,000	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹	₹
Var. overhead (Q×2)	2,000	2,500	2,000	4,000	3,800			
Var. overhead (Q×2.50)						5,500	5,500	5,750
Paid one month later		2,000	2,500	3,000	4,000	3,800	5,500	5,500

4) Wages payments

Month	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty produced (Q)	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹
Wages (Q × 4)	5,000	6,000	8,000				
Wages (Q × 4.50)				8,550	9,900	9,900	10,350
75% this month	3,750	4,500	6,000	6,412	7,425	7,425	7,762
25% this month		1,250	1,500	2,000	2,137	2,475	2,475
		5,750	7,500	8,412	9,562	9,900	10,237

Cash budget – six months ended June

Particulars	Jan	Feb	Mar	Apr	May	Jun
	₹	₹	₹	₹	₹	₹
Receipts:						
Sales receipts	15,000	15,000	16,500	20,250	25,500	29,400
Freehold property	-	-	-		25,000	-
	15,000	**15,000**	**16,500**	**20,250**	**50,500**	**29,400**
Payments:						
Materials	5,000	6,250	7,500	10,000	9,500	11,000
Var. overheads	2,500	3,000	4,000	3,800	5,500	5,500
Wages	5,750	7,500	8,412	9,562	9,900	10,237
Printing press	-	-	-	-	10,000	-
Corporation tax	-	-	10,000	-	-	-
	13,250	**16,750**	**29,912**	**23,362**	**34,900**	**26,737**
Net cash flow	1,750	(1,750)	(13,412)	(3,112)	15,600	2,663
Balance b/f	**1,500**	**3,250**	**1,500**	**(11,912)**	**(15,024)**	**576**
Cumulative cash flow	**3,250**	**1,500**	**(11,912)**	**(15,024)**	**576**	**3,239**

24. From the information and the assumption that the cash balance in hand on 1st January 20X1 is ₹72,500, PREPARE a cash budget.

Assume that 50 per cent of total sales are cash sales. Assets are to be acquired in the months of February and April. Therefore, provisions should be made for the payment of ₹8,000 and ₹25,000 for the same. An application has been made to the bank for the grant of a loan of ₹30,000 and it is hoped that the loan amount will be received in the month of May.

It is anticipated that a dividend of ₹35,000 will be paid in June. Debtors are allowed one month's credit. Creditors for materials purchased and overheads grant one month's credit. Sales commission at 3 per cent on sales is paid to the salesman each month.

(ICAI SM)

Month	Sales (₹)	Materials Purchases (₹)	Salaries & Wages (₹)	Production Overheads (₹)	Office and Selling Overheads (₹)
January	72,000	25,000	10,000	6,000	5,500
February	97,000	31,000	12,100	6,300	6,700
March	86,000	25,500	10,600	6,000	7,500
April	88,600	30,600	25,000	6,500	8,900
May	1,02,500	37,000	22,000	8,000	11,000
June	1,08,700	38,800	23,000	8,200	11,500

Ans.

Cash Budget

Particulars	Jan ₹	Feb ₹	Mar ₹	Apr ₹	May ₹	June ₹	Total ₹
Receipts							
Cash sales	36,000	48,500	43,000	44,300	51,250	54,350	2,77,400
Collections from debtors	-	36,000	48,500	43,000	44,300	51,250	2,23,050
Bank loan	-	-	-	-	30,000	-	30,000
Total	36,000	84,500	91,500	87,300	1,25,550	1,05,600	5,30,450
Payments							
Materials	-	25,000	31,000	25,500	30,600	37,000	1,49,100
Salaries and wages	10,000	12,100	10,600	25,000	22,000	23,000	1,02,700
Production overheads	-	6,000	6,300	6,000	6,500	8,000	32,800
Office & selling overheads	-	5,500	6,700	7,500	8,900	11,000	39,600
Sales commission	2,160	2,910	2,580	2,658	3,075	3,261	16,644
Capital expenditure	-	8,000	-	25,000	-	-	33,000
Dividend	-	-	-	-	-	35,000	35,000
Total	12,160	59,510	57,180	91,658	71,075	1,17,261	4,08,844
Net cash flow	23,840	24,990	34,320	(4,358)	54,475	(11,661)	1,21,606
Balance, beginning of month	72,500	96,340	1,21,330	1,55,650	1,51,292	2,05,767	1,94,106
Balance, end of month	96,340	1,21,330	1,55,650	1,51,292	2,05,767	1,94,106	3,15,712

25. From the following information relating to a departmental store, you are required to PREPARE for the three months ending 31st March, 20X1: -

i) Month-wise cash budget on receipts and payments basis; and

ii) Statement of Sources and uses of funds for the three months period.

It is anticipated that the working capital & other account balances at 1st January, 20X1 will be as follows: -

Particulars			₹ in '000's
Cash in hand and at bank			545
Short term investments			300
Debtors			2,570
Stock			1,300
Trade creditors			2,110
Other creditors			200
Dividends payable			485
Tax due			320
Plant			800

Budgeted Profit Statement:	₹ in '000's		
	January	**February**	**March**
Sales	2,100	1,800	1,700
Cost of sales	1,635	1,405	1,330
Gross Profit	465	395	370
Administrative, Selling and Distribution Expenses	315	270	255
Net Profit before tax	150	125	115

Budgeted balances at the end of each months:	₹ in '000's		
	31st Jan.	**29th Feb.**	**31st March**
Short term investments	700	---	200
Debtors	2,600	2,500	2,350
Stock	1,200	1,100	1,000
Trade creditors	2,000	1,950	1,900
Other creditors	200	200	200
Dividends payable	485	--	--
Tax due	320	320	320
Plant (depreciation ignored)	800	1,600	1,550

Depreciation amount to ₹60,000 is included in the budgeted expenditure for each month.

(ICAI SM)

Ans.

Workings:		₹ in '000'		
1)	Payments to creditors:	**Jan. 2020**	**Feb. 2020**	**March, 2020**
	Cost of Sales	1,635	1,405	1,330
	Add Closing Stocks	1,200	1,100	1,000
		2,835	2,505	2,330
	Less: Opening Stocks	1,300	1,200	1,100
	Purchases	1,535	1,305	1,230
	Add: Trade Creditors, Opening Balance	2,110	2,000	1,950
		3,645	3,305	3,180
	Less: Trade Creditors, Closing Balance	2,000	1,950	1,900
	Payment	1,645	1,355	1,280
2)	Receipts from debtors:			
	Debtors, Opening balances	2,570	2,600	2,500
	Add: Sales	2,100	1,800	1,700
		4,670	4,400	4,200
	Less: Debtors, closing balance	2,600	2,500	2,350
	Receipt	2,070	1,900	1,850

a) 3 months ending 31st March, 20X1

			(₹ in 000)
Particulars	**January, 2020**	**February, 2020**	**March, 2020**
Opening cash balances	545	315	65
Add: Receipts:			
From Debtors	2,070	1,900	1,850
Sale of Investments	---	700	----
Sale of Plant	---	---	50
Total (A)	2,615	2,915	1,965
Deduct: Payments			
Creditors	1,645	1,355	1,280
Expenses	255	210	195
Capital Expenditure	---	800	---
Payment of dividend	---	485	---
Purchase of investments	400	---	200
Total payments (B)	2,300	2,850	1,675
Closing cash balance (A-B)	315	65	290

b) Statement of Sources and uses of Funds for the three-month period ending 31st March, 20X1

Sources:	**₹ '000**	**₹ '000**
Funds from operation:		
Net profit (150+125+115)	390	
Add: Depreciation (60×3)	180	570
Sale of plant		50
		620
Decrease in Working Capital (Refer Statement of changes in working capital)		665
Total		1,285
Uses:		
Purchase of plant		800
Payment by dividends		485
Total		1,285

Statement of Changes in Working Capital

Particulars	**January, 20**	**March, 20**	**Increase**	**Decrease**
	₹' 000	**₹' 000**	**₹' 000**	**₹' 000**
Current Assets				
Cash in hand and at Bank	545	290		255
Short term Investments	300	200		100
Debtors	2,570	2,350		220
Stock	1,300	1,000		300
	4,715	3,840		

	Current Liabilities				
	Trade Creditors	2,110	1,900	210	---
	Other Creditors	200	200	---	---
	Tax Due	320	320	---	---
		2,630	2,420		
	Working Capital	2,085	1,420		
	Decrease		665	665	
		2,085	2,085	875	875

26. You are given below the Profit & Loss Accounts for two years for a company:

Profit and Loss Account

Particulars	Year 1	Year 2	Particulars	Year 1	Year 2
	₹	₹		₹	₹
To Opening stock	80,00,000	1,00,00,000	By Sales	8,00,00,000	10,00,00,000
To Raw materials	3,00,00,000	4,00,00,000	By Closing stock	1,00,00,000	1,50,00,000
To Stores	1,00,00,000	1,20,00,000	By Misc. Income	10,00,000	10,00,000
To Manufacturing Expenses	1,00,00,000	1,60,00,000			
To Other Expenses	1,00,00,000	1,00,00,000			
To Depreciation	1,00,00,000	1,00,00,000			
To Net Profit	1,30,00,000	1,80,00,000		-	-
	9,10,00,000	11,60,00,000		9,10,00,000	11,60,00,000

Sales are expected to be ₹ 12,00,00,000 in year 3.
As a result, other expenses will increase by ₹ 50,00,000 besides other charges. Only raw materials are in stock. Assume sales and purchases are in cash terms and the closing stock is expected to go up by the same amount as between year 1 and 2. You may assume that no dividend is being paid. The Company can use 75% of the cash generated to service a loan. COMPUTE how much cash from operations will be available in year 3 for the purpose? Ignore income tax.

(ICAI SM)

Ans. **Projected Profit and Loss Account for the year 3**

Particulars	Year 2 Actual (₹ in lakhs)	Year 3 Projected (₹ in lakhs)	Particulars	Year 2 Actual (₹ in lakhs)	Year 3 Projected (₹ in lakhs)
To Materials consumed	350	420	By Sales	1,000	1,200
To Stores	120	144	By Misc. Income	10	10
To Mfg. Expenses	160	192			
To Other expenses	100	150			
To Depreciation	100	100			
To Net profit	180	204			
	1,010	1,210		1,010	1,210

Cash Flow:

Particulars	(₹ in lakhs)
Profit	204
Add: Depreciation	100
	304
Less: Cash required for increase in stock	50
Net cash inflow	254

Available for servicing the loan: 75% of ₹ 2,54,00,000 or ₹ 1,90,50,000

Working Notes:

i) Material consumed in year 2: 35% of sales.
Likely consumption in year 3: ₹ $1,200\frac{35}{100}$ or ₹ 420 (lakhs)

ii) Stores are 12% of sales, as in year 2.

iii) Manufacturing expenses are 16% of sales.

Note: The above also shows how a projected profit and loss account is prepared.

27. Prachi Ltd is a manufacturing company producing and selling a range of cleaning products to wholesale customers. It has three suppliers and two customers. Prachi Ltd relies on its cleared funds forecast to manage its cash.

You are an accounting technician for the company and have been asked to prepare a cleared funds forecast for the period Friday 7 August to Tuesday 11 August 20X1 inclusive. You have been provided with the following information:

1) Receipts from customers

	Credit terms	Payment method	7 Aug 20X1 sales	7 Jul 20X1 sales
W Ltd	1 calendar month	BACS	₹ 150,000	₹ 130,000
X Ltd	None	Cheque	₹ 180,000	₹ 160,000

i) Receipt of money by BACS (Bankers' Automated Clearing Services) is instantaneous.

ii) X Ltd's cheque will be paid into Prachi Ltd's bank account on the same day as the sale is made and will clear on the third day following this (excluding day of payment).

2) Payments to suppliers

Supplier name	Credit terms	Payment method	7 Aug 20X1 purchases	7 July 20X1 purchases	7 June 20X1 purchases
A Ltd	1 calendar month	Standing order	₹ 65,000	₹ 55,000	₹ 45,000
B Ltd	2 calendar months	Cheque	₹ 85,000	₹ 80,000	₹ 75,000
C Ltd	None	Cheque	₹ 95,000	₹ 90,000	₹ 85,000

i) Prachi Ltd has set up a standing order for ₹ 45,000 a month to pay for supplies from A Ltd. This will leave Prachi's bank account on 7 August. Every few months, an adjustment is made to reflect the actual cost of supplies purchased (you do NOT need to make this adjustment).

ii) Prachi Ltd will send out, by post, cheques to B Ltd and C Ltd on 7 August. The amounts will leave its bank account on the second day following this (excluding the day of posting).

3) Wages and salaries

Particulars	July 2020	August 2020
Weekly wages	₹ 12,000	₹ 13,000
Monthly salaries	₹ 56,000	₹ 59,000

i) Factory workers are paid cash wages (weekly). They will be paid one week's wages, on 11 August, for the last week's work done in July (i.e., they work a week in hand).

ii) All the office workers are paid salaries (monthly) by BACS. Salaries for July will be paid on 7 August.

4) Other miscellaneous payments

a) Every Friday morning, the petty cashier withdraws ₹ 200 from the company bank account for the petty cash. The money leaves Prachi's bank account straight away.

b) The room cleaner is paid ₹ 30 from petty cash every Sunday morning.

c) Office stationery will be ordered by telephone on Saturday 8 August to the value of ₹ 300. This is paid for by company debit card. Such payments are generally seen to leave the company account on the next working day.

d) Five new software's will be ordered over the Internet on 10 August at a total cost of ₹ 6,500. A cheque will be sent out on the same day. The amount will leave Prachi Ltd.'s bank account on the second day following this (excluding the day of posting).

5) Other information

The balance on Prachi's bank account will be ₹ 200,000 on 7 August 20X1. This represents both the book balance and the cleared funds.

PREPARE a cleared funds forecast for the period Friday 7th August to Tuesday 11th August 20X1 inclusive using the information provided. Show clearly the uncleared funds float each day.

(ICAI SM)

Ans.

Cleared Funds Forecast

Particulars	7 Aug 20X1 (Friday) ₹	8 Aug 20X1 (Saturday) ₹	9 Aug 20X1 (Sunday) ₹	10 Aug 20X1 (Monday) ₹	(Tuesday) ₹
Receipts					
W Ltd.	1,30,000	0	0	0	0
X Ltd.	0	0		1,80,000	0
a)	**1,30,000**	**0**		**1,80,000**	**0**
Payments					
A Ltd	45,000	0	0	0	0
B Ltd	0	0	75,000	0	0
C Ltd	0	0	95,000	0	0
Wages	0	0	0	0	12,000
Salaries	56,000	0	0	0	0
Petty Cash	200	0	0	0	0
Stationery	0	0	300	0	0
b)	**1,01,200**	**0**	**1,70,300**	**0**	**12,000**
Cleared excess Receipts over payments (a) – (b)	**28,800**	0	(1,70,300)	1,80,000	(12,000)
Cleared balance b/f	2,00,000	2,28,800	2,28,800	58,500	2,38,500

	Cleared balance c/f (c)	**2,28,800**	**2,28,800**	**58,500**	**2,38,500**	**2,26,500**
	Uncleared funds float					
	Receipts	1,80,000	1,80,000	1,80,000	0	0
	Payments	(1,70,000)	(1,70,300)	(6,500)	(6,500)	Payments
	d)	**10,000**	**9,700**	**180,000**	**(6,500)**	**(6,500)**
	Total book balance c/f **(c)+ (d)**	**2,38,800**	**2,38,500**	**2,38,500**	**2,32,000**	**2,20,000**

28. The following information is available in respect of Sai trading company:

i) On an average, debtors are collected after 45 days; inventories have an average holding period of 75 days and creditor's payment period on an average is 30 days.

ii) The firm spends a total of ₹ 120 lakhs annually at a constant rate.

iii) It can earn 10 per cent on investments.

From the above information, you are required to CALCULATE:

a) The cash cycle and cash turnover,

b) Minimum amounts of cash to be maintained to meet payments as they become due,

c) Savings by reducing the average inventory holding period by 30 days.

(ICAI SM)

Ans.

a) Cash cycle = 45 days + 75 days – 30 days = 90 days (3 months) Cash turnover = 12 months (360 days)/3 months (90 days) = 4.

b) Minimum operating cash = Total operating annual outlay/cash turnover, that is, ₹ 120 lakhs/4 = ₹ 30 lakhs.

Cash cycle = 45 days + 45 days – 30 days = 60 days (2 months). Cash turnover = 12 months (360 days)/2 months (60 days) = 6. Minimum operating cash = ₹ 120 lakhs/6 = ₹ 20 lakhs. Reduction in investments = ₹ 30 lakhs – ₹ 20 lakhs = ₹ 10 lakhs. Savings = 0.10 × ₹ 10 lakhs = ₹ 1 lakh.

29. You are given below the Profit & Loss Accounts for two years for a company:

Profit and Loss Account

Particulars	**Year 1**	**Year 2**	**Particulars**	**Year 1**	**Year 2**
	(₹)	**(₹)**		**(₹)**	**(₹)**
To Opening stock	32,00,000	40,00,000	By Sales	3,20,00,000	4,00,00,000
To Raw materials	1,20,00,000	1,60,00,000	By Closing stock	40,00,000	60,00,000
To Stores	38,40,000	48,00,000	By Misc. Income	4,00,000	4,00,000
To Manufacturing Expenses	51,20,000	64,00,000			
To Other Expenses	40,00,000	40,00,000			
To Depreciation	40,00,000	40,00,000			
To Net Profit	42,40,000	72,00,000		-	-
	3,64,00,000	**4,64,00,000**		**3,64,00,000**	**4,64,00,000**

Sales are expected to be ₹4,80,00,000 in year 3.

As a result, other expenses will increase by ₹20,00,000 besides other charges. Only raw materials are in stock. Assume sales and purchases are in cash terms and the closing stock is expected to go up by the same amount as between year 1 and 2. You may assume that no dividend is being paid. The Company can use 75% of the cash generated to service a loan. COMPUTE how much cash from operations will be available in year 3 for the purpose? Ignore income tax. **(May 2022 RTP)**

Ans.

Projected Profit and Loss Account for the year 3

Particulars	Year 2 Actual (₹ in lakhs)	Year 3 Projected (₹ in lakhs)	Particulars	Year 2 Actual (₹ in lakhs)	Year 3 Projected (₹ in lakhs)
To Materials consumed	140.00	168.00	By Sales	400.00	480.00
To Stores	48.00	57.60	By Misc. Income	4.00	4.00
To Mfg. Expenses	64.00	76.80			
To Other expenses	40.00	60.00			
To Depreciation	40.00	40.00			
To Net profit	72.00	81.60			
	404.00	484.00		484.00	484.00

Cash Flow:

Particulars	(₹ in lakhs)
Profit	81.60
Add: Depreciation	40.00
	121.60
Less: Cash required for increase in stock	20.00
Net cash inflow	101.60

Available for servicing the loan: 75% of ₹ 1,01,60,000 or ₹ 76,20,000

Working Notes:

i) Material consumed in year 1 = (32 + 120 – 40)/320 = 35%
Material consumed in year 2 = (40 + 160 – 60)/400 = 35%
Likely consumption in year 3 = 480 × $\frac{35}{100}$ ₹168 $(lakhs)$

ii) Stores are 12% of sales & Manufacturing expenses are 16% of sales for both the years.

30. PQR Ltd., a company newly commencing business in the year 20X1-X2, provides the following projected Profit and Loss Account:

Particulars	(₹)	(₹)
Sales		5,04,000
Cost of goods sold		3,67,200
Gross Profit		1,36,800
Administrative Expenses	33,600	
Selling Expenses	31,200	64,800
Profit before tax		72,000
Provision for taxation		24,000
Profit after tax		48,000

	The cost of goods sold has been arrived at as under:		
	Materials used	2,01,600	
	Wages and manufacturing Expenses	1,50,000	
	Depreciation	56,400	
		4,08,000	
	Less: Stock of Finished goods (10% of goods produced not yet sold)	40,800	
		3,67,200	

The figure given above relate only to finished goods and not to work-in-progress. Goods equal to 15% of the year's production (in terms of physical units) will be in process on the average requiring full materials but only 40% of the other expenses. The company believes in keeping materials equal to two months' consumption in stock.

All expenses will be paid one month in advance. Suppliers of materials will extend 1 -1/2 months credit. Sales will be 20% for cash and the rest at two months' credit. 70% of the Income tax will be paid in advance in quarterly instalments. The company wishes to keep ₹19,200 in cash. 10% must be added to the estimated figure for unforeseen contingencies.

PREPARE an estimate of working capital. **(May 2022 RTP)**

Ans. **Statement showing the requirements of Working Capital**

Particulars	(₹)	(₹)
A) Current Assets:		
Inventory:		
Stock of Raw material (₹ 2,31,840 × 2/12)	38,640	
Stock of Work-in-progress (As per Working Note)	39,240	
Stock of Finished goods (₹ 3,51,600 × 10/100)	35,160	
Receivables (Debtors) (₹3,04,992 × 2/12)	50,832	
Cash in Hand	19,200	
Prepaid Expenses:		
Wages & Mfg. Expenses (₹ 1,59,000 × 1/12)	13,250	
Administrative expenses (₹ 33,600 × 1/12)	2,800	
Selling & Distribution Expenses (₹ 31,200 × 1/12)	2,600	
Advance taxes paid {(70% of ₹ 24,000) × 3/12}	4,200	
Gross Working Capital	2,05,922	2,05,922
B) Current Liabilities:		
Payables for Raw materials (₹ 2,70,480 × 1.5/12)	33,810	
Provision for Taxation (Net of Advance Tax) (₹ 24,000 × 30/100)	7,200	
Total Current Liabilities	41,010	41,010
C) Excess of CA over CL		1,64,912
Add: 10% for unforeseen contingencies		16,491
Net Working Capital requirements		1,81,403

Working Notes:

i) Calculation of Stock of Work-in-progress

Particulars	(₹)
Raw Material (₹ 2,01,600 × 15%)	30,240
Wages & Mfg. Expenses (₹ 1,50,000 × 15% × 40%)	9,000
Total	39,240

ii) Calculation of Stock of Finished Goods and Cost of Sales

Particulars	(₹)
Direct material Cost [₹ 2,01,600 + ₹ 30,240]	2,31,840
Wages & Mfg. Expenses [₹ 1,50,000 + ₹ 9,000]	1,59,000
Depreciation	0
Gross Factory Cost	3,90,840
Less: Closing W.I.P.	(39,240)
Cost of goods produced	3,51,600
Add: Administrative Expenses	33,600
	3,85,200
Less: Closing stock	(35,160)
Cost of Goods Sold	3,50,040
Add: Selling and Distribution Expenses	31,200
Total Cash Cost of Sales	3,81,240
Debtors (80% of cash cost of sales)	3,04,992

iii) Calculation of Credit Purchase

Particulars	(₹)
Raw material consumed	2,31,840
Add: Closing Stock	38,640
Less: Opening Stock	-
Purchases	2,70,480

31. A company was incorporated w.e.f. 1st April, 2021.

Its authorised capital was ₹ 1,00,00,000 divided into 10 lakh equity shares of ₹ 10 each. It intends to raise capital by issuing equity shares of ₹ 50,00,000 (fully paid) on 1st April. Besides this, a loan of ₹ 6,50,000 @ 12% per annum will be obtained from a financial institution on 1st April and further borrowings will be made at same rate of interest on the first day of the month in which borrowing is required. All borrowings will be repaid along with interest on the expiry of one year. The company will make payment for the following assets in April.

Particulars	(₹)
Plant and Machinery	10,00,000
Land and Building	20,00,000
Furniture	5,00,000
Motor Vehicles	5,00,000
Stock of Raw Materials	5,00,000

The following further details are available:

1) Projected Sales (April-September):

Particulars	(₹)
April	15,00,000
May	17,50,000
June	17,50,000
July	20,00,000
August	20,00,000
September	22,50,000

2) Gross profit margin will be 25% on sales.

3) The company will make credit sales only and these will be collected in the second month following sales.

4) Creditors will be paid in the first month following credit purchases. There will be credit purchases only.

5) The company will keep minimum stock of raw materials of ₹ 5,00,000.

6) Depreciation will be charged @ 10% per annum on cost on all fixed assets.

7) Payment of miscellaneous expenses of ₹ 50,000 will be made in April.

8) Wages and salaries will be ₹ 1,00,000 each month and will be paid on the first day of the next month.

9) Administrative expenses of ₹ 50,000 per month will be paid in the month of their incurrence.

10) No minimum cash balance is required.

You are required to PREPARE the monthly cash budget (April-September), the projected Income Statement for the 6 months period and the projected Balance Sheet as on 30th September, 2021.

(Nov. 2022 RTP)

Ans.

Monthly Cash Budget (April-September) **(₹)**

Particulars	April	May	June	July	August	September
Opening cash balance	-	10,50,000	-	1,37,500	5,25,000	7,25,000
A) Cash inflows						
Equity shares	50,00,000	-	-	-	-	-
Loans (Refer to working note 1)	6,50,000	1,25,000	-	-	-	-
Receipt from debtors	-	-	15,00,000	17,50,000	17,50,000	20,00,000
Total (A)	56,50,000	11,75,000	15,00,000	18,87,500	22,75,000	27,25,000
B) Cash Outflows						
Plant and Machinery	10,00,000	-	-	-	-	-
Land and Building	20,00,000	-	-	-	-	-
Furniture	5,00,000	-	-	-	-	-
Motor Vehicles	5,00,000	-	-	-	-	-
Stock of raw materials	5,00,000	-	-	-	-	-

(Minimum stock)						
Miscellaneous expenses	50,000	-	-	-	-	-
Payment to creditors for credit purchases (Refer to working note 2)	-	10,25,000	12,12,500	12,12,500	14,00,000	14,00,000
Wages and salaries	-	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Admn. expenses	50,000	50,000	50,000	50,000	50,000	50,000
Total: (B)	46,00,000	11,75,000	13,62,500	13,62,500	15,50,000	15,50,000
Closing balance (A)-(B)	10,50,000	-	1,37,500	5,25,000	7,25,000	11,75,000

Budgeted Income Statement for six-month period ending 30th September

Particulars	(₹)	Particulars	(₹)
To Purchases	83,37,500	By Sales	1,12,50,000
To Wages and Salaries	6,00,000	By Closing stock	5,00,000
To Gross profit c/d	28,12,500		
	1,17,50,000		1,17,50,000
To Admn. expenses	3,00,000	By Gross profit b/d	28,12,500
To Depreciation	2,00,000		
(10% on ₹ 40 lakhs for six months)			
To Accrued interest on loan (Refer to working note 3)	45,250		
To Miscellaneous expenses	50,000		
To Net profit c/d	22,17,250		
	28,12,500		28,12,500

Projected Balance Sheet as on 30th September, 2021

Liabilities		Amount (₹)	Assets			Amount (₹)
Share Capital:			Fixed Assets:			
Authorised capital			Land and Building	20,00,000		
			Less: Depreciation	1,00,000	19,00,000	
10,00,000 equity shares of ₹ 10 each		1,00,00,000	Plant and Machinery	10,00,000		
			Less: Depreciation	50,000	9,50,000	

Issued, subscribed and paid-up capital 5,00,000 equity shares of ₹ 10 each		50,00,000	Furniture Less: Depreciation Motor Vehicles Less: Depreciation Current Assets:	5,00,000 25,000 5,00,000 25,000	4,75,000 4,75,000	38,00,000
Reserve and Surplus:			Stock Sundry debtors Cash		5,00,000 42,50,000 11,75,000	59,25,000
Profit and Loss		22,17,250				
Long-term loans		7,75,000				
Current liabilities and provisions:						
Sundry creditors	15,87,500					
Accrued interest	45,250					
Outstanding expenses	1,00,000	17,32,750				
		97,75,000				97,75,000

Working Notes:

Subsequent Borrowings Needed **(₹)**

Particulars	April	May	June	July	August	September
A) Cash Inflow						
Equity shares	50,00,000					
Loans	6,50,000					
Receipt from debtors	-	-	15,00,000	17,50,000	17,50,000	20,00,000
Total (A)	56,50,000	-	15,00,000	17,50,000	17,50,000	20,00,000
B) Cash Outflow						
Purchase of fixed assets	40,00,000					
Stock	5,00,000					
Miscellaneous expenses	50,000					
Payment to creditors	-	10,25,000	12,12,500	12,12,500	14,00,000	14,00,000
Wages and salaries	-	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Administrative expenses	50,000	50,000	50,000	50,000	50,000	50,000

Total	46,00,000	11,75,000	13,62,500	13,62,500	15,50,000	15,50,000
Surplus/ (Deficit)	10,50,000	(11,75,000)	1,37,500	3,87,500	2,00,000	4,50,000
Cumulative balance	10,50,000	(1,25,000)	12,500	4,00,000	6,00,000	10,50,000

1) There is shortage of cash in May of ₹ 1,25,000 which will be met by borrowings in May.

2) Payment to Creditors

Purchases = Cost of goods sold - Wages and salaries

Purchases for April = (75% of 15,00,000) - ₹ 1,00,000 = ₹ 10,25,000

(Note: Since gross margin is 25% of sales, cost of manufacture i.e. materials plus wages and salaries should be 75% of sales)

Hence, Purchases = Cost of manufacture minus wages and salaries of ₹ 1,00,000). The creditors are paid in the first month following purchases.

Therefore, payment in May is ₹ 10,25,000

The same procedure will be followed for other months.

April	(75% of 15,00,000) - ₹ 1,00,000 = ₹ 10,25,000
May	(75% of 17,50,000) - ₹ 1,00,000 = ₹ 12,12,500
June	(75% of 17,50,000) - ₹ 1,00,000 = ₹ 12,12,500
July	(75% of 20,00,000) - ₹ 1,00,000 = ₹ 14,00,000
August	(75% of 20,00,000) - ₹ 1,00,000 = ₹ 14,00,000
September	(75% of 22,50,000) - ₹ 1,00,000 = ₹ 15,87,500
Minimum Stock	₹ 5,00,000
Total Purchases	₹ 83,37,500

3) Accrued Interest on Loan

12% interest on ₹ 6,50,000 for 6 months	39,000
Add: 12% interest on ₹ 1,25,000 for 5 months	6,250
	45,250

Unit III
Management of Inventory

32. ZED Company supplies plastic crockery to fast food restaurants in metropolitan city. One of its products is a special bowl, disposable after initial use, for serving soups to its customers. Bowls are sold in pack 10 pieces at a price of ₹ 50 per pack.

The demand for plastic bowl has been forecasted at a fairly steady rate of 40,000 packs every year. The company purchases the bowl direct from manufacturer at ₹ 40 per pack within a three days lead time. The ordering and related cost is ₹8 per order. The storage cost is 10% per annum of average inventory investment.

Required:

i) Calculate Economic Order Quantity.

ii) Calculate number of orders needed every year.

iii) Calculate the total cost of ordering and storage bowl for the year.

iv) Determine when should the next order to be placed. And that the present inventory level is 333 packs with a year of 360 working days.

(May 2008/ICAI SM/ Modified Nov 2007 & Nov-2009 RTP)

Ans.

i) Computation of EOQ

U = Annual Requirement = 40,000

B = Buying Cost = $40\sqrt{2,50,000}$

O = Ordering cost = ₹ 8

PC = Carrying cost permit × % cost of cost price

= ₹ 40 × 10% = ₹ 4

EOQ = $\sqrt{\frac{2UO}{PC}}$

= $\sqrt{\frac{2 \times 40,000 \times 8}{4}} = 400$

Therefore, EOQ = 400 units

ii) No. of orders needed = $\frac{40,000}{400}$ = 100 orders

iii) Total Cost of Ordering

At EOQ level

Carrying cost = ordering cost

Ordering cost = 100×B = 800

Carrying cost = 800

Total cost = 1600

Alternatively Total Cost = $\sqrt{2UOPC}$

= $\sqrt{2 \times 40,000 \times 8 \times 4}$ = ₹ 1,600

iv) Timing of next order

i) **Day's requirement served by each order**

Number of days requirements = $\frac{\text{No.of working days}}{\text{No.of order in a year}}$

= $\frac{360}{100}$

= 3.6 days supply

This implies that each order of 400 packs supplies for requirements of 3.6 days only.

ii) **Days requirement covered by inventory**

$\frac{\text{Unit ininventory}}{\text{Economic order quanjtity}}$ × (Day'srequirement served by an order)

$\therefore \frac{333 \text{ packs}}{400 \text{ packs}} \times 3.6 \text{ days} = 3 \text{ days requirement}$

iii) **Time interval for placing next order**

Inventory left for day's requirement – Lead time of delivery

3 days – 3 days = 0 days

This means that next order for the replenishment of supplies has to be placed immediately.

33. The annual carrying cost of material 'X' is ₹ 3.6 per unit and its total carrying cost is ₹ 9,000 per annum. What would be the Economic order quantity for material 'X', if there is no safety stock of material X?

(November 2008)

Ans. **Computation of Economic Order Quantity**

$$\text{Average Inventory} = \frac{\text{Total Carrying Cost}}{\text{Carrying Cost per unit}}$$

$$= \frac{₹\ 9{,}000}{₹\ 3.60}$$

= 2,500 Units

Economic Order Quantity = Average Inventory × 2 = 2,500 × 2 = 5,000 units

Alternatively

$$\text{Total Carrying Cost} = \frac{\text{Carrying cost per unit} \times \text{E.O.Q}}{2}$$

$$\text{or } 9{,}000 = \frac{3.6 \times \text{E.O.Q}}{2}$$

$$\text{or E.O.Q.} = \frac{9{,}000 \times 2}{3.6}$$

= 5,000 units

34. Answer the following:

ABC Limited has received an offer of quantity discounts on its order of materials as under:

Price per tonne	**Tonnes**
₹	**Nos.**
4,800	Less than 50
4,680	50 and less than 100
4,560	100 and less than 200
4,440	200 and less than 300
4,320	300 and above

The annual requirement for the material is 500 tonnes. The ordering cost per order is ₹ 6,250 and the stock holding cost is estimated at 25% of the material cost per annum.

Required:

i) Compute the most economical purchase level.

ii) Compute E.O.Q. if there are no quantity discounts and the price per tonne is ₹ 5,250.

(November 2010)

Ans. **i) Calculation of most economical purchase level:**

A = Annual requirement = 500 tonnes

Order Size (Q) Units	**No. of Orders (A/Q)**	**Cost of Purchase (A×Cost/total)**	**Ordering Cost (A/Q×₹ 6,250)**	**Carrying Cost (Q/2 ×Price/tonne×25%)**	**Total Cost**
40	500/40 = 12.5	500×4,800 = 24,00,000	12.5×6,250 = 78,125	$\frac{40}{2} \times 4{,}800 \times 2.5 = 24{,}000$	25,02,125
50	500/50 = 10	500×4,680 = 23,40,000	10×6,250 = 62,500	$\frac{50}{2} \times 4{,}680 \times 2.5 = 29{,}250$	24,31,750
100	500/100 = 5	500×4,560 = 22,80,000	5×6,250 = 31,250	$\frac{100}{2} \times 4{,}560 \times 2.5 = 57{,}000$	23,68,250
200	500/200 = 2.5	500×4,440 = 22,20,000	2.5×6,250 = 15,625	$\frac{200}{2} \times 4{,}440 \times 2.5 = 1{,}11{,}000$	23,46,625
300	500/300 = 1.67	500×4,320 = 21,60,000	1.67×6,250 = 10,437.50	$\frac{300}{2} \times 4{,}320 \times 2.5 = 1{,}62{,}000$	23,32,437.50

Since the total cost of purchase, ordering cost and carrying cost of 500 tonnes is minimum ₹23,32,437.50 when the order size is 300 tonnes.

Therefore, most economical purchase level is 300 tonnes.

ii) **EOQ** = $\sqrt{\frac{2AO}{C \times i}} = \sqrt{\frac{2 \times 500 \text{ tonnes} \times ₹\ 6,250}{₹\ 5,250 \times 0.25}}$

= 69 tonnes

A is the annual requirement for the material.

O is the ordering Cost per order

Ci is the carrying Cost per unit per annum.

35. KL Limited produces product 'M' which has a quarterly demand of 8,000 units. The product requires 3 kgs. Quantity of material 'X' for every finished unit of product. The other information are follows:

Cost of material 'X'	: ₹ 20 per kg.
Cost of placing an order	: ₹ 1000 per order
Carrying Cost	: 15% per annum of average inventory

You are required:

i) Calculate the Economic Order Quantity for material 'X'

ii) Should the company accept an offer of 2 percent discount by the supplier, if he wants to supply the annual requirement of material 'X' in 4 equal quarterly instalments?

(November 2012)

Ans. **Annual demand of material 'X'**

= 8000 units (per quarter) ×4 (No. of Quarter in a year)×3 kgs. (for every Finished product) = 96,000 kgs.

i) Calculation of Economic Order Quantity (ECQ) for material 'X'

EOQ = $\sqrt{\frac{2 \times \text{Annual demand} \times \text{Ordering cost}}{\text{Carrying cost per unit per annum}}}$

= $\sqrt{\frac{2 \times 96,000 \times 1000}{20 \times 15\%}}$

= 8,000 kg.

ii) Analysis of cost under different options of 'order quantity'

Particulars	**When EOQ is Ordered**	**When discount of 2% is Accepted and supply is in 4 equal instalments**
Order size	8000 kgs.	$\frac{96,000}{4}$ = 24,000 kgs.
No. of order	$\frac{96,000 \text{ kgs}}{8,000 \text{ kgs}} = 12$	$\frac{96,000 \text{ Kgs}}{24,000 \text{ Kgs}} = 4$
Purchase Cost per kg.	₹ 20	(20-2% ₹ 20) = ₹ 19.60
Total Purchase Cost (A)	(96,000 kgs. × ₹ 20) = ₹ 19,20,000	(96,000 kgs.×19.6) = ₹ 18,81,600
Ordering Cost (B)	12 orders ×₹ 1000 = ₹ 12,000	4 orders ×₹ 1000 = ₹ 4000
Carrying Cost (C)	$\frac{8,000 \text{ Kgs}}{2} \times 15\% \times 20$ = ₹ 12,000	$\frac{24,000 \text{ Kgs}}{2} \times 15\% \times 19.6$ = ₹35,280
Total Cost (A+B+C)	₹ 19,44,000	₹ 19,20,880

Advice: The total Cost is lower if Company accept an offer of 2% discount by the supplier, when supply of the annual requirement of material 'X' is made in 4 equal instalments. Hence, the company should accept the offer of 2% discount.

36. A company manufactures a product from a raw material, which is purchased at ₹ 80 per kg. The company incurs a handling cost of ₹ 370 plus freight of ₹ 380 per order. The incremental carrying cost of inventory of raw material is ₹ 0.25 per kg per month. In addition, the cost of working capital finance on the investment in inventory of raw material is ₹ 12 per kg per annum. The annual production of the product is 1,00,000 units and 2.5 units are obtained from one kg. of raw material

Required:

i) Calculate the economic order quantity of raw materials.

ii) Advise, how frequently company should order for procurement be placed.

iii) If the company proposes to rationalize placement of orders on quarterly basis, what percentage of discount in the price of raw materials. Assume 360 days in a year.

(May 2014)

Ans.

i) Economic order Quantity:

$$EOQ = \sqrt{\frac{2ACa}{Ci}}$$

$$= \sqrt{\frac{2\times 40,000\times 750}{15}}$$

= 2,000 Kg.

A = Annual units required

$$= \frac{1,00,000}{2.5}$$

= 40,000 Kg.

** Ordering Cost = Ca = 370+380 = ₹ 750

** Carrying Cost = Ci = 12+3 = 15

(incremental carrying cost = 0.25 p.m. /per Kg.)

ii) Computation of days of placing Next Order

for 40,000 units ⟶ 360 days

for 2,000 units ⟶ ? days

∴ Days required = $\frac{2,000\times 360}{40,000}$

= 18 days.

Frequency of placing orders for procurement:

Annual consumption (A) = 40,000 Kg.

Quantity per order (E.O.Q) = 2,000 Kg.

No. of orders per annum $\left(\frac{A}{E.O.Q}\right) = \frac{40,000\ Kg.}{2,000\ Kg.} = 20$ orders

Frequency of placing orders (in days) = $\frac{360\ days}{20\ orders} = 18$ days.

iii) Percentage of discount in the price of raw materials to be negotiated:

Particulars	On Quarterly Basis	On E.O.Q Basis
1) Annual Usage (in Kg.)	40,000 Kg.	40,000 Kg.
2) Size of the order	10,000 Kg.	2,000 Kg.
3) No. of orders (1+2)	4	20
4) Cost placing orders or Ordering cost (No. of orders × Cost per order)	₹ 3,000 (4 orders×₹ 750)	₹ 15,000 (20 orders×₹ 750)
5) Inventory carrying cost (Average Inventory × Carrying cost per unit)	₹ 75,000 (10,000 Kg.×1/2× ₹ 15)	₹ 15,000 (2,000 Kg.×1/2× ₹ 15)
6) Total Cost (4+5)	₹ 78,000	₹ 30,000

When order is placed on quarterly basis the ordering cost and carrying
Cost increased by ₹ 48,000 (₹ 78,000 - ₹ 30,000).
So, discount required = ₹ 48,000
Total annual purchase = 40,000 Kg. ×₹ 80 = ₹ 32,00,000
Therefore, Percentage of discount to be negotiated

$= \frac{₹\ 48,000}{₹\ 32,00,000} \times 100 \quad = \quad 1.5\%$

37. Marvel Limited uses a large quantity of salt in its production process. Annual consumption is 60,000 tonnes over a 50-week working year. It costs ₹ 100 to initiate and process an order and delivery follow two weeks later. Storage costs for the salt are estimated at ₹ 0.10 per tonne per annum. The current practice is to order twice a year when the stock falls to 10,000 tonnes. IDENTIFY an appropriate ordering policy for Marvel Limited, and contrast it with the cost of the current policy.

(ICAI SM)

Ans. The recommended policy should be based on the EOQ model.

F = ₹ 100 per order
S = 60,000 tonnes per year
H = ₹ 0.10 per tonne per year

Substituting: $EOQ = \sqrt{\frac{2\times100\times60,000}{0.10}}$ = 10,954 tonnes per order

Number of orders per year = 60,000/10,954 = 5.5 orders
Re-order level = 2×60,000/50 = 2,400 tonnes
Total cost of optimum policy = holding costs + ordering costs
= (0.1×10954)/2 + (100×60,000)/10,954
= 547.70 + 547.74 = 1,095

To compare the optimum policy with the current policy, the average level of stock under the current policy must be found. An order is placed when stock falls to 10,000 tonnes, but the lead time is two weeks. The stock used in that time is (60,000×2)/50 = 2,400 tonnes. Before delivery, inventory has fallen to (10,000 – 2,400) = 7,600 tonnes. Orders are made twice per year, and so the order size = 60,000/2 = 30,000 tonnes. The order will increase stock level to 30,000 + 7,600 = 37,600 tonnes. Hence the average stock level = 7,600 + (30,000/2) = 22,600 tonnes.
Total costs of current policy = (0.1×22,600) + (100×2) = ₹ 2,460 per year.
Advise: The recommended policy should be adopted as the costs are less than the current policy (by ₹ 1,365 per year).

38. Pure air Company is a distributor of air filters to retail stores. It buys its filters from several manufacturers. Filters are ordered in lot sizes of 1,000 and each order costs ₹ 40 to place. Demand from retail stores is 20,000 filters per month, and carrying cost is ₹ 0.10 a filter per month.

a) COMPUTE the optimal order quantity with respect to so many lot sizes?

b) CALCULATE the optimal order quantity if the carrying cost were ₹ 0.05 a filterper month?

c) COMPUTE the optimal order quantity if ordering costs were ₹ 10? **(ICAI SM)**

Ans.

a) $EOQ^* = \sqrt{\frac{2(20)(40)}{100}} = 4$

Carrying costs = ₹ 0.10 ×1,000 = ₹ 100. The optimal order size would be 4,000 filters, which represents five orders a month.

b) $EOQ^* = \sqrt{\frac{2(20)(40)}{50}} = 5.66$

Since the lot size is 1,000 filters, the company would order 6,000 filters each time. The lower the carrying cost, the more important ordering costs become relatively, and larger the optimal order size.

c) $EOQ^* = \sqrt{\frac{2(20)(40)}{100}} = 2$

The lower the order cost, the more important carrying costs become relatively and the smaller the optimal order size.

Unit IV and V
Management of Receivables and Payables

39. RST Limited is considering relaxing its present credit policy and is in the process of evaluating two proposed policies. Currently, the firm has annual credit sales of ₹ 225 lakhs and accounts receivable turnover ratio of 5 times a year. The current level of loss due to bad debts is ₹7,50,000. The firm is required to give a return of 20% on the investment in new accounts receivables. The company's variable costs are 60% of the selling price.

Given the following information, which is better option?

Particulars	(Amount in ₹ Lakh)		
	Present Policy	Policy Option I	Policy Option II
Annual credit sales (₹)	225	27	350
Accounts receivable turnover ratio	5	4	3
Bad debt losses (₹)	7.5	22.5	47.5

(November 2010/Modified May 2011, May 2017, Nov 2013 & ICAI SM)

Ans. **Evaluation of Credit Policies for RST Ltd.**

Amount in ₹ Lakhs

Particulars	Present Policy	Policy Option I	Policy Option II
Annual Credit Sales	225	275	350
Accounts Receivable Turnover	5 times	4 times	3 times
Average Collection period (12/Accounts Receivable	2.4 months	3 months	4 months

Turnover)	-	-	-
Average Level of Accounts Receivables	45	68.75	116.67
(Annual Credit Sales/Accounts Receivable Turnover)	-	-	-
Marginal Increase in Investment in Receivables less	-	-	-
Profit Margin	-	14.25	28.75
Marginal Increase in Sales	-	50	75
Profit on Marginal Increase in Sales (40%)	-	20	30
Marginal Increase in Bad Debt Losses	-	15	25
Net Gain	-	5	5
Required Return on Marginal Investment 20%	-	2.85	5.75
Surplus (Deficit) after Required Rate of Return	-	2.15	(0.75)

Advise: On the basis of above analysis the Policy Option I has, a surplus of ₹2.15 lakhs whereas Option II shows a deficit of ₹ 0.75 lakhs on the basis of 20% return. Therefore, Policy Option I is better.

40. A trader whose current sales are in the region of ₹ 6 lakhs per annum and an average collection period of 30 days wants to pursue a more liberal policy to improve sales. A study made by a management consultant reveals the following information:

Credit Policy	Increase in collection period	Increase in sales	Present default anticipated
A	10 days	₹ 30,000	1.5%
B	20 days	₹ 48,000	2%
C	30 days	₹ 75,000	3%
D	45 days	₹ 90,000	4%

The selling price per unit is ₹ 3. Average cost per unit is ₹ 2.25 and variable costs per unit are ₹ 2. The current bad debt loss is 1%. Required return on additional investment is 20%. Assume a 360 days year.

ANALYSE which of the above policies would you recommend for adoption?

(ICAI SM/ Modified May 2016 & Nov 2020 RTP)

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

	Particulars	Present Policy 30 days	Proposed Policy A 40 days	Proposed Policy B50 days	Proposed Policy C60 days	Proposed Policy D 75 days
		₹	₹	₹	₹	₹
A)	**Expected Profit:**					
	a) Credit Sales	6,00,000	6,30,000	6,48,000	6,75,000	6,90,000
	b) Total Cost other than Bad Debts					
	i) Variable Costs [Sales × 2/ 3]	4,00,000	4,20,000	4,32,000	4,50,000	4,60,000
	ii) Fixed Costs	50,000	50,000	50,000	50,000	50,000
		4,50,000	4,70,000	4,82,000	5,00,000	5,10,000
	c) Bad Debts	6,000	9,450	12,960	20,250	27,600

	d) Expected Profit [(a) – (b) – (c)]	1,44,000	1,50,550	1,53,040	1,54,750	1,52,400
B)	**Opportunity Cost of Investments in Receivables**	7,500	10,444	13,389	16,667	21,250
C)	**Net Benefits (A – B)**	1,36,500	1,40,106	1,39,651	1,38,083	1,31,150

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

Working Notes:

i) **Calculation of Fixed Cost** **=** [Average Cost per unit – Variable Cost per unit] × No. of Units sold

= [₹ 2.25 − ₹ 2.00] × (₹ 6,00,000/3)

= ₹ 0.25 × 2,00,000 = ₹ 50,000

ii) Calculation of Opportunity Cost of Average Investments

Opportunity Cost = Total Cost $\times \frac{\text{Collection period}}{360} \times \frac{\text{Rate of Return}}{100}$

Present Policy = $4,50,000 \times \frac{30}{360} \times \frac{20}{100}$ = 7,500

Policy A = $4,70,000 \times \frac{40}{360} \times \frac{20}{100}$ = 10,444

Policy B = $4,82,000 \times \frac{50}{360} \times \frac{20}{100}$ = 13,389

Policy C = $5,00,000 \times \frac{60}{360} \times \frac{20}{100}$ = 16,667

Policy D = $5,10,000 \times \frac{75}{360} \times \frac{20}{100}$ = 21,250

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

	Particulars	**Present Policy 30 days**	**Proposed Policy A40 days**	**Proposed Policy B 50 days**	**Proposed Policy C60 days**	**Proposed Policy D75 days**
		₹	**₹**	**₹**	**₹**	**₹**
A)	**Incremental Expected Profit:**					
	a) Incremental Credit Sales	---	30,000	48,000	75,000	90,000
	b) Incremental Costs					
	i) Variable Costs	---	20,000	32,000	50,000	60,000
	ii)Fixed Costs	---	-	-	-	-
	c) Incremental BadDebt Losses	---	3,450	6,960	14,250	21,600
	d) Incremental Expected Profit (a – b –c)]		**6,550**	**9,040**	**10,750**	**8,400**

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

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

C) Another method of solving the problem is by computing the **Expected Rate of Return.**

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

For Policy A $= \frac{₹\ 6,550}{₹\ 14,722} \times 100 = 44.49\%$

For Policy B $= \frac{₹\ 6,550}{₹\ 14,772} \times 100 = 30.70\%$

For Policy C $= \frac{₹\ 10,750}{₹\ 45,833} \times 100 = 23.45\%$

For Policy D $= \frac{₹\ 8,400}{₹\ 68,750} \times 100 = 12.22\%$

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

41. The Sales Manager of AB Limited suggests that if credit period is given for 1.5 months then sales may likely to increase by ₹ 1,20,000 per annum. Cost of sales amounted to 90% of sales. The risk of non-payment is 5%. Income tax rate is 30%. The expected return on investment is ₹3,375 (after tax). Should the company accept the suggestion of Sales Manager?

(May 2008/May 2015 modified)

Ans. Credit period =1.5 Months

Increase in Sales	1,20,000
Less: Cost of Production	1.08.000
Contribution	12,000
Less: Bad Debts	6.000
Contribution after bad debts	6,000
Less: Tax @ 30%	1.800
Profit after tax	4.200

Conclusion:

Since, Net Profit is ₹ 4,200 and expected return is 3,375, therefore as PAT is positive hence, the suggestion of the sales manager may be accepted.

42. A new customer with 10% risk of non-payment desires to establish business connections with you. He would require 1.5 month of credit and is likely to increase your sales by ₹1,20,000 p.a. Cost of sales amounted to 85% of sales. The tax rate is 30%
Should you accept the offer it the required rate of return is 40% (after tax)?
(November 2011/ICAI SM)

Ans. **Working Notes:**

i) Receivable Turnover = $\frac{12}{1.5} = 8$ Times

ii) Average Investment in Receivable

$$= \frac{\text{Cost of Sales}}{\text{Receivables Turnover}} = \frac{1,02,000}{8} = ₹\ 12,750$$

Opportunity Cost of Funds Blocked = 12,750 × 40/100 = 5,100

Evaluation of Credit to New Customer

A) Profit on Additional Sales

Increase in Annual Sales	1,20,000
Less: Cost of Sales 85%	1,02,000
	18,000
Less: Bad Debts Loss (10% on sales)	12,000
Profit before Tax	6,000
Less: Tax 30%	1,800
Net Profit after Tax	4,200

B) Opportunity Cost of Investment
in Receivables (12,750 × 40) 5,100

C) Net Benefit/Loss (A - B) (900)

Decision: The offer should not be accepted since ₹4,200 the estimated profit after tax on additional sales is less than the required return on additional investment of ₹5,100 in. receivables.

43. PQR Ltd. having an annual sale of ₹30 lakhs, is re-considering its present collection policy. At present, the average collection period is 50 days and the bad debt losses are 5% of sales. The company is incurring an expenditure of ₹ 30,000 on account of collection of receivables. Cost of funds is 10 percent.
The alternative policies are as under:

Particulars	Alternative I	Alternative II
Average Collection Period	40 days	30 days
Bad Debt Losses	4% of sales	3% of sales
Collection Expenses	₹60,000	₹95,000

DETERMINE the alternatives on the basis of incremental approach and state which alternative is more beneficial. **(November 2014/ICAI SM)**

Ans.

Particulars	Present Policy	Alternative I	Alternative II
	₹	₹	₹
Sales Revenue	30,00,000	30,00,000	30,00,000
Average Collection Period (ACP) days	50	40	30
Receivables (₹) (Sales × $\frac{ACP}{360}$)	4,16,667	3,33,333	2,50,000
Reduction in Receivables from Present Level (₹)		83,334	1,66,667
Savings in interest @ 10% p.a. (A)		₹ 8,333	₹ 16,667
% of Bad Debt Loss	5%	4%	3%
Amount (₹)	1,50,000	1,20,000	90,000
Reduction in Bad Debts from Present Level (B)		30,000	60,000
Incremental Benefits from Present Level (C) = (A)+(B)	-	38,333	76,667
Collection Expenses (₹)	30,000	60,000	95,000
Incremental Collection Expenses from Present Level (D)		30,000	65,000
Incremental Net Benefit (C-D)		₹ 8,333	₹ 11,667

Conclusion: From the analysis it is apparent that Alternative I has a benefit of ₹ 8,333 and Alternative II has a benefit of ₹ 11,667 over present level. Alternative II has a benefit of ₹ 3,334 more than Alternative. I. Hence Alternative II is more viable.

(**Note:** In absence of Cost of Sales, sales has been taken for purpose of calculating investment in receivables. Cost of Funds has been assumed to be 10% 1 year = 360 days)

44. A company is presently having credit sales of ₹12 lakhs. The existing credit terms are 1/10, net 45 days and average collection period is 30 days. The current bad debts loss is 1.5%. In order to accelerate the collection process further as also to increase sales, the company is contemplating liberalization of its existing credit terms to 2/10, net 45 days. It is expected that sales are likely to increase 1/3 of existing sales, bad debts increase to 2% of sales and average collection period to decline to 20 days. The contribution to sales ratio of the company is 22 % and opportunity cost of investment in receivables is 15% percent (pre-tax). 50 percent and 80 percent of customers in term of sales revenue are expected to avail cash discount under existing and liberalization scheme respectively. The tax rate is 30%.

Should the company change its credit terms? (Assume 360 days in a year).

(May 2012/Modified Nov-2017)

Ans. **Evaluation of Credit Policy**

Working Notes:

i) Computation of Cash Discount

Cash Discount = Total credit sales × % of customers who take up discount × Rate

Present Policy = $\frac{12,00,000 \times 50 \times .01}{100}$ = ₹ 6,000

Proposed Policy = 16,00,000 × 0.80 00D7 25,600

ii) Opportunity Cost of Investment in Receivables

Present Policy = 9,36,000 × (30/360) × (70% of 15)/100 = 78,000 × 10.5/100 = ₹ 8,190

Proposed Policy = 12,48,000 × (20/360) × 10.50/100 = ₹7,280

Statement showing Evaluation of Credit Policies

Particulars	Present Policy	Proposed Policy
Credit Sales	12,00,000	16,00,000
Variable Cost @ 78% of sales	9,36,000	12,48,000
Bad Debts @ 1.5% and 2%	18,000	32,000
Cash Discount	6,000	25,600
Profit before tax	2,40,000	2,94,400
Tax @30%	72,000	88,320
Profit after tax	1,68,000	2,06,080
Opportunity Cost of Investment in Receivables	8,190	7,280
Net Profit	1,59,810	1,98,800

Advise: Proposed policy should be adopted since the net benefit is increased by (₹ 1,98,800 - 1,59,810) =₹ 38,990.

[**Note:** Opportunity cost of investment in receivables can be computed alternatively taking contribution @22 percent into consideration. The net benefit then would change accordingly to ₹1,95,137.]

45. MN Ltd. has a current turnover of ₹ 30,00,000 p.a. Cost of Sale is 80% of turnover and Bad Debts are 2% of turnover, Cost of Sales includes 70% variable cost and 30% Fixed Cost, while company's required rate of return is 15%. MN Ltd. currently allows 15 days credit to its customer, but it is considering increase this to 45 days credit in order to increase turnover. It has been estimated that this change in policy will increase turnover by 20%, while Bad Debts will increase by 1%. It is not expected that the policy change will result in an increase in fixed cost and creditors and stock will be unchanged.

Should MN Ltd. introduce the proposed policy? **(November 2018/Modified ICAI SM)**

Ans.

Statement Showing Evaluation of Credit Policies

	Particulars	Present Policy	Proposed Policy
A)	Expected Contribution		
	a) Credit Sales	30,00,000	36,00,000
	b) Less: Variable Cost	16,80,000	20,16.000
	c) Contribution	13.20,000	15.84.000
	d) Less: Bad Debts	60,000	1.08.000
	e) Contribution after Bad Debt [(c)-(d)]	12,60,000	14,76,000
B)	Opportunity Cost of investment in Receivables	15,000	54.000
C)	Net Benefits [A-B]	**12,45,000**	**14,22,000**
D)	Increase in Benefit		**1,77,000**

Recommendation: Proposed Policy i.e. credit from 15 days to 45 days should be implemented by NM Ltd. since the net benefit under this policy are higher than those under present policy.

Working Note: 1)

Particulars	Present Policy (₹)	Proposed Policy (₹)
Sales	30,00,000	36,00,000

Cost of Sales (80% of sales)	24,00,000	28,80,000
Variable Cost (70% of cost of sales)	16,80,0000	20,16,000

2) Opportunity Costs of Average Investments

$= \text{Variable Cost} \times \frac{\text{Collection Period}}{360} \times \text{Rate of Return}$

Present Policy $= ₹24,00,000 \times \frac{15}{360} \times 15\% = ₹\ 15,000$

Proposed Policy $= ₹\ 28,80,000 \times \frac{45}{360} \times 15\% = ₹54,000$

46. A firm has a total sale of ₹ 12,00,000 and its average collection period is 90 days. The past experience indicates that bad debt losses are 1.5% on sales. The expenditure incurred by the firm in administering receivable collection efforts are 50,000. A factor is prepared to buy the firm's receivables by charging 2% commission. The factor will pay advance on receivables to the firm at an interest rate of 16% p.a. after withholding 10% as reserve.
Calculate effective cost of factoring to the firm. Assume 360 days in a year,

(May 2009 RTP/Modified ICAI SM)

Ans. **Computation of Effective Cost of Factoring**

Average level of Receivables	=	12,00,000 × 90/360	3,00,000
Factoring Commission	=	3,00,000 × 2/100	6,000
Factoring Reserve	=	3,00,000 × 10/100	30,000
Amount Available for Advance	=	3,00,000 – (6,000+30,000)	2,64,000

Factor will deduct his interest@ 16%:

Interest $= \frac{₹\ 2,64,000 \times 16 \times 90}{360 \times 100} = ₹\ 10,560$

Advance to be paid = ₹2,64,000-₹ 10,560 = ₹2,53,440

Annual Cost of Factoring to the Firm:	₹
Factoring Commission (₹ 6,000 × 360/90)	24,000
interest Charges (₹10,560 × 360/90)	42,240
Total	66,240

Firm's Savings on taking Factoring Service:	₹
Cost of Administration Saved	50,000
Cost of Bad Debts (₹12,00,000 × 1.5/100) avoided	18,000
Total	68,000
Net Benefit to the Firm (₹68,000 – ₹ 66,240)	1,760
Effective Cost of Factoring $= \frac{₹\ 66,240 \times 100}{2,53,440}$	26.136%

Effective Cost of Factoring = 26.136%

Note: In the same manner we can also calculate effective rate of cost saving to the firm.

$$= \frac{1,760 \times 100}{2,53,440} = 0.694\%$$

47. The Marketing Manager of XY Ltd. is giving a proposal to the Board of Directors of the company that an increase in credit period allowed to customers from the present one month to two months will bring a 25% increase in sales volume in the next year.

The following operational data of the company tor the current year are taken from the records of the company:

	₹
Selling price	21 p.u.
Variable cost	14 p.u.
Total cost	18 p.u.
Sales value	18,90,000

The Board, by forwarding the above proposal and data requests you to give your expert opinion on the adoption of the new credit policy in next year subject to a condition that the company's required rate of return on investments is 40%.

(May 2011 RTP)

Ans. **Advise regarding Change in Credit Policy**

Working Notes:

1)	Present Sales Value	₹ 18,90,000
	Present Selling Price per unit	₹ 21
	∴ Present Sales Volume	$= \frac{18,90,000}{21} = 90,000$ units
	Expected increase in Sales Volume	= 25%
	∴ Expected Sales Volume in next year	= 90,000 + 25% of 90,000. p;
		= 90,000 + 22,500
		= 1,12,500 units
2)		₹
	Present total cost (90,000 × 18)	16,20,000
	Add Variable cost on additional Sales (22,500 × 14)	3,15,000
	∴Total cost of future sales	19,35,000
	∴Average cost per unit	$\frac{19,35,000}{1,12,500} =$ ₹ 17.2
3)		₹
	Cost of Sale (1,12,500 × 17.2)	19,35,000
	Average collection period	= 2 months
	∴ Average Investment in receivables in the proposed credit policy	$= \frac{19,35,000}{12} \times 12 = 3,22,500$
4)		₹
	Additional Investment in receivables	$= 3,22,500 - \frac{90,000 \times 18}{12}$
		= 3,22,500 -1,35,000
		₹1,87,500
5)	Contribution from additional sales	= (21-14) 22,500
		=₹1,57,500
6)	Return on additional investments in receivables	$= \frac{1,57,500}{1,87,500} \times 100$
		= 84%

Advise: The expected rate of return on additional investment in receivables (84%) is more than the required rate of return (40%), therefore the proposed increase in credit period from one month to two months should be accepted and implemented in the next year.

48. Current annual sale of SKD Ltd. Is 7,360 lakhs. It's directors are of the opinion that company's current expenditure on receivables management is too high and with a view to reduce the expenditure they are considering following two new alternate credit policies:

Particulars	Policy X	Policy Y
Average collection period	1.5 months	1 month
% of default	2%	1%
Annual collection expenditure	₹12 lakh	₹20 lakh

Selling price per unit of product is ₹ 150. Total cost per unit is 120. Current credit terms are 2 months and percentage of default is 3%. Current annual collection expenditure is ₹8 lakh. Required rate of return on investment of SKD Ltd. Is 20%. Determine which credit policy SKD Ltd. Should follow.

(July 2021)

Ans.

Particulars	Current Policy	Policy x	Policy Y
Sales	3,60,00,000	3,60,00,000	3,60,000
Cost of investment in debtors	9,60,000	7,20,000	4,80,000
Bad debt losses	10,80,000	7,20,000	3,60,000
Collection expenditure	85,00,000	12,00,000	20,00,000
Cost of credit	28,40,000	26,40,000	28,40,000

SKD Ltd. Should follow Policy X having lowest cost of credit.

Working Note:

Calculation of cost of investment in debtors:

Current Policy $= 3,60,00,000 \times 80\% \times \frac{2}{12} \times 20\%$ = 9,60,000

Policy X $= 3,60,00,000 \times 80\% \times \frac{15}{12} \times 20\%$ = 7,20,000

Policy Y $= 3,60,00,000 \times 80\% \times \frac{1}{12} \times 20\%$ = 4,80,000

Percentage of cost of sales $= 120/150 \times 100$ = 80%

49. The turnover of PQR Ltd. Is ₹120 lakhs of which 75 per cent is on credit. The variable cost ratio is 80 per cent. The credit terms are 2/10, net 30. On the current level of sales, the bad debts are 1 per cent. The company spends ₹1,20,000 per annum on administering its credit sales. The cost includes salaries of staff who handle credit checking, collection etc. These are avoidable costs. The past experience indicates that 60 per cent of the customers avail of the cash discount, the remaining customers pay on an average 60 days after the date of sale.

The Book debts (receivable) of the company are presently being financed in the ratio of 1:1 by a mix of bank borrowings and owned funds which cost per annum 15 per cent and 14 per cent respectively.

A factoring firm has offered to buy the firm's receivables. The main elements of such deal structured by the factor are:

i) Factor reserve, 12 per cent
ii) Guaranteed payment, 25 days
iii) Interest charges, 15 per cent, and
iv) Commission 4 per cent of the value of receivables.

Assume 360 days in a year.

What advise would you give to PQR Ltd. Whether to continue with the in-house management of receivables or accept the factoring firm's offer?

(May 2007)

Ans.

In-house management decision of receivable

Particulars	₹
Cash discount (₹ 90 lakhs × 0.60 x 0.02)	1,08,000
Bad debts losses (90,00,000 × 0.01)	90,000
Administration cost	1,20,000
Cost of funds in receivables (Note)	1,08,750
	4,26,750

Note: Average collection period (10 × 0.6) +(60 days × 0.40) = 30 days

Average investments in debtors = $\frac{90}{12} = 7.5$ lakhs

Cost of Bank funds $\left(₹\ 7.5\ \times 0.15 \times \frac{1}{2}\right)$ 56,250

Cost of Owned funds $\left(₹\ 7.5\ \times 0.14 \times \frac{1}{2}\right)$ 52,500

1,08,750

ii) After Accepting the factoring firm's offer:

Particulars	₹
Factoring commission (₹ 90 lakhs × 0.04)	3,60,000
Interest charges 0.88 (90,00,000 – 3,60,000) = 76,03,200 × 0.15 × $\frac{25}{360}$	79,200
Cost of owned funds invested in receivables	
(90,00,000 – 76,03,200) × $\frac{25}{360}$	13,580
Total	4,52,780

Decision: PQR should not go for the factoring because the cost of factoring is much higher than in house decision.

Cost of In-house Decision	4,26,750
Cost of Factoring Firm	4.52,780
Net loss	(26.030)

50. A firm has a total sales of ₹ 200 lakhs of which 80% is on credit. It is offering credit terms of 2/40, net 120. Of the total, 50% of customers avail of discount and the balance pay in 120 days. Past experience indicates that bad debt losses are around 1% of credit sales. The firm spends about ₹2,40,000 per annum to administer its credit sales. These are avoidable as a factor is prepared to buy the firm's receivables. He will charge 2% commission. He will pay advance against receivables to the firm at an interest rate of 18% after withholding 10% as reserve.

i) What is the effective cost of factoring? Consider year as 360 days.
ii) If bank finance for working capital is available at 14% interest, should the firm avail of factoring service? **(November 2015)**

Ans.

Total Sales = ₹ 200 lakhs
Credit Sales (80%) =₹ 160 lakhs
Receivables for 40 days = ₹ 80 lakhs
Receivables for 120 days = ₹ 80 lakhs
Average collection period [(40 × 0.5) + (120 × 0.5)] = 80 days
Average level of Receivables (₹ 1,60,00,000 × 80/360) = ₹ 35,55,556
Factoring Commission (₹ 35,55,556 × 2/100) = ₹ 71,111
Factoring Reserve (₹ 35,55,556 × 10/100) = ₹ 3,55,556
Amount available for advance {₹ 35,55,556 - (3,55,556 + 71,111)} = ₹ 31,28,889
Factor will deduct his interest @ 18%:

Interest = $\frac{₹31,28,889 \times 18 \times 80}{100 \times 360}$ = ₹ 1,25,156

Advance to be paid (₹ 31,28,889 – ₹ 1,25,156) = ₹ 30,03,733

i) Calculation of Effective Cost of Factoring:

Annual Cost of Factoring to the Firm:	**₹**
Factoring commission (₹ 71,111 × 360/80)	3,20,000
Interest charges (₹ 1,25,156 × 360/80)	5,63,200
Total (A)	8,83,200
Firm's Savings on taking Factoring Service:	**₹**
Cost of credit administration saved	2,40,000
Bad Debts (₹ 160,00,000 × 1/100) avoided	1,60,000
Total (B)	4,00,000
Net Cost to the firm (A – B) (₹ 8,83,200 – ₹ 4,00,000)	4,83,200

Effective cost of factoring = $\frac{₹\ 4,83,200}{₹30,03,733}$ × 100 = 16.09* %

* If cost of factoring is calculated on the basis of total amount available for advance, then, it will be = $\frac{₹\ 4,83,200}{₹31,28,889}$ × 100 = 15.44%

ii) If Bank finance for working capital is available at 14%, firm will not avail factoring service as 14 % is less than 16.08% (or 15.44%)

51. Suppose ABC Ltd. has been offered credit terms from its major supplier of 2/10, net 45. Hence the company has the choice of paying ₹10 per ₹100 or to invest ₹98 for an additional 35 days and eventually pay the supplier ₹100 per ₹100. The decision as to whether the discount should be accepted depends on the opportunity cost of investing ₹98 for 35 days. ANALYSE what should the company do?

(ICAI SM)

Ans. If the company does not avail the cash discount and pays the amount after 45 days, the implied cost of interest per annum would be approximately:

$\left(\frac{100}{100-2}\right)^{\frac{365}{35}} - 1 = 23.5\%$

Now let us assume that ABC Ltd. can invest the additional cash and can obtain an annual return of 25% and if the amount of invoice is ₹ 10,000. The alternatives are as follows:

Particulars	Refuse discount	Accept discount
	₹	₹
Payment to supplier	10,000	9,800
Return from investing ₹ 9,800 between day 10 and day 45;		
$\frac{35}{365} \times$ ₹9,800 × 25%	(235)	
Net Cost	9,765	9,800

Advise: Thus, it is better for the company to refuse the discount, as return on cash retained is more than the saving on account of discount.

52. The Dolce Company purchases raw materials on terms of 2/10, net 30. A review of the company's records by the owner, Mr. Gautam, revealed that payments are usually made 15 days after purchases are made. When asked why the firm did not take advantage of its discounts, the accountant, Mr. Rohit, replied that it cost only 2 per cent for these funds, whereas a bank loan would cost the company 12 per cent.

i) ANALYSE what mistake is Rohit making?

ii) If the firm could not borrow from the bank and was forced to resort to the use of trade credit funds, what suggestion might be made to Rohit that would reduce the annual interest cost? IDENTIFY.

(ICAI SM)

Ans.

a) Rohit's argument of comparing 2% discount with 12% bank loan rate is not rational as 2% discount can be earned by making payment 5 days in advance i.e. within 10 days rather 15 days as payments are made presently. Whereas 12% bank loan rate is for a year.

Assume that the purchase value is R100, the discount can be earned by making payment within 10 days is ₹2, therefore, net payment would be ₹98 only. Annualized benefit

$= \frac{₹\ 2}{₹\ 98} \times \frac{365\ \text{days}}{5\ \text{days}} \times 100 = 149\%$

This means cost of not taking cash discount is 149%.

b) If the bank loan facility could not be available, then in this case the company should resort to utilise maximum credit period as possible.

Therefore, payment should be made in 30 days to reduce the interest cost.

53. Slow Payers are regular customers of Goods Dealers Ltd. and have approached the sellers for extension of credit facility for enabling them to purchase goods. On an analysis of past performance and on the basis of information supplied, the following pattern of payment schedule emerges in regard to Slow Payers:

Pattern of Payment Schedule	
At the end of 30 days	15% of the bill
At the end of 60 days	34% of the bill.
At the end of 90 days	30% of the bill.
At the end of 100 days	20% of the bill.
Non-recovery	1% of the bill.

Slow Payers want to enter into a firm commitment for purchase of goods of ₹15 lakhs in 20X1, deliveries to be made in equal quantities on the first dayof each quarter in the calendar year. The price per unit of commodity is ₹ 150 on which a profit of ₹ 5 per unit is expected to be made. It is anticipated by Goods Dealers Ltd., that taking up of this contract would mean an extra recurring expenditure of ₹ 5,000 per annum. If the opportunity cost of funds in the hands of Goods Dealers is 24% per annum, would you as the finance manager of the seller recommend the grant of credit to Slow Payers? ANALYSE. Workings should form part of your answer. Assume year of 365 days. **(ICAI SM)**

Ans.

Statement showing the Evaluation of Debtors Policies

Particulars		Proposed Policy `
A)	**Expected Profit:**	
	a) Credit Sales	15,00,000
	b) Total Cost	
	i) Variable Costs	14,50,000
	ii) Recurring Costs	5,000
		14,55,000
	c) Bad Debts	15,000
	d) Expected Profit [(a) – (b) – (c)]	30,000
B)	Opportunity Cost of Investments in Receivables	68,787
C)	Net Benefits (A – B)	(38,787)

Recommendation: The Proposed Policy should not be adopted since the net benefits under this policy are negative

Working Note: Calculation of Opportunity Cost of Average Investments

Opportunity Cost = Total Cost × $\frac{Collection\ Period}{365}$ × $\frac{Rate\ of\ Return}{100}$

Particulars		15%	34%	30%	20%	Total
A)	Total Cost	2,18,250	4,94,700	4,36,500	2,91,000	14,40,450
B)	Collection period	30/365	60/365	90/365	100/365	
C)	Required Rate of Return	24%	24%	24%	24%	
D)	Opportunity Cost (A × B × C)	4,305	19,517	25,831	19,134	68,787

54. TM Limited, a manufacturer of colour TV sets is considering the liberalization of existing credit terms to three of their large customers A, B and C. The credit period and likely quantity of TV sets that will be sold to the customers in addition to other sales are as follows:

Quantity sold (No. of TV Sets)

Credit Period (Days)	A	B	C
0	10,000	10,000	-
30	10,000	15,000	-
60	10,000	20,000	10,000
90	10,000	25,000	15,000

The selling price per TV set is ₹15,000. The expected contribution is 50% of the selling price. The cost of carrying receivable averages 20% per annum.

You are required to COMPUTE the credit period to be allowed to each customer. (Assume 360 days in a year for calculation purposes).

(May 2020 RTP)

Ans. In case of customer A, there is no increase in sales even if the credit is given. Hence comparative statement for B & C is given below:

Particulars	**Customer B**				**Customer C**			
1) Credit period (days)	0	30	60	90	0	30	60	90
2) Sales Units	10,000	15,000	20,000	25,000	-	-	10,000	15,000
	₹ in lakh				**₹in lakh**			
3) Sales Value	1,500	2,250	3,000	3,750	-	-	1,500	2,250
4) Contribution at 50% (A)	750	1,125	1,500	1,875	-	-	750	1,125
5) Receivables: Credit Period × Sales 360	-	187.5	500	937.5	-	-	250	562.5
6) Debtors at cost	-	93.75	250	468.75	-	-	125	281.25
7) Cost of carrying debtors at 20% (B)	-	18.75	50	93.75	-	-	25	56.25
8) Excess of contributions over cost of carrying debtors (A – B)	750	1,106.25	1,406.25	1,781.25	-	-	725	1,068.75

The excess of contribution over cost of carrying Debtors is highest in case of credit period of 90 days in respect of both the customers B and C. Hence, credit period of 90 days should be allowed to B and C.

Ans. Statement showing the Evaluation of Debtors Policies

Particulars	**Proposed Policy ₹**
A) Expected Profit:	
a) Credit Sales	15,00,000
b) Total Cost	
i) Variable Costs	14,50,000
ii) Recurring Costs	5,000
	14,55,000
c) Bad Debts	15,000
d) Expected Profit [(a) – (b) – (c)]	30,000
B) Opportunity Cost of Investments in Receivables	68,787
C) Net Benefits (A – B)	(38,787)

Recommendation: The Proposed Policy should not be adopted since the net benefits under this policy are negative

Working Note: Calculation of Opportunity Cost of Average Investments

Opportunity Cost = Total Cost × $\frac{\text{Collection period}}{365}$ × $\frac{\text{Rate of Return}}{100}$

Particulars		15%	34%	30%	20%	Total
A)	Total Cost	2,18,250	4,94,700	4,36,500	2,91,000	14,40,450
B)	Collection period	30/365	60/365	90/365	100/365	
C)	Required Rate of Return	24%	24%	24%	24%	
D)	Opportunity Cost (A × B × C)	4,305	19,517	25,831	19,134	68,787

55. The Alliance Ltd., a Petrochemical sector company had just invested huge amount in its new expansion project. Due to huge capital investment, the company is in need of an additional ₹ 1,50,000 in working capital immediately. The Finance Manger has determined the following three feasible sources of working capital funds:

i) Bank loan: The Company's bank will lend ₹ 2,00,000 at 15%. A 10% compensating balance will be required, which otherwise would not be maintained by the company.

ii) Trade credit: The company has been offered credit terms from its major supplier of 3/30, net 90 for purchasing raw materials worth ₹ 1,00,000 per month.

iii) Factoring: A factoring firm will buy the company's receivables of ₹ 2,00,000 per month, which have a collection period of 60 days. The factor will advance up to 75 % of the face value of the receivables at 12% on an annual basis. The factor will also charge commission of 2% on all receivables purchased. It has been estimated that the factor's services will save the company a credit department expense and bad debt expense of ₹ 1,250 and ₹ 1,750 per month respectively.

On the basis of annual percentage cost, ADVISE which alternative should the company select? Assume 360 days year.

(November 2021 RTP)

Ans. **Bank loan:** Since the compensating balance would not otherwise be maintained, the real annual cost of taking bank loan would be:

= $\frac{15}{90}$ × 100 = 16.67% p.a.

Trade credit: Amount upto ₹ 1,50,000 can be raised within 2 months or 60 days. The real annual cost of trade credit would be:

= $\frac{3}{97}$ × $\frac{360}{60}$ × 100 = 18.56% p.a.

Factoring:

Commission charges per year = 2% × (₹ 2,00,000 × 12) = ₹ 48,000

Total Savings per year = (₹ 1,250 + ₹ 1,750) × 12 = ₹ 36,000

Net factoring cost per year = ₹ 48,000 - ₹ 36,000 = ₹ 12,000

Annual Cost of Borrowing ₹ 1,50,000 receivables through factoring would be:

= $\frac{12\% + ₹\ 1,50,000 + ₹\ 12,000}{₹1,50,000}$ × 100

= $\frac{₹\ 18,000 + ₹\ 12,000}{₹1,50,000}$ × 100

= 20% p.a.

Advise: The company should select alternative of Bank Loan as it has the lowest annual cost i.e., 16.67% p.a.

56. Mosaic Limited has current sales of ₹ 15 lakhs per year. Cost of sales is 75 per cent of sales and bad debts are one per cent of sales. Cost of sales comprises 80 per cent variable costs and 20 per cent fixed costs, while the company's required rate of return is 12 per cent. Mosaic Limited currently allows customers 30 days' credit, but is considering increasing this to 60 days' credit in order to increase sales.

It has been estimated that this change in policy will increase sales by 15 per cent, while bad debts will increase from one per cent to four per cent. It is not expected that the policy change will result in an increase in fixed costs and creditors and stock will be unchanged.

Should Mosaic Limited introduce the proposed policy? ANALYSE (Assume a 360 days year)

(ICAI SM)

Ans. New level of sales will be 15,00,000 × 1.15 = ₹ 17,25,000

Variable costs are 80% × 75% = 60% of sales

Contribution from sales is therefore 40% of sales

Fixed Cost are 20% × 75% = 15% of sales

Particulars	**₹**	**₹**
Proposed investment in debtors = Variable Cost + Fixed Cost* = (17,25,000 × 60%) + (15,00,000 × 15%) = (10,35,000 + 2,25,000) × $\frac{60}{360}$		2,10,000
Current investment in debtors = [(15,00,000 × 60%) + (15,00,000 × 15%)] × $\frac{30}{360}$		93,750
Increase in investment in debtors		1,16,250
Increase in contribution = 15% × 15,00,000 × 40%		90,000
New level of bad debts = (17,25,000 × 4%)	69,000	
Current level of bad debts (15,00,000 × 1%)	15,000	
Increase in bad debts		(54,000)
Additional financing costs = 1,16,250 × 12% =		(13,950)
Savings by introducing change in policy		22,050

* Fixed Cost is taken at existing level in case of proposed investment as well

Advise: Mosaic Limited should introduce the proposed policy.

57. The following data relating to an auto component manufacturing company isavailable for the year 20X0-X1:

Raw material held in storage	20 days
Receivables' collection period	30 days
Conversion process period	10 days
(raw material – 100%, other costs – 50% complete)	
Finished goods storage period	45 days
Credit period from suppliers	60 days
Advance payment to suppliers	5 days
Total cash operating expenses per annum	₹ 800 lakhs

75% of the total cash operating expenses are for raw material. 360 days areassumed in a year.

You are required to CALCULATE:

1) Each item of current assets and current liabilities,
2) The working capital requirement, if the company wants to maintain a cash balance of ₹ 10 lakhs at all times.

(ICAI SM)

Ans. Since WIP is 100% complete in terms of material and 50% complete in terms of other cost, the same has been considered for number of days for WIP inventory i.e. 10 days for material and 5 days for other costs respectively.

Particulars	For Raw Material	For Other Costs	Total
Cash Operating expenses	$\frac{75}{100} \times 800 = 600$	$\frac{25}{100} \times 800 = 200$	800.00
Raw Material Stock Holding	$\frac{20}{360} \times 600 = 33.33$	-	33.33
WIP Conversion	$\frac{10}{360} \times 600 = 16.67$	$\frac{5}{360} \times 200 = 2.78$	19.45
Finished Goods Stock Holding	$\frac{45}{360} \times 600 = 75$	$\frac{45}{360} \times 200 = 25$	100.00
Receivable Collection Period	$\frac{30}{360} \times 600 = 50$	$\frac{30}{360} \times 200 = 16.67$	66.67
Advance to suppliers	$\frac{5}{360} \times 600 = 8.33$	-	8.33
Credit Period from suppliers	$\frac{60}{360} \times 600 = 100$	-	100.00

Computation of working capital

Particulars	₹ in lakhs
Raw Material Stock	33.33
WIP	19.45
Finished Goods stock	100.00
Receivables	66.67
Advance to Suppliers	8.33
Cash	10.00
	237.78
Less: Payables (Creditors)	100.00
Working capital	133.78

58. As a part of the strategy to increase sales and profits, the sales manager of a company proposes to sell goods to a group of new customers with 10% risk of non-payment. This group would require one and a half months credit and is likely to increase sales by ₹ 1,00,000 p.a. Production and Selling expenses amount to 80% of sales and the income-tax rate is 50%. The company's minimum required rate of return (after tax) is 25%.

Should the sales manager's proposal be accepted? ANALYSE

Also COMPUTE the degree of risk of non-payment that the company should be willing to assume if the required rate of return (after tax) were (i) 30%, (ii) 40% and (iii) 60%.

(ICAI SM)

Ans. **Statement showing the Evaluation of Proposal**

Particulars	₹
A) Expected Profit:	
Net Sales	1,00,000

	Less: Production and Selling Expenses @ 80%	(80,000)
	Profit before providing for Bad Debts	20,000
	Less: Bad Debts @10%	(10,000)
	Profit before Tax	10,000
	Less: Tax @ 50%	(5,000)
	Profit after Tax	5,000
B)	**Opportunity Cost of Investment in Receivables**	(2,500)
C)	**Net Benefits (A – B)**	2,500

Advise: The sales manager's proposal should be accepted.

Working Note: Calculation of Opportunity Cost of Funds

Opportunity Cost = Total Cost of Credit Sales × $\frac{Collection\ Period}{12}$ × $\frac{Required\ Rate\ of\ Return}{100}$ = ₹80,000 × $\frac{1.5}{12}$ × $\frac{25}{100}$ = ₹2,500

Statement showing the Acceptable Degree of Risk of Non-payment

Particulars	**Required Rate of Return**		
	30%	**40%**	**60%**
Sales	1,00,000	1,00,000	1,00,000
Less: Production and Sales Expenses	80,000	80,000	80,000
Profit before providing for Bad Debts	20,000	20,000	20,000
Less: Bad Debts (assume X)	X	X	X
Profit before tax	20,000 – X	20,000 – X	20,000 – X
Less: Tax @ 50%	(20,000 – X) 0.5	(20,000 – X) 0.5	(20,000 – X) 0.5
Profit after Tax	10,000 –0.5X	10,000 –0.5X	10,000 –0.5X
Required Return (given)	30% of 10,000*	40% of 10,000*	60% of 10,000*
	= ₹ 3,000	= ₹ 4,000	= ₹ 6,000

*Average Debtors = Total Cost of Credit Sales × $\frac{Collection\ Period}{12}$

= ₹80,000 × $\frac{1.5}{12}$ = ₹10,000

Computation of the value and percentage of X in each case is as follows:

Case I 10,000 – 0.5x = 3,000

0.5x = 7,000

X = 7,000/0.5 = ₹ 14,000

Bad Debts as % of sales = ₹ 14,000/₹1,00,000 × 100 = 14%

Case II 10,000 – 0.5x = 4,000

0.5x = 6,000

X = 6,000/0.5 = ₹ 12,000

Bad Debts as % of sales = ₹ 12,000/₹1,00,000 ×

Case III 10,000 – 0.5x = 6,000

0.5x = 4,000

X = 4,000/0.5 = ₹ 8,000

Bad Debts as % of sales = ₹ 8,000/₹1,00,000 × 100 = 8%

Thus, it is found that the Acceptable Degree of risk of non-payment is 14%, 12% and 8% if required rate of return (after tax) is 30%, 40% and 60% respectively.

59. A Factoring firm has credit sales of ₹ 360 lakhs and its average collection period is 30 days. The financial controller estimates, bad debt losses are around 2% of credit sales. The firm spends ₹ 1,40,000 annually on debtors administration. This cost comprises of telephonic and fax bills along with salaries of staff members. These are the avoidable costs. A Factoring firm has offered to buy the firm's receivables. The factor will charge 1% commission and will pay an advance against receivables on an interest @15% p.a. after withholding 10% as reserve. ANALYSE what should the firm do?

Assume 360 days in a year.

(ICAI SM)

Ans. **Working Notes:**

Average level of receivables = ₹360 lakhs × $\frac{30}{360} = 30\ lakhs$

Factoring Commission = 1% of ₹ 30,00,000	=	₹30,000
Reserve = 10% of ₹ 30,00,000	=	₹3,00,000
Total (i)	=	₹3,30,000
Thus, the amount available for advance is		
Average level of receivables		₹30,00,000
Less: Total (i) from above		₹3,30,000
(ii)		₹26,70,000
Less: Interest @ 15% p.a. for 30 days		₹33,375
Net Amount of Advance available.		₹26,36,625

Evaluation of Factoring Proposal

	Particulars	₹	₹
A)	**Savings (Benefit) to the firm**		
	Cost of Credit administration	₹ 1,40,000	₹ 1,40,000
	Cost of bad-debt losses	(0.02 × 360 lakhs)	₹ 7,20,000
	Total		₹ 8,60,000
B)	**Cost to the Firm:**		
	Factoring Commission [Annual credit Sales × % of Commission (or calculated annually)]	₹ 30,000 × $\frac{360}{30}$	₹ 3,60,000
	Interest Charges	₹ 33,375×$\frac{360}{30}$	₹ 4,00,500
	Total		₹ 7,60,500
C)	**Net Benefits to the Firm: (A-B)**		₹ 99,500

Advice: Since the savings to the firm exceeds the cost to the firm on account of factoring, therefore, the proposal is acceptable.

60. A Ltd. is in the manufacturing business and it acquires raw material from X Ltd. on a regular basis. As per the terms of agreement the payment must be made within 40 days of purchase. However, A Ltd. has a choice of paying ₹ 98.50 per ₹ 100 it owes to X Ltd. on or before 10th day of purchase.

Required:

EXAMINE whether A Ltd. should accept the offer of discount assuming average billing of A Ltd. with X Ltd. is ₹ 10,00,000 and an alternative investment yield a return of 15% and company pays the invoice.

(May 2018 RTP)

Ans.

Annual Benefit of accepting the Discount

$\frac{₹1.5}{₹100-₹1.50} \times \frac{365\ Days}{40-10\ Days} = 18.53\%$

Annual Cost = Opportunity Cost of foregoing interest on investment = 15%

If average invoice amount is ₹10,00,000

Particulars	If discount is	
	Accepted (₹)	Not Accepted (₹)
Payment to Supplier (₹)	9,85000	10,00,000
Return on investment of ₹9,85,000 for 30 days {₹ 9,85,000 × (30/365) × 15%}		(12,144)
	9,85,000	9,87,856

Thus, from above table it can be seen that it is cheaper to accept the discount.

61. K Ltd. has a Quarterly cash outflow o ₹9,00,000 arising uniformly during the Quarter. The company has an Investment portfolio of Marketable Securities. It plans to meet the demands for cash by periodically selling marketable securities. The marketable securities are generating a return of 12% p.a. Transaction cost of converting investments to cash is ₹60. The company uses Baumol model to find out the optimal transaction size for converting marketable securities in cash.

Consider 360 days in a year.

You are required to calculate.

i) Company's average cash balance.

ii) Number of conversations each year and

iii) Time interval between two conversions. **(Nov. 2022)**

Ans.

i) Computation of Average Cash balance:

Annual cash outflow (U) = 9,00,000 x 4 = ₹ 36,00,000

Fixed cost per transaction (P) = ₹ 60

Opportunity cost of one rupee p.a. (S) = $\frac{12}{100} = 0.12$

Optimum cash balance (C) = $\sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 36,00,000 \times 60}{0.12}}$ = ₹60,000

∴ Average Cash balance = $\frac{(0+60,000)}{2} =$ ₹30,000

ii) Number of conversions p.a.

Annual cash outflow = ₹ 36,00,000

Optimum cash balance = ₹ 60,000

∴ No. of conversions p.a. = $\frac{36,00,000}{60,000} = 60$

iii) Time interval between two conversions

No. of days in a year = 360

No. of conversions p.a. = 60

∴ Time interval = $\frac{360}{60}$ = 6 days

62. Balance Sheet of X Ltd. for the year ended 31st March, 2022 is given below:

(₹ in lakhs)

Liabilities	Amount	Assets	Amount
Equity Shares ₹10 each	200	Fixed Assets	500
Retained earnings	200	Raw Materials	150
11% Debentures	300	W.I.P.	100
Public deposits (Short-Term)	100	Finished Goods	50
Trade Creditors	80	Debtors	125
Bills Payable	100	Cash/Bank	55
	980		**980**

Calculate the amount of maximum permissible bank finance under three methods as per Tandon Committee lending norms.

The total core current assets are assumed to be ₹30 lakhs. **(May 2022)**

Ans.

Current Assets = 150 + 100 + 50 + 125 + 55 = ₹ 480 Lakhs

Current Liabilities = 100 + 80 + 100 = ₹ 280 Lakhs

Maximum Permissible Banks Finance under Tandon Committee Norms:

Method I

Maximum Permissible Bank Finance = 75% of (Current Assets – Current Liabilities)

= 75% of (480 - 280)

= ₹ 150 Lakhs

Method II

Maximum Permissible Bank Finance = 75% of Current Assets – Current Liabilities

= 75 % of 480 – 280

= ₹ 80 Lakhs

Method III

Maximum Permissible Bank Finance = 75% of (Current Assets – Core Current Assets) – Current Liabilities

= 75 % of (480 - 30) – 280

= ₹ 57.5 Lakhs

63. A factoring firm has offered a company to buy it's accounts receivables.

The relevant information is given below.

i) The current average collection period for the company's debt is 80 days and ½% debtors default. The factor has agreed to pay over money due, to the company after 60 days and it will suffer all the losses of bad debts also.

ii) Factor will charge commission @ 2%.

iii) The company spends ₹1,00,000 p.a. on administration of debtor. These are avoidable cost.

iv) Annual credit sales are ₹90. Total variable costs is 80% of sales. The company's cost of borrowing is 15% per annum.

Assume 365 days in a year.

Should the company enter into agreement with factoring firm? **(Dec. 2021)**

Ans.

	Particulars	(₹)
A)	**Annual Savings (Benefit) on taking Factoring Service**	
	Cost of credit administration saved	1,00,000
	Bad debts avoided (₹ 90 lakh × ½%)	45,000
	Interest saved due to reduction in average collection period [₹ 90 lakh × 0.80 × 0.15 × (80 days – 60 days)/365 days]	**59,178**
	Total	**2,04,178**
B)	**Annual Cost of Factoring to the Firm:**	
	Factoring Commission [₹ 90 lakh × 2%]	1,80,000
	Total	**1,80,000**
C)	**Net Annual Benefit of Factoring to the Firm (A – B)**	**24,178**

Advice: Since savings to the firm exceeds the cost to the firm on account of factoring, therefore, the company should enter into agreement with the factoring firm.

Cost of Capital
Assignment

Q. No. 1.

Navya Limited to wishes to raise additional capitals of ₹ 10 lakh for meetings its modernization plan. It has ₹ 3,00,000 in the form of retained earnings available for investment purposes. The following are the further details:

Debt/ Equity mix	40%/60%
Cost of debt (before tax)	
Upto ₹ 1,80,000	10%
Beyond ₹ 1,80,000	16%
Earning per share	₹4
Dividend pay-out	₹2
Expect growth rate in dividend	10%
Current market price per share	₹44
Tax rate	50%

Required:

i) To determine the pattern of raising the additional finance.
ii) To calculate the post –tax average cost of additional debt.
iii) To calculate the cost of retained earning and cost of equity, and
iv) To determine the overall weighted average cost of capital (after tax).

(ICAI SM modified/May 2015 modified/ May 2008 modified / November 2019 modified/July 2021 modified/ November 2011 modified/May 2019 modified)

Ans.

i) Pattern of Raising Additional Finance

Equity = 10,00,000 × 60/100 = ₹6,00,000
Debt = 10,00,000 × 40/100 = ₹4,00,000
Capital structure after Raising Additional Finance

Sources of Fund	Amount (₹)
Shareholder's Fund	
Equity Capital (6,00,000 – 3,00,000)	3,00,000
Retained earnings	3,00,000
Debt at 10% p.a.	1,80,000
Debt at 16% p.a. (4,00,000 – 1,80,000)	2,20,000
Total funds	10,00,000

ii) Post-tax Average Cost of Additional Debt

K_d = l (1 -t), where ' K_d' is cost of debt, 'l' is interest and 't' tax rate.
On ₹1,80,000 = 10% (1 – 0.5) = 5% or 0.05
On ₹2,20,000 = 16% (1 – 0.5) = 8% or 0.08
Average Cost of Debt (Post Tax) i.e.

$K_d = \frac{(1,80,000 \times 0.05)+(2,20,000 \times 0.08)}{4,00,000} = 100 = 6.65\%$

iii) Cost of Retained Earning and Cost of Equity applying Dividend Growth Model

$K_e = \frac{1.3865}{20} + g$ or $\frac{D_0(1+g)}{P_0} + g$

Then, $K_e = \frac{2.(1.1)}{44} + 0.10 = \frac{2.2}{44} + 0.010 = 0.15 \; or \; 15\%$

iv) Overall Weighted Average Cost of Capital (WACC) (After Tax)

Particulars	Amount (₹)	Weights	Cost of Capital	(WACC)
Equity (including retained earnings)	6,00,000	0.6	15	9
Debt	4,00,000	0.4	6.65	2.66
Total	**10,00,000**	**1**		**11.66**

2. CALCULATE the WACC using the following data by using:

a) Book value weights

b) Market value weights

The capital structure of the company is as under:

Particulars	(₹)
Debentures (₹ 100 per debenture)	5,00,000
Preference shares (₹ 100 per share)	5,00,000
Equity shares (₹ 10 per share)	10,00,000
	20,00,000

The market prices of these securities are:

Debentures ₹ 105 per debenture

Preference shares ₹ 110 per preference share

Equity shares ₹ 24 each.

Additional information:

i) ₹ 100 per debenture redeemable at par, 10% coupon rate, 4% floatation costs, 10-year maturity.

ii) ₹ 100 per preference share redeemable at par, 5% coupon rate, 2% floatation cost and 10-year maturity.

iii) Equity shares has ₹ 4 floatation cost and market price ₹ 24 per share.

The next year expected dividend is ₹ 1 with annual growth of 5%. The firm has practice of paying all earnings in the form of dividend.

Corporate tax rate is 30%. Use YTM method to calculate cost of debentures and preference shares.

(RTP November 2020/ ICAI SM / MTP March 2021 /January 2021/ May 2009)

Ans.

i) Cost of Equity (K_e)

$= \frac{D_1}{P_0 - F} + g$

$= \frac{₹1}{₹24-4} + 0.05 = 0.1 \; or \; 10\%$

ii) Cost of Debt (K_d)

Current market price (P0) – floatation cost = I(1-t) × PVAF(r,10) + RV × PVIF(r,10)

₹ 105 – 4% of ₹ 105 = ₹ 10 (1-0.3) × PVAF (r,10) + ₹ 100 × PVIF (r,10)

Calculation of NPV at discount rate of 5% and 7%

Year	Cash flows (₹)	Discount factor @ 5%	Present Value	Discount factor @ 7%	Present Value (₹)
0	100.8	1.000	(100.8)	1.000	(100.8)
1 to 10	7	7.722	54.05	7.024	49.17
10	100	0.614	61.40	0.508	50.80
NPV			+14.65		-0.83

Calculation of IRR

$IRR = 5\% + \frac{14.65}{14.65-(-0.83)} (7\% - 5\%) = 5\% + \frac{14.65}{15.48} (7\% - 5\%) = 6.89\%$

Cost of Debt (K_d) = 6.89%

iii) Cost of Preference shares (K_p)

Current market price (P_0) – floatation cost = PD × PVAF (r,10) + RV × PVIF(r,10)

₹ 110 – 2% of ₹ 110 = ₹ 5 × PVAF (r,10) + ₹ 100 × PVIF (r,10)

Calculation of NPV at discount rate of 3% and 5%

Year	Cash flows (₹)	Discount factor @ 3%	Present Value	Discount factor @ 5%	Present Value (₹)
0	107.8	1.000	(107.8)	1.000	(107.8)
1 to 10	5	8.530	42.65	7.722	38.61
10	100	0.744	74.40	0.614	61.40
NPV			+9.25		-7.79

Calculation of IRR

$IRR = 3\% + \frac{9.25}{9.25-(-7.79)} (5\% - 3\%) = 3\% + \frac{9.25}{17.04} (5\% - 3\%) = 4.08\%$

Cost of Debt (K_p) = 4.08%

a) Calculation of WACC using book value weights

Source of capital	Book Value	Weights	After tax cost of capital	WACC (K_0)
	(₹)	(a)	(b)	(c) = (a)×(b)
10% Debentures	5,00,000	0.25	0.0689	0.01723
5% Preference shares	5,00,000	0.25	0.0408	0.0102
Equity shares	10,00,000	0.50	0.10	0.05000
	20,00,000	1.00		0.07743

WACC (K_0) = 0.07743 or 7.74%

b) Calculation of WACC using market value weights

Source of capital	Market Value	Weights	After tax cost of capital	WACC (K_0)
	(₹)	(a)	(b)	(c) = (a)×(b)
10% Debentures (₹ 105× 5,000)	5,25,000	0.151	0.0689	0.0104
5% Preference shares (₹ 110× 5,000)	5,50,000	0.158	0.0408	0.0064
Equity shares (₹ 24× 1,00,000)	24,00,000	0.691	0.10	0.0691
	34,75,000	1.000		0.0859

WACC (K_0) = 0.0859 or 8.59%

3. ABC Ltd. has the following capital structure, which is considered to be optimum as on 31st March, 2022.

	(₹)
14% Debentures	30,000
11% Preference shares	10,000
Equity Shares (10,000 shares)	1,60,000
	2,00,000

The company share has a market price of ₹ 23.60. Next year dividend per share is 50% of year 2021 EPS. Following is the uniform trend of EPS for the preceding 10 years which is expected to continue in future:

Year	EPS (₹)	Year	EPS (₹)
2012	1.00	2017	1.61
2013	1.10	2018	1.77
2014	1.21	2019	1.95
2015	1.33	2020	2.15
2016	1.46	2021	2.36

The company issued new debentures carrying 16% rate of interest and the current market price of debenture is ₹ 96.

Preference shares of ₹ 9.20 (with annual dividend of ₹ 1.1 per share) were also issued. The company is in 50% tax bracket.

A) CALCULATE after tax:
- i) Cost of new debt
- ii) Cost of new preference shares
- iii) Cost of new equity share (assuming new equity from retained earnings)

B) CALCULATE marginal cost of capital when no new shares are issued.

C) DETERMINE the amount that can be spent for capital investment before new ordinary shares must be sold. Assuming that the retained earnings for next year's investment is 50 percent of 2021.

D) COMPUTE marginal cost of capital when the fund exceeds the amount calculated in (C), assuming new equity is issued at ₹ 20 per share?

(ICAI SM modified/May 2016/ RTP May 2021 modified)

Ans.

A) i) Cost of new debt

$$K_d = \frac{I(1-t)}{P_0}$$

$$= \frac{16(1-0.5)}{96} = 0.0833$$

ii) Cost of new preference shares

$$K_d = \frac{PD}{P_0} = \frac{1.1}{9.2} = 0.12$$

iii) Cost of new equity shares

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

$$= \frac{1.18}{23.60} + 0.10 = 0.05 + 0.10 = 0.15$$

Calculation of g when there is a uniform trend (on the basis of EPS)

$$= \frac{EPS\ (2013) - EPS(2012)}{EPS(2012)} = \frac{₹\ 1.10 - ₹\ 1.00}{₹\ 1.00} = 0.10 \text{ or } 10\%$$

Calculation of D_1

D_1 = 50% of 2021 EPS = 50% of 2.36 = ₹ 1.18

B) Calculation of marginal cost of capital

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(2) × (3) = (4)
Debenture	0.15	0.0833	0.0125
Preference Share	0.05	0.1200	0.0060
Equity Share	0.80	0.1500	0.1200
Marginal cost of capital			**0.1385**

C) The company can spend the following amount without increasing marginal cost of capital and without selling the new shares:

Retained earnings = 50% of EPS of 2021 × outstanding equity shares

= 0.50 × ₹ 2.36 × 10,000 shares = ₹ 11,800

The ordinary equity (Retained earnings in this case) is 80% of total capital So, ₹ 11,800 = 80% of Total Capital

∴ Capital investment before issuing equity shares = $\frac{₹\ 11,800}{0.80}$ = ₹ 14,750

D) If the company spends in excess of ₹ 14,750, it will have to issue new equity shares at ₹ 20 per share.

∴ the cost of new issue of equity shares will be = $\frac{D_1}{P_0} + g = \frac{₹\ 1.18}{20} + 0.10 = 0.159$

The marginal cost of capital will be:

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(2) × (3) = (4)
Debentures	0.15	0.0833	0.0125
Preference Shares	0.05	0.1200	0.0060
Equity Shares (New)	0.80	0.1590	0.1272
			0.1457

4. The following details are provided are by the GPS Limited:

Equity share capital	65,00,000
12% preference share capital	12,00,000
15% Redeemable Debentures	20,00,000
10% Convertible Debentures	8,00,000

The cost of equity capital for the company is 16.30% and income tax rate for the company is 30%. You are required to calculate the weighted average cost of capital (WACC) of the company. **(May 2014/ICAI SM modified)**

Ans. **Computation of WACC:**

Statement Showing Weighted Cost & Cost

Particulars	Cost	Weight	Weighted Cost
Equity Share Capital	65,00,000	16.30%	10,59,500
12% Preference Share Capital	12,00,000	12.00%	1,44,000
15% Redeemable Debentures	20,00,000	(W.N.1)	2,10,000
10% Convertible Debentures	8,00,000	10.50%	56,000
		(W.N.2)	
		7.00%	
		(W.N.3)	
Total	1,05,00,000		14,69,500

Weighted Average Cost of Capital $= \frac{Weighted\ Cost}{Total\ Cost}$

$= \frac{14,69,500}{1,05,00,000}$

= 0.1399 or

= 13.99%

Working Notes:

1) Calculation of Cost of Preference Shares:

$K_p = \frac{D_p}{NP} = \frac{1,44,000}{12,00,000} = 0.12 = 12\%$

2) Calculation of Cost of 15% Redeemable Debentures:

$K_d = \frac{I\,(1-t)}{NP} = \frac{3,00,000\,(1-0.30)}{20,00,000} = 0.105 = 10.5\%$

3) Calculation of Cost of 10% Convertible Debentures:

$K_d = \frac{I\,(1-t)}{NP} = \frac{80,000\,(1-0.30)}{20,00,000} = 0.07 = 7\%$

5. A company issued 10,000, 10% debentures of ₹ 100 each at par on 1.4.2XX1 to be matured on 1.4.2X11. The company wants to know the cost of its existing debt on 1.4.2XX7 when the market price of the debentures is ₹ 80. COMPUTE the cost of existing debentures assuming 35% tax rate.

(May 2015 RTP/ ICAI SM modified)

Ans.

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

I	= Interest on debenture = 10% of ₹100	= ₹10
NP	= Net Proceeds =	= ₹80
RV	= Redemption value	= ₹100
n	= Period of debenture	= 5 years
t	= Tax rate	= 35% or 0.35

$K_d = \frac{₹10(1-0.35)+\frac{(₹100-₹80)}{5\text{ years}}}{\frac{(₹100+₹80)}{2}}$

Or, $K_d = \frac{₹10 \times 0.65+₹4}{₹90}$

$= \frac{₹10.5}{₹90}$

= 0.1166 or 11.67%

6. ABC Company's equity share is quoted in the market at ₹25 per share currently. The company pays a dividend of ₹ 2 per share and the investors market expects a growth rate of 6% per years.

You are required to:

i) Calculate the company's cost of equity capital.

ii) If the anticipated growth rate is 8% per annum, calculate the indicate market price per share.

iii) If the company issues 10% debentures of face value of ₹ 100 and realises ₹ 96 per debenture while the debentures are redeemable after years at a premium of 12%, what will be the cost of debenture? Assume tax to be 50%

(November 2016/ ICAI SM)

Ans.

i) Calculation of Cost of Equity Capital:

$K_e = \frac{D_0(1+g)}{P_0} + g$

$= \frac{2 \times 1.06}{25} + 0.06$

= 0.0848 + 0.06

= 0.1448

= 14.48%.

ii) Calculation the indicated Market price per share:

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

$\therefore 0.14 = \frac{2}{x} + 0.08$

$\therefore 0.14 - 0.08 = \frac{2}{x}$

$\therefore x\ (0.06) = 2$

$\therefore x = 33.33.$

iii) Calculation of Cost of Debenture:

$$K_d = \frac{l\,(1-t) + \left(\frac{RV-NP}{N}\right)}{\frac{RV+NP}{2}}$$

$$= \frac{10(1-0.50) + \left(\frac{112-96}{12}\right)}{\frac{112+96}{2}}$$

$$= \frac{5+1.33}{104}$$

$$= \frac{6.33}{104}$$

$$= 0.0608$$

$$= 6.08\%$$

7. PQR LTD. has the following capital structure on October 31, 2XX1:

Equity share capital	20,00,000
(2,00,000 Shares of ₹ 10 each)	
Reserves & Surplus	20,00,000
12% preference shares	10,00,000
9% debentures	30,00,000

The market price of equity shares is ₹ 30. It is expected the company will pay next year a dividend of ₹ 3 per share, which will grow at 7% forever. Assumes 40% income tax rate.
You are required to compute weighted average cost of capital using market value weights.

(November 2010 / November 2016)

Ans.

COST OF EQUITY = $\frac{D_1}{P_0} + g$

$= \frac{₹3}{₹30} + 0.07 = 0.1 + 0.07 = 0.17 = 17\%$

COST OF DEBENTURE =I(1-T) = 9% x (1 -0.4) = 0.054OR 5.4%

COST OF PREFERENCE SHARE = 12% OR .12

Computation of Weighted Average Cost of Capital (Using Market Value)

SOURCE OF CAPITAL	MARKET VALUE OF CAPITAL (₹)	WEIGHT	COST OF CAPITAL (%)	WACC (%)
9% Debentures (K_d)	30,00,000	0.30	5.40	1.62
12% Preference Shares	10,00,000	0.10	12.00	1.2
Equity Capital	60,00,000 (30X200000)	0.60	17.00	10.20
TOTAL	1,00,00,000			13.02

NOTE: - While using MV, reserve such as share premium and retained earnings are ignored as they incorporated in the value of equity.

8. Kalyanam Ltd. has an operating profit of ₹ 34,50,000 and has employed Debt which gives total Interest Charge of ₹ 7,50,000. The firm has an existing Cost of Equity and Cost of Debt as 16% and 8% respectively. The firm has a new proposal before it, which requires funds of ₹ 75 Lakhs and is expected to bring an additional profit of ₹ 14,25,000. To finance the proposal, the firm is expecting to issue an additional debt at 8% and will not be issuing any new equity shares in the market. Assume no tax culture.

You are required to CALCULATE the Weighted Average Cost of Capital (WACC) of Kalyanam Ltd.:

i) Before the new Proposal

ii) After the new Proposal

(RTP November 2021/ ICAI SM)

Ans.

a) Value of Debt $= \frac{Interest}{Cost\ of\ debt\ (K_d)}$

$= \frac{₹7,50,000}{0.08} = ₹93,75,000$

b) Value of equity capital $= \frac{Operating\ profit - Interest}{Cost\ of\ debt\ (K_e)}$

$= \frac{₹34,50,000 - ₹7,50,000}{0.16} = ₹1,68,75,000$

c) New Cost of equity (K_e) after proposal

$= \frac{Increased\ Operating\ profit - Interest\ on\ Increased\ debt}{Equity\ capital}$

$= \frac{(₹34,50,000 + ₹14,25,000) - (₹7,50,000 + ₹6,00,000)}{₹1,68,75,000}$

$= \frac{₹48,75,000 - ₹13,50,000}{₹1,68,75,000} = \frac{₹35,25,000}{₹1,68,75,000} = 0.209\ or\ 20.9\%$

i) Calculation of Weighted Average Cost of Capital (WACC) before the new proposal

Sources	Amount (₹)	Weight	Cost of Capital	WACC
Equity	1,68,75,000	0.6429	0.160	0.1029
Debt	93,75,000	0.3571	0.080	0.0286
Total	2,62,50,000	1		0.1315 or 13.15 %

ii) Calculation of Weighted Average Cost of Capital (WACC) after the new proposal

Sources	Amount (₹)	Weight	Cost of Capital	WACC
Equity	1,68,75,000	0.5000	0.209	0.1045
Debt	1,68,75,000	0.5000	0.080	0.0400
Total	3,37,50,000	1		0.1445 or 14.45 %

9. Answer the following:

A company issues 25,000, 14% debentures of ₹ 1,000 each. The debentures are redeemable after the expiry period of 5 years. Tax rate application to the company is 35% (include surcharge and education cess). Calculate the cost of debt after tax if debentures are issued at 5% discount with 2% flotation cost. **(November 2015)**

Ans.

Calculation of Cost of Debt after Tax:

Cost of Debt (K_d)

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

Where, I = Interest payment i.e. 14% of ₹1,000 = ₹140

t = Tax rate applicable to the company i.e. 35%

RV = Redeemable value of debentures i.e. ₹1,000

NP = Net proceeds per debentures
= ₹1,000 × {1 – (0.05 + 0.02)}
= ₹1,000 × 0.93 = ₹930
= Redemption period of debentures i.e. 5 years

Therefore, $K_d = \frac{₹140\ (1-0.35) + \left[\frac{₹1,000-₹930}{5\ Year}\right]}{\left[\frac{₹1,000+₹930}{2}\right]} \times 100$

$= \frac{₹91+₹14}{₹965} \times 100 = 10.88\%$

The Cost of Debt can also be calculated using the formula, where first Cost of Debt before tax is calculated and then tax adjustment is made.

Accordingly: -

Cost of Debt = $\frac{I + \left[\frac{RV-NP}{N}\right]}{\left[\frac{RV+NP}{2}\right]} \times (1 - t) \times 100$

$= \frac{₹140+₹14}{₹965}(1 - 0.35) \times 100$

$= 10.37\%$

10. Answer the following:
A company issued 40,000, 12% redeemable after 10 years at a premium of ₹ 10 each.
The floatation cost of each share is ₹ 2.
You are required to calculate cost of preference share capital ignoring dividend tax.
(May 2013)

Ans. **Computation of Cost of Preference Shares (K_p)**

Preference Dividend (PD)	= 0.12 × 40,000 × 100
	= 4,80,000
Floatation Cost	= 40,000 × 2 = ₹80,000
Net Proceeds (NP)	= 42,00,000 – 80,000 = 41,20,000
Redemption Value (RV)	= 40,000 ×110 = 44,00,000

Cost of Redeemable Preference Shares = $\frac{PD+(RV-NP)/N}{\frac{RV+NP}{2}}$

$K_p = \frac{4,80,000+(44,00,000-41,20,000)/10}{\frac{44,00,000+41,20,000}{2}}$

$= \frac{4,80,000+(2,80,000)/10}{85,20,000/2}$

$= \frac{4,80,000+28,000}{42,60,000} = \frac{5,08,000}{42,60,000}$

$= 0.1192$

$\boldsymbol{K_p = 11.92\%}$

Alternative Treatment:
K_p may be computed alternatively by taking the RV and NP for one unit of preference shares. Final figure would remain unchanged.

11. Answer the following:
Z ltd.'s operating income (before interest and tax) is ₹ 9,00,000. The firm's cost of debts is 10 % and currently firm employs ₹ 30,00,000 of debts K_0 is 12%

Required:
Calculate cost of equity. **(November 2007)**

Ans. Total Value of Firm $= \frac{\text{Operating Income}}{K_0}$

$= \frac{₹9,00,000}{0.12}$

$= 75,00,000$

Debt capital: = 30,00,000

Equity capital = 45,00,000

$0.12 = 0.10 \left(\frac{30,00,000}{75,00,000}\right) \times K_e \left(\frac{45,00,000}{75,00,000}\right)$

$0.12 = 0.10\ (.4) + K_e\ (.6)$

$0.12 = .04 + K_e\ .6$

$0.08 = K_e\ .6$

$K_e = \frac{.08}{.6}$

$= 0.1333$

$= 13.33\%$

12. Y ltd. retains ₹ 7,50,000 out of its current earning. The expected rate of return to the shareholders if they had invested the funds elsewhere is 10%. The brokerage is 3% and the shareholders came in 30% tax bracket. Calculate the cost of retained earning. **(November 2009)**

Ans. **Computation of Cost of Retained Earnings (K_r)**

K_r = K (1 - Tp) – Brokerage

K_r = 0.10 (1-0.30) – 0.03

= 0.04 Or 4%

Cost of Retained Earnings = 4%

13. SK limited has obtained funds from the following sources, the specific cost are also given against them:

Source of funds	Amount	Cost of capital
Equity shares	30,00,000	15 percent
Preference share	8,00,000	8 percent
Retained earnings	12,00,000	11 percent
Debentures	10,00,000	9 percent (before tax)

You are required to calculate weighted to calculate average cost of capital. Assume that corporate tax rate is 30 percent. **(May 2010)**

Ans. **Calculation of Weighted Average Cost of Capital (WACC)**

Sources	Amount (₹)	Weight	Cost of Capital (after tax) %	WACC %
Equity Shares	30,00,000	0.500	15	7.50
Preference Shares	8,00,000	0.133	8	1.06
Retained Earnings	12,00,000	0.200	11	2.20
Debentures	10,00,000	0.167	6.3*	1.05
Total	**60,00,000**			**11.81%**

Weighted Average Cost of Capital = ***11.81%***

*Cost of Debentures (K_d) (after tax) = K_d (before tax) × (I - T)

= 9% (1 – 0.3) = 6.3%

14. RST Ltd. is expecting an EBIT of ₹ 4 lakh for F. Y. 2XX1-X2. Presently the company is financed entirely by equity share capital of ₹ 20 lakh with equity capitalization rate of 16% The company is contemplating to redeem the part of the capital by introducing debt financing.

The company has two options to raise debt to the extent of 30% or 50% of the total fund. It is expected that for debt financing upto 30%, the rate of interest will be 10% and equity capitalization rate will increase to 17%. If the company opts for 50% debt, then the interest rate will be 12% and equity capitalization rate will be 20%. You are required to compute the value of company; it's overall cost of capital under difference option and also state which is the best option. **(November 2015)**

Ans.

Value of the Company:

Market Value of Equity	=	₹25,00,000
(+) Market Value of Debt	=	-
Value of Company		₹25,00,000

Working Note:

1) Calculation of Market Value of Equity:

$$\text{Equity Capitalisation Rate} = \frac{EBIT}{Market\ Value}$$

$$16\% = \frac{4,00,000}{Market\ Value}$$

$$\text{Market Value} = 25,00,000$$

Computation of Value of the Company and Overall Cost of Capital under the two options:

Particulars	Option I	Option II
Debt	30%	50%
Equity (existing)	₹20,00,000	₹20,00,000
Debt	₹6,00,000	₹10,00,000
Equity capitalization rate	17%	20%
Interest on Debt	10%	12%
EBIT	₹4,00,000	₹4,00,000
Less: Interest on Debt	₹60,000	₹1,20,000
Earnings to equity share holders	₹3,40,000	₹2,80,000
Market Value of equity	₹20,00,000 $\left(3,40,000 \times \frac{100}{17}\right)$	₹14,00,000 $\left(2,80,000 \times \frac{100}{20}\right)$
Value of Debt	₹6,00,000	₹10,00,000
Value of the company (Equity + Debt)	₹26,00,000	₹24,00,000
Overall Cost of Capital	15.38%	16.67%
	$\left(\frac{₹4,00,000}{₹26,00,000} \times 100\right)$	$\left(\frac{₹4,00,000}{₹24,00,000} \times 100\right)$

Since, in Option I value of the Company is more and overall cost of Capital is less compared to Option II, hence Option I is better.

15. Five years ago, Sona Limited issued 12 per cent irredeemable debentures at ₹ 103, at ₹ 3 premium to their par value of ₹ 100. The current market price of these debentures is ₹ 94. If the company pays corporate tax at a rate of 35 per cent CALCULATE its current cost of debenture capital?

(ICAI SM)

Ans. Cost of irredeemable debenture:

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

$$K_d = \frac{₹12}{₹94}(1 - 0.35)$$

$$= 0.08297 \text{ or } 8.30\%$$

16.	Institutional Development Bank (IDB) issued Zero interest deep discount bonds of face value of ₹ 1,00,000 each issued at ₹ 2,500 & repayable after 25 years. COMPUTE the cost of debt if there is no corporate tax. **(ICAI SM)**
Ans.	Here, Redemption Value (RV)= ₹1,00,000 Net Proceeds (NP) = ₹ 2,500 Interest = 0 Life of bond = 25 years There is huge difference between RV and NP therefore in place of approximation method we should use trial & error method. FV = PV x $(1+r)^n$ 1,00,000 = 2,500 x $(1+r)^{25}$ 40 = $(1+r)^{25}$ Trial 1: r = 15%, $(1.15)^{25}$ = 32.919 Trial 2: r = 16%, $(1.16)^{25}$ = 40.874 Here: L = 15%, H = 16% NPV_L = 32.919-40 = -7.081 NPV_H = 40.874 = + 0.874 IRR = L + $\frac{\text{NPV}_\text{L}}{NPV_{I-NPV_H}}$ (H – L) = 15% + $\frac{-7.081}{-7.081-(0.874)} \times (16\% - 15\%)$ = 15.89%
17.	RBML is proposing to sell a 5-year bond of ₹ 5,000 at 8 per cent rate of interest per annum. The bond amount will be amortised equally over its life. CALCULATE the bond's present value for an investor if he expects a minimum rate of return of 6 per cent? **(ICAI SM)**
Ans.	First year: ₹5,000 × 0.08 = ₹400; Second year: (₹5,000 – ₹1,000) × 0.08 = ₹320; Third year: (₹4,000 – ₹1,000) × 0.08 = ₹ 240; Fourth year: (₹3,000 – ₹1,000) × 0.08 = ₹160; and Fifth year: (₹2,000 – ₹1,000) × 0.08 = ₹80. The outstanding amount of bond will be zero at the end of fifth year. Since RBML will have to return ₹1,000 every year, the outflows every year willconsist of interest payment and repayment of principal: First year: ₹1,000 + ₹400 = ₹1,400; Second year: ₹1,000 + ₹320 = ₹1,320; Third year: ₹1,000 + ₹240 = ₹1,240; Fourth year: ₹1,000 + ₹160 = ₹1,160; and Fifth year: ₹1,000 + ₹80 = ₹1,080. The above cash flows of all five years will be discounted with the cost of capital.Here the expected rate i.e. 6% will be used. Value of the bond is calculated as follows: $V_B = \frac{₹1,400}{(1.06)^1}, \frac{₹1,320}{(1.06)^2}, \frac{₹1,240}{(1.06)^3}, \frac{₹1,160}{(1.06)^4}, \frac{₹1080}{(1.06)^5}$ $= \frac{₹1,400}{1.06} + \frac{₹1,320}{1.1236} + \frac{₹1,240}{1.1910} + \frac{₹1,160}{1.2624} + \frac{₹1,080}{1.3382}$ = ₹1,320.75 + ₹1,174.80 + ₹1,041.14 + ₹918.88 + ₹807.05 = ₹5,262.62
18.	If R Energy is issuing preferred stock at ₹100 per share, with a stated dividend of ₹12, and a floatation cost of 3% then, CALCULATE the cost of preference share? **(ICAI SM)**

Ans.

$$K_P = \frac{\text{Preferred stock dividend}}{\text{Market price of preferred stock (1}-\text{floatation cost)}}$$

$$= \frac{₹12}{₹100\ (1-0.03)}$$

$$= \frac{₹12}{₹97} = 0.1237 \text{ or } 12.37\%$$

19. XYZ Ltd. issues 2,000 10% preference shares of ₹ 100 each at ₹ 95 each. The company proposes to redeem the preference shares at the end of 10th year from the date of issue. CALCULATE the cost of preference share? **(ICAI SM)**

Ans.

$$K_P = \frac{PD + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$$

$$K_P = \frac{10 + \frac{(100-95)}{10}}{\frac{(100+95)}{2}}$$

= 0.1077 (approx.) = 10.77%

20. Mr. Mehra had purchased a share of Alpha Limited for ₹ 1,000. He received dividend for a period of five years at the rate of 10 percent. At the end of the fifth year, he sold the share of Alpha Limited for ₹ 1,128. You are required to COMPUTE the cost of equity as per realised yield approach. **(ICAI SM)**

Ans. We know that as per the realised yield approach, cost of equity is equal to the realised rate of return. Therefore, it is important to compute the internal rate of return by trial-and-error method. This realised rate of return is the discount rate which equates the present value of the dividends received in the past five years plus the present value of sale price of ₹ 1,128 to the purchase price of ₹1,000. The discount rate which equalises these two is 12 percent approximately. Let us look at the table given for a better understanding:

Year	Dividend(₹)	Sale Proceeds(₹)	Discount Factor @12%	Present Value (₹)
1	100	-	0.893	89.3
2	100	-	0.797	79.7
3	100	-	0.712	71.2
4	100	-	0.636	63.6
5	100	-	0.567	56.7
6	Beginning	1,128	0.567	639.576
				1,000.076

We find that the purchase price of Alpha limited's share was ₹ 1,000 and the present value of the past five years of dividends plus the present value of the sale price at the discount rate of 12 per cent is ₹1,000.076. Therefore, the realised rate of return may be taken as 12 percent. This 12 percent is the cost of equity.

21. CALCULATE the cost of equity from the following data using realized yield approach:

Year	1	2	3	4	5
Dividend per share	1.00	1.00	1.20	1.25	1.15
Price per share (at the beginning)	9.00	9.75	11.50	11.00	10.60

(ICAI SM)

Ans. In this question we will first calculate yield for last 4 years and then calculate it geometric mean as follows:

$$1 + Y_1 = \frac{D_1 + P_1}{P_0} = \frac{1+9.75}{9} = 1.1944$$

$$1 + Y_2 = \frac{D_2 + P2}{P_1} = \frac{1+11.50}{9.75} = 1.2821$$

$$1 + Y_3 = \frac{D_3 + P_3}{P_2} = \frac{1.2+11}{11.5} = 1.0609$$

$$1 + Y_4 = \frac{D_4 + P_4}{P_3} = \frac{1.25+10.60}{11} = 1.0772$$

	Geometric mean: $K_e = [(1 + Y_1) \times (1 + Y_2) \times \ldots\ldots\ldots (1 + Y_n)]^{1/n - 1}$ $K_e = [1.1944 \times 1.2821 \times 1.0609 \times 1.0772]^{1/4 - 1} = 0.15 = 15\%$ Note: to calculate power ¼ simply press square root switch, two times on your calculator.
22.	CALCULATE the cost of equity capital of H Ltd., whose risk-free rate of return equals 10%. The firm's beta equals 1.75 and the return on the market portfolio equals to 15%. **(ICAI SM)**
Ans.	$K_e = R_f + \beta\ (R_m - R_f)$ $K_e = 0.10 + 1.75\ (0.15 - 0.10)$ $= 0.10 + 1.75\ (0.05) = 0.1875$ or 18.75%
23.	Face value of equity shares of a company is ₹ 10, while current market price is ₹ 200 per share. Company is going to start a new project and is planning to finance it partially by new issue and partially by retained earnings. You are required to CALCULATE cost of equity shares as well as cost of retained earnings if issue price will be ₹ 190 per share and floatation cost will be₹ 5 per share. Dividend at the end of first year is expected to be ₹ 10 and growth rate will be 5%. **(ICAI SM)**
Ans.	$K_r = \frac{D_1}{P_0} + g$ $= \frac{10}{200} + .05 = 10\%$ $K_e = \frac{D_1}{P_0} + g$ $= \frac{10}{190-5} + .05 = 10.41\%$ NOW 10% TAX WILL IMPOSED ON EQUITY SHAREHOLDER U/S 194N FOR THE SAME YOU CAN USE BOTH FORMULA FOR SAFETY $K_r = k_e(1\text{-}tp)\ (1\text{-}f)$
24.	ABC Company provides the following details: D_0 = ₹4.19 P_0 = ₹50 g = 5% CALCULATE the cost of retained earnings. **(ICAI SM)**
Ans.	$K_r = \frac{D_1}{P_0} + g = \frac{D_0\ (1+g)}{P_0} + g$ $= \frac{₹4.19\ (1+0.05)}{50} + 0.05$ $= 0.088 + 0.05 = 13.8\%$
25.	ABC Company provides the following details: $R_f = 7\%$ $\beta = 1.20$ $R_m - R_f = 6\%$ CALCULATE the cost of retained earnings based on CAPM method. **(ICAI SM)**
Ans.	$K_r = R_f + \beta\ (R_m - R_f)$ $= 7\% + 1.20\ (6\%) = 7\% + 7.20$ $K_r = 14.2\%$
26.	Cost of equity of a company is 10.41% while cost of retained earnings is 10%. There are 50,000 equity shares of ₹10 each and retained earnings of ₹15,00,000. Market price per equity share is ₹50. Calculate WACC using market value weights if there are no other sources of finance. **(ICAI SM)**

Ans.

Book value of paid-up equity capital = ₹5,00,000
Book value of retained earnings = ₹15,00,000
Ratio of Paid-up equity capital & retained earnings = 5,00,000:15,00,000 = 1:3
Market value of paid equity capital & retained earnings = ₹ 50,000 x ₹ 50 = ₹25,00,000
Market value of paid-up equity capital = ₹25,00,000 × ¼ = ₹6,25,000
Market value of retained earnings = ₹25,00,000 × ¾ = ₹18,75,000

Calculation of WACC using market value weights

Source of capital	Market Value	Weights	Cost ofcapital	WACC (K_0)
	(₹)	(a)	(b)	(c) = (a)×(b)
Equity shares	6,25,000	0.25	0.1041	0.0260
Retained earnings	18,75,000	0.75	0.1000	0.0750
	25,00,000	1.000		0.1010

WACC (K_0) = 0.1010 or 10.10%.

27. Gamma Limited has in issue 5,00,000 ₹ 1 ordinary shares whose current ex- dividend market price is ₹ 1.50 per share. The company has just paid a dividend of 27 paise per share, and dividends are expected to continue at this level for some time. If the company has no debt capital, COMPUTE the weighted average cost of capital?

(ICAI SM)

Ans.

Market value of equity, E = 5,00,000 shares ×₹1.50 = ₹7,50,000
Market value of debt, D = Nil
Cost of equity capital, $K_e = \frac{D_1}{P_0} \times 100 = \frac{₹0.27}{₹1.50} \times 100 = 0.18$
Since there is no debt capital, WACC = K_e = 18 per cent.

28. ABC Company's equity share is quoted in the market at ₹ 25 per share currently. The company pays a dividend of ₹ 2 per share and the investor's market expects a growth rate of 6% per year.

You are required to:

i) CALCULATE the company's cost of equity capital.

ii) If the company issues 10% debentures of face value of ₹ 100 each and realises ₹ 96 per debenture while the debentures are redeemable after 12 years at a premium of 12%, CALCULATE cost of debenture Using YTM?

Assume Tax Rate to be 50%.

(ICAI SM)

Ans.

i) Cost of Equity Capital (K_e)

$K_e = \frac{Expected\ dividend\ per\ share\ (D_1)}{Market\ price\ per\ share\ (P_0)}$

$= \frac{₹2 \times 1.06}{25} + 0.06 = 0.1448$ or 14.48%

ii) Cost of Debenture (K_d):

Using Present Value method or (YTM)

Identification of relevant cash flows

Year	Cash flows
0	Current market price (P0) = ₹96
1 to 12	Interest net of tax [I(1-t)] = 10% of ₹100 (1 – 0.5) = ₹5
12	Redemption value (RV) = ₹100 (1.12) = ₹112

Calculation of Net Present Values (NPV) at two discount rates

Year	Cash flows	Discount factor @ 5%(L)	Present Value	Discount factor @10% (H)	Present Value
0	(96)	1.000	(96.00)	1.000	(96.00)
1 to 12	5	8.863	44.32	6.814	34.07
12	112	0.557	62.38	0.319	35.73
NPV			+10.7		-26.2

Calculation of IRR

IRR = L + $\frac{NPV_L}{NPV_{L-}\ NPV_H}$ (H – L)

= 5% $\frac{10.7}{10.7-(-26.2)}$ $(10\% - 5\%) = 5\% + \frac{53.5}{36.9} = 6.45\%$

Therefore, K_d = 6.45%

29. DETERMINE the cost of capital of Best Luck Limited using the book value (BV) and market value (MV) weights from the following information:

Sources	Book Value	Market Value
	(₹)	(₹)
Equity shares	1,20,00,000	2,00,00,000
Retained earnings	30,00,000	—
Preference shares	36,00,000	33,75,000
Debentures	9,00,000	10,40,000

Additional information:

1) Equity: Equity shares are quoted at ₹130 per share and a new issue priced at ₹125 per share will be fully subscribed; flotation costs will be ₹5 per share.

2) Dividend: During the previous 5 years, dividends have steadily increased from ₹ 10.60 to ₹ 14.19 per share. Dividend at the end of the current year is expected to be ₹ 15 per share.

3) Preference shares: 15% Preference shares with face value of ₹ 100 would realise ₹105 per share.

4) Debentures: The company proposes to issue 11-year 15% debentures but the yield on debentures of similar maturity and risk class is 16%; flotation cost is 2%.

5) Tax: Corporate tax rate is 35%. Ignore dividend tax. Floatation cost would be calculated on face value. **(ICAI SM)**

Ans.

1) Cost of Equity (K_e) = $\frac{D_1}{P_0}$ + g = $\frac{₹15}{₹125-₹5}$ + 0.06 (refer to working Note)

Market price of debentures (approximation method)

= ₹15 ÷ 0.16 = ₹93.75

Market value (P_0) of debentures can also be found out using the present value method:

P_0 = Annual Interest × PVIFA (16%, 11 years) + Redemption value × PVIF (16%, 11 years)

P_0 = ₹15 × 5.029 + ₹100 × 0.195

P_0 = ₹75.435 + ₹19.5 = ₹94.935

Net Proceeds = ₹94.935 – 2% of ₹100 = ₹92.935

Accordingly, the cost of debt can be calculated

Cost of capital **(Amount in lakh of rupees)**

[BV weights and MV weights]

Source of capital	Weights		SpecificCost	Total cost	
	BV	MV	(K)	(BV × K)	(MV × K)
Equity Shares	120	160*	0.1850	22.2	29.6
Retained Earnings	30	40*	0.1800	5.4	7.2
Preference Shares	36	33.75	0.1429	5.14	4.82
Debentures	9	10.4	0.1095	0.986	1.139
Total	195	244.15		33.73	42.76

*Market Value of equity has been apportioned in the ratio of Book Value of equity and retained earnings

Weighted Average Cost of Capital (WACC):

Using Book Value = $\frac{₹33.73}{₹195}$ = 0.1729 or 17.29%

Using Market Value = $\frac{₹42.76}{₹244.15}$ = 0.1751 or 17.51%

Working Note: Calculation of 'g'

₹10.6 $(1+g)^5$ = ₹14.19 Or, $(1+g)^5 = \frac{14.19}{10.6}$ = 1.338

Table (FVIF) suggests that ₹1 compounds to ₹1.338 in 5 years at the compound rate of 6 percent. Therefore, g is 6 per cent.

2) Cost of Retained Earnings $(K_r) = \frac{D_1}{P_0} + g = \frac{₹15}{₹125} + 0.06 = 0.18$

3) Cost of Preference Shares $(K_p) = \frac{PD}{P_0} = \frac{₹15}{₹105} = 0.1429$

4) Cost of Debenture (K_d) = $K_P = \frac{I\,(1-t) + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$

$$= \frac{₹15\,(1-0.35) + \frac{(₹100 - ₹91.75^*)}{11 \text{ years}}}{\frac{(₹100+₹91.75^*)}{2}}$$

$$= \frac{₹15 \times 0.65 + ₹0.75}{₹95.875} = \frac{₹10.5}{₹95.875} = 0.1095$$

*Since yield on similar type of debentures is 16 per cent, the company would be required to offer debentures at discount.

30. PK Ltd. has the following book-value capital structure as on March 31, 2XX1.

	(₹)
Equity share capital (10,00,000 shares)	2,00,00,000
11.5% Preference shares	60,00,000
10% Debentures	1,00,00,000
	3,60,00,000

The equity shares of the company are sold for ₹ 200. It is expected that the company will pay next year a dividend of ₹ 10 per equity share, which is expected to grow by 5% p.a. forever. Assume a 35% corporate tax rate.

Required:

i) COMPUTE weighted average cost of capital (WACC) of the company based on the existing capital structure.

ii) COMPUTE the new WACC, if the company raises an additional ₹50 lakhs debt by issuing 12% debentures. This would result in increasing the expected equity dividend to ₹12.40 and leave the growth rate unchanged, but the price of equity share will fall to ₹ 160 per share. **(RTP May 2020)**

Ans.

i) Computation of Weighted Average Cost of Capital based on existing capital structure

Source of Capital	Existing Capital structure (₹)	Weights (a)	After tax cost of capital (%) (b)	WACC (%) (a) × (b)
Equity share capital (W.N.1)	2,00,00,000	0.555	10.00	5.55
11.5% Preference share capital	60,00,000	0.167	11.50	1.92
10% Debentures (W.N.2)	1,00,00,000	0.278	6.50	1.81
	3,60,00,000	1.000		9.28

Working Note (W. N.):

1) Cost of equity capital:

$$K_e = \frac{Expected\ Dividend\ (D_1)}{Current\ Market\ Price\ per\ Share\ (P_0)} + \text{Growth (g)}$$

$$= \frac{₹10}{₹200} + 0.05 = 10\%$$

2) Cost of Debenture:

$$= \frac{I\ (1-t)}{NP} = \frac{₹10,00,000\ (1-0.35)}{₹1,00,00,000} = 0.065\ or\ 6.5\%$$

ii) Computation of Weighted Average Cost of Capital based on new capital structure

Source of Capital	New Capital structure (₹)	Weights (b)	After tax cost of capital (%) (a)	WACC (%) (a) × (b)
Equity share capital (W.N. 3)	2,00,00,000	0.488	12.75	6.22
Preference share	60,00,000	0.146	11.50	1.68
10% Debentures (W.N. 2)	1,00,00,000	0.244	6.50	1.59
12% Debentures (W.N.4)	50,00,000	0.122	7.80	0.95
	4,10,00,000	1.00		10.44

Working Note (W. N.):

3) Cost of equity capital:

$$K_e = \frac{Expected\ Dividend\ (D_1)}{Current\ Market\ Price\ per\ Share\ (P_0)} + \text{Growth (g)}$$

$$= \frac{₹12.4}{₹160} + 0.05 = 0.1275\ or\ 12.75\%$$

4) Cost of Debenture:

$$= \frac{₹6,00,000\ (1-0.35)}{₹50,00,000} = 0.078\ or\ 7.8\%$$

$$K_d = \frac{₹2,40,000\ (1-0.35)}{₹20,00,000} = 0.078\ or\ 7.8\%$$

31. The information relating to book value (BV) and market value (MV) weights of Ex Limited is given below:

Sources	Book Value (₹)	Market Value (₹)
Equity shares	2,40,00,000	4,00,00,000
Retained earnings	60,00,000	-
Preference shares	72,00,000	67,50,000
Debentures	18,00,000	20,80,000

Additional information:

1) Equity shares are quoted at ₹130 per share and a new issue priced at ₹125 per share will be fully subscribed; flotation costs will be ₹5 per share on face value.
2) During the previous 5 years, dividends have steadily increased from ₹10 to ₹16.105 per share. Dividend at the end of the current year is expected to be ₹17.716 per share.
3) 15% Preference shares with face value of ₹100 would realise ₹105 per share.
4) The company proposes to issue 11-year 15% debentures but the yield on debentures of similar maturity and risk class is 16%; flotation cost is 2% on face value.
5) Corporate tax rate is 30%.

You are required to DETERMINE the weighted average cost of capital of Ex Limited using both the weights. **(May 2022 RTP)**

Ans.

1) Cost of Equity $(K_e) = \frac{D_1}{P_0 - F} + g = \frac{₹17.716}{₹125 - ₹5} + 0.10 *$

$K_e = 0.2476$

* Calculation of g:

₹10 $(1+g)^5$ = ₹16.105

Or, $(1+g)^5 = \frac{16.105}{10} = 1.6105$

Table (FVIF) suggests that ₹ 1 compounds to ₹ 1.6105 in 5 years at the compound rate of 10 percent. Therefore, g is 10 per cent.

2) Cost of Retained Earnings $(K_f) = \frac{D_1}{P_0} + g = \frac{₹17.716}{₹130} + 0.10 = 0.2363$

3) Cost of Preference Shares $(K_p) = \frac{PD}{P_0} = \frac{₹15}{₹105} = 0.1429$

4) Cost of Debentures $(K_d) = \frac{I(1-t) + \left(\frac{RV-NP}{n}\right)}{\frac{RV+NP}{2}}$

$= \frac{₹15\ (1-0.30) + \left(\frac{₹100 - ₹91.75*}{11\ years}\right)}{\frac{₹100 + ₹91.75*}{2}}$

$= \frac{₹15 \times 0.70 + ₹0.75}{₹95.875} = \frac{₹11.75}{₹95.875} = 0.1173$

*Since yield on similar type of debentures is 16 per cent, the company would be required to offer debentures at discount.

Market price of debentures (approximation method)
= ₹ 15 ÷ 0.16 = ₹ 93.75
Sale proceeds from debentures = ₹ 93.75 – ₹ 2 (i.e., floatation cost) = ₹91.75
Market value (P_0) of debentures can also be found out using the present value method:
P_0 = Annual Interest × PVIFA (16%, 11 years) + Redemption value × PVIF (16%, 11 years)
P_0 = ₹ 15 × 5.0287 + ₹ 100 × 0.1954
P_0 = ₹ 75.4305 + ₹ 19.54 = ₹ 94.9705
Net Proceeds = ₹ 94.9705 – 2% of ₹ 100 = ₹ 92.9705
Accordingly, the cost of debt can be calculated

Total Cost of capital [BV weights and MV weights]

(Amount in (₹) lakh)

Source of capital	Weights		Specific Cost (K)	Total cost	
	BV	MV		(BV × K)	(MV × K)
Equity Shares	240	320**	0.2476	59.4240	79.2320
Retained Earnings	60	80**	0.2363	14.1780	18.9040
Preference Shares	72	67.50	0.1429	10.2888	9.6458
Debentures	18	20.80	0.1173	2.1114	2.4398
Total	390	488.30		86.0022	110.2216

**Market Value of equity has been apportioned in the ratio of Book Value of equity and retained earnings i.e., 240:60 or 4:1.

Weighted Average Cost of Capital (WACC):

Using Book Value = $\frac{₹86,0022}{₹390} = 0.2205 \; or \; 22.05\%$

Using Market Value = $\frac{₹110.2216}{₹488.30} = 0.2257 \; or \; 22.57\%$

32. Kalyanam Ltd. has an operating profit of ₹34,50,000 and has employed Debt which gives total Interest Charge of ₹7,50,000. The firm has an existing Cost of Equity and Cost of Debt as 16% and 8% respectively. The firm has a new proposal before it, which requires funds of ₹75 Lakhs and is expected to bring an additional profit of ₹14,25,000. To finance the proposal, the firm is expecting to issue an additional debt at 8% and will not be issuing any new equity shares in the market. Assume no tax culture.

You are required to CALCULATE the Weighted Average Cost of Capital (WACC) of Kalyanam Ltd.:

1) Before the new Proposal

2) After the new Proposal **(Nov. 2021 RTP)**

Ans.

a) Value of Debt = $\frac{Interest}{Cost\ of\ debt\ (K_e)}$

$= \frac{₹7,50,000}{0.08} = ₹93,75,000$

b) Value of equity capital = $\frac{Operating\ profit - Interest}{Cost\ of\ equity\ (K_e)}$

$= \frac{₹34,50,000 - ₹7,50,000}{0.16} = ₹1,68,75,000$

c) New Cost of equity (K_e) after proposal

$= \frac{\text{Increased Operating profit} - \text{Interest on Increased deb}}{\text{Equity capital}}$

$= \frac{₹48,75,000 - ₹13,50,000}{₹1,68,75,000} = \frac{₹35,25,000}{₹1,68,75,000} = 0.209 \text{ or } 20.9\%$

i) Calculation of Weighted Average Cost of Capital (WACC) before the new proposal

Sources	Amount (₹)	Weight	Cost of Capital	WACC
Equity	1,68,75,000	0.6429	0.160	0.1029
Debt	93,75,000	0.3571	0.080	0.0286
Total	2,62,50,000	1		**0.1315 or 13.15 %**

ii) Calculation of Weighted Average Cost of Capital (WACC) after the new proposal

Sources	Amount (₹)	Weight	Cost of Capital	WACC
Equity	1,68,75,000	0.5000	0.209	0.1045
Debt	1,68,75,000	0.5000	0.080	0.0400
Total	3,37,50,000	1		**0.1445 or 14.45 %**

33. A company has paid dividend of ₹1 per share (of face value of ₹10 each) last year and it is expected to grow @ 10% every year. CALCULATE the cost of equity if the market price of share is ₹55. **(ICAI SM)**

Ans. $K_e = \frac{D_1}{P_0} + g = \frac{₹1\ (1+0.1)}{₹55} + 0.1 = 0.12 \; or \; 12\%$

34. Answer the following:

The Capital structure of a Company is given below:

Source of capital	Book Value (₹)
Equity shares @ ₹100 each	24,00,000
9% Cumulative preference shares @ ₹100 each	4,00,000
11% Debentures	12,00,000
	40,00,000

The company had paid equity dividend @ 25% for the last year which is likely to grow@ 5% every year. The current market price of the company is equity share is ₹200.
Considering corporate tax @30%, you are required to CALCULATE:
i) Cost of capital for each source of capital
ii) Weighted average cost of capital. **(Sept. 2022 MTP)**

Ans.

i) Calculation of Cost of Capital for each source of capital:

a) Cost of Equity share capital:

$$K_e = \frac{D_0\,(1+g)}{Market\ Price\ per\ Share\ (P_0)} + g = \frac{25\% \times ₹100\,(1+0.05)}{₹200} + 0.05$$

$$= \frac{₹26.25}{₹200} + 0.05 = 0.18125 \text{ o } \mathbf{18.125\%}$$

b) Cost of Preference share capital (K_p) = **9%**

c) Cost of Debentures (K_d) = r (1 – t)
= 11% (1 – 0.3) = **7.7%**

ii) Weighted Average Cost of Capital

Source	Amount (₹)	Weights (a)	After tax Cost of Capital (%) (b)	WACC (%) (c) = (a) × (b)
Equity share	24,00,000	0.60	18.125	10.875
9% Preference share	4,00,000	0.10	9.000	0.900
11% Debentures	12,00,000	0.30	7.700	2.310
	40,00,000	1.00		**14.085**

35. ABC Limited has the following book value capital structure.

Equity Share Capital (1 crore shares @ ₹10 each)	₹1,000 lakh
Reserves Surplus	₹2,250 lakh
9% Preference Share Capital (5 lakh shares @ ₹100 each)	₹500 lakh
8.5% Debenture (1.5 lakh debentures @ ₹1,000 each)	₹1,500 lakh
12% Term Loans from Financial Institutions	₹500 lakh

- ✓ The debentures of ABC Limited are redeemable at par after five years and are quoting at ₹985 per debenture
- ✓ The current market price per equity share is ₹60. The prevailing default-risk free interest rate on 10-year GOI Treasury Bonds is 5.5%. The average market risk premium is 7%. The beta of the company is 1.85
- ✓ The preference shares of the company are redeemable at 10% premium after 5 years is currently selling at ₹102 per share.

The applicable income tax rate for the company is 35%

Required:

CALCULATE weighted average cost of capital of the company using market value weights.

(May 2020 MTP)

Ans.

Working Notes:

1) Computation of cost of debentures K_d):

$$K_d = \frac{₹85\,(1-0.35) + \frac{(1,000-985)}{5}}{\frac{(1,000+985)}{2}} = \frac{55.25+3}{992.5} = 0.0586\ or\ 5.86\%$$

2) Computation of cost of term loans (K_T):

= (1 – t)
= 0.12 (1 – 0.35) = 0.078 or 7.8%

3) Computation of cost of preference capital (K_P):

$$K_P = \frac{Preference\ Dividend + (RV - NP)/n}{(RV + NP)/2}$$

$$= \frac{₹9 + \frac{(110-102)}{5}}{\frac{(110+102)}{2}} = \frac{9+1.6}{106} = 0.1\ or\ 10\%$$

4) Computation of cost of equity (K_e):

$= R_f + ß\ (R_m - R_f)$

Or, = Risk free rate + (Beta × Risk Premium)

= 0.055 + (1.85 × 0.07) = 0.1845 or 18.45%

Calculation of Weighted Average cost of capital Using market value weights

Source of Capital	Market value of capital structure (₹ in lakh)	Weights	After tax cost of capital (%)	WACC (%)
Equity share capital (1 crore shares × ₹ 60)	6,000	0.71	18.45	13.09
9% Preference share capital (5 lakh shares × ₹102)	510	0.06	10.00	0.60
8.5 % Debentures (1.5 lakh × ₹985)	1,477.5	0.17	5.86	0.99
12% Term loans	500	0.06	7.80	0.47
	8,487.50	1.000		15.15

36. Annova Ltd is considering raising of funds of about ₹250 lakhs by any of two alternative methods, viz, 14% institutional term loan and 13% non-convertible debentures. The term loan option would attract no major incidental cost and can be ignored. The debentures would have to be issued at a discount of 2.5% and would involve cost of issue of 2% on face value. ADVISE the company as to the better option based on the effective cost of capital in each case. Assume a tax rate of 50%.

(May 2019 MTP)

Ans.

Calculation of Effective Cost of Capital

Particulars	Option 1 14% institutional Term loan (₹ in Lakhs)	Option 2 13% Non-convertible Debentures (₹ in lakhs)
A) Effective capital to be raised Face value	250.00	250.00
Less: Discount	Nil	(6.25)
	250.00	243.75
Less: Cost of issue	Nil	5.00
Effective amount of capital	250.00	238.75
B) Annual interest charges on face value of ₹ 250 lakhs	35.0	32.50
Less: Tax benefit on interest @ 50%	17.5	16.25
	17.5	16.25
C) Effective cost of capital after tax	B x 100 A = 7.0%	16.25 x100 238.75 = 6.81% (approx)

So, the better option is raising of funds of ₹250 lakhs by issue of 13% Non-convertible Debenture

37. Bounce Ltd. evaluates all its capital projects using discounting rate of 15%, its capital structure consists of equity share capital, retained earnings, bank term loan and debentures redeemable at par.

Rate of interest on bank term loan is 1.5 times that of debenture, remaining tenure of debenture and bank loan is 3 years and 5 years respectively. Book value of equity share capital, retained earnings and bank loan is ₹10,00,000, ₹15,00,000 and ₹10,00,000 respectively. Debentures which are having book value of ₹15,00,000 are currently trading at ₹97 per debenture. The ongoing P/E multiple for the shares of the company stands at 5. You are required to CALCULATE the rate interest on bank loan and debentures if tax rate applicable is 25%. **(Nov. 2022 RTP)**

Ans. Let the rate of Interest on debenture be x

∴ Rate of Interest on loan = 1.5x

∴ K_d on debentures = $\frac{Int\,(1-t)+\frac{RV-NP}{n}}{\frac{RV+NP}{2}}$

$= \frac{100 \times (1-0.25)+\frac{100-97}{3}}{\frac{100+97}{2}}$

$= \frac{75x+1}{98.5}$

∴ K_d on bank loan = 1.5x (1 – 0.25) = 1.125x

$K_e = \frac{EPS}{MPS} = \frac{1}{MPS/EPS} = \frac{1}{P/E} = \frac{1}{5} = 0.2$

$K_Y = K_e = 0.2$

Computation of WACC

Capital	Amount (₹)	Weights	Cost	Product
Equity	10,00,000	0.2	0.2	0.04
Reserves	15,00,000	0.3	0.2	0.06
Debentures	15,00,000	0.3	(75x+1)/98.5	(22.5x + 0.3)/98.5
Bank Loan	10,00,000	0.2	1.125x	0.225x
	50,00,000	1		$\frac{0.1+0.225x+22.5x+0.3}{98.5}$

WACC = 15%

∴ $10.1 + 0.225x + \frac{22.5x}{98.5} + \frac{0.3}{98.5} = 0.15$

∴ 9.85+22.1625x+22.5x+0.3 = (0.15) (98.5)

∴ 44.6625x = 14.775 – 9.85 – 0.3

∴ 44.6625x = 4.625

∴ x = $\frac{4.625}{44.6625}$

∴ x = 10.36%

∴ Rate of interest on debentures = x = 10.36%

Rate of interest on Bank loan = 1.5x = (1.5) (10.36%) = 15.54%.

38. The following is the extract of the Balance Sheet of M/s KD Ltd.:

Particulars	Amount (₹)
Ordinary shares (Face value ₹10/- per share)	5,00,000
Share Premium	1,00,000
Retained Profits	6,00,000
8% Preference Shares (Face Value ₹25/- per share)	4,00,000
12% Debentures (Face value ₹100/- each)	6,00,000
	22,00,000

The ordinary shares are currently priced at ₹39 ex-dividend and preference share is priced at ₹18 cum-dividend. The debentures are selling at 120 percent ex-interest. The applicable tax rate to D Ltd. is 30 percent. KD Ltd.'s cost of equity has been estimated at 19 percent.
Calculate the WACC (weighted average cost of capital) of KD Ltd. on the basis of market value.
(Nov. 2022)

Ans.

Computation of WACC on the basis of market value

W.N. 1

Cum-dividend price of Preference shares = ₹ 18

Less: Dividend (8/100) × 25 = $\frac{₹2}{₹16}$

∴ Market Price of Preference shares = ₹ 16

KP = $\frac{2}{16}$ = 0.125 (or) 12.5%

No. of Preference shares = $\left(\frac{4,00,000}{25}\right)$ = 16,000

W.N. 2

Market price of Debentures = $\left(\frac{120}{100}\right) \times 100 = ₹120$

$K_d = \left[\frac{12\ (1-0.3)}{120}\right] = 0.07\ (or) 7\%$

No. of Debentures = $\left(\frac{6,00,000}{100}\right) = 6,000$

W.N.3

Market Price of Equity shares = ₹39

K_e (given) 19% or 0.19

No. of Equity shares = $\frac{5,00,000}{10} = 50,000$

Sources	Market Value (₹)	Nos.	Total Market value (₹)	Weight	Cost of Capital	Product
Equity Shares	39	50,000	19,50,000	0.6664	0.19	0.1266
Preference Shares	16	16,000	2,56,000	0.0875	0.125	0.0109
Debentures	120	6,000	7,20,000	0.2461	0.07	0.0172
					WACC =	0.1547

WACC = 0.1547 or 15.47%

39. TT Ltd. issued 20,000, 10% convertible debenture of ₹100 each with a maturity period of 5 years. At maturity the debenture holders will have the option to convert debentures into equity shares of the company in ratio of 1:5 (5 shares for each debenture). The current market price of the equity share is ₹20 each and historically the growth rate of the share is 4% per annum. Assuming tax rate is 25%. Compute the cost of 10% convertible debenture using Approximation Method and Internal Rate of Return Method.

PV Factor are as under:

Year	1	2	3	4	5
PV Factor @ 10%	0.909	0.826	0.751	0.683	0.621
PV Factor @ 15%	0.870	0.756	0.658	0.572	0.497

(Nov. 2020)

Ans.

40. Alpha Ltd. has furnished the following information:

✓ Earnings Per Share (EPS)	₹4
✓ Dividend pay-out ratio	25%
✓ Market price per share	₹50
✓ Rate of tax	30%
✓ Growth rate of dividend	10%

The company wants to raise additional capital of ₹10 lakhs including debt of ₹4 lakhs. The cost of debt (before tax) is 10% up to ₹2 lakhs and 15% beyond that. Compute the after-tax cost of equity and debt and also weighted average cost of capital.

(May 2019)

Ans.

i) Cost of Equity Share Capital (K_e)

$K_e = \frac{D_0\,(1+g)}{P_0} + g = \frac{25\%\ of\ ₹4\ (1+0.10)}{₹50} + 0.10 = \frac{₹1.10}{₹50} + 0.10 =$ **0.122 or 12.2%**

ii) Cost of Debt (K_d)

$K_d = \frac{Interest}{Net\ Procedds} \times 100 \times (1-t)$

$Interest$ on first ₹2,00,000 @ 10% = ₹20,000

$Interest$ on next ₹2,00,000 @ 15% = ₹30,000

$K_d = \frac{50,000}{4,00,000} \times (1-0.3) =$ **0.0875 or 8.75%**

iii) Weighted Average Cost of Capital (WACC)

Source of capital	Amount (₹)	Weights	Cost of Capital (%)	WACC (%)
Equity shares	6,00,000	0.60	12.20	7.32
Debt	4,00,000	0.40	8.75	3.50
Total	10,00,000	1.00		10.82

Alternatively Cost of Equity Share Capital (K_e) can be calculated as

$K_e = \frac{D}{P_0} + g = \frac{25\%\ of\ ₹4}{₹50} + 0.10 = \frac{₹1.00}{₹50} + 0.10 = 0.120$ or 12.00%

Accordingly

Weighted Average Cost of Capital (WACC)

Source of capital	Amount (₹)	Weights	Cost of Capital (%)	WACC (%)
Equity shares	6,00,000	0.60	12.00	7.20
Debt	4,00,000	0.40	8.75	3.50
Total	10,00,000	1.00		10.70

Leverage Analysis
Assignment

Q. No. | **Questions/ Answers**

1. A company had the following Balance Sheet as on 31st March, 2XX1:

Liabilities	₹ (in crores)	Assets	₹ (in crores)
Equity share Capital (50 lakh shares of ₹ 10 each)	5	PPE (Net)	12.5
Reserves and Surplus	1	Current Assets	7.5
15% Debentures	10		
Current Liabilities	4		
	20		20

The additional information given is as under:

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

Required:

Calculate the following and comment:

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

(May 2014/November 2011 modified/May 2016 RTP modified / ICAI SM /November 2018/November 2019/ July 2021)

Ans.

Total Assets = ₹ 20 crores

Total Asset Turnover Ratio $= \frac{\text{Total Sales}}{\text{Total Assets}} = 2.5$

Hence, Total Sales = 20 × 2.5 = ₹ 50 crores

Computation of Profit after Tax (PAT)

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

i) Earnings per Share

$$\text{EPS} = \frac{8.40 \text{ crores}}{\text{Number of Equity Shares}}$$

$$= \frac{8.40 \text{ crores}}{50,00,000} = ₹ 16.80$$

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

ii) Operating Leverage

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

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

iii) Financial Leverage

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

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

iv) Combined Leverage

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

Or, = Operating Leverage × Financial Leverage

= 1.296 × 1.125 = 1.458

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

2. The information related to XYZ Company Ltd. for the year ended 31st March 2XX1 are as follows:

Equity Share Capital of ₹100 each	₹ 50 Lakhs
12% Bonds of ₹1000 each	₹ 30 Lakhs
Sales	₹ 84 lakhs
Fixed Cost (Excluding interest)	₹ 7.5 Lakhs
Financial Leverage	1.39
Profit Volume Ratio	25%
Make Price per Equity Share	₹ 200
₹ 200	30%

You are required to compute the following

i) Operating Leverage
ii) Combined Leverage
iii) Earning per share
iv) Earing Yield

(Jan 2021/May 2013 RTP modified/November 2016 modified/May 2020 RTP modified)

Ans.

1) Profit Volume Ratio $= \frac{\text{Contribution}}{\text{Sales}} \times 100$

So, $25 = \frac{\text{Contribution}}{₹\ 84{,}00{,}000} \times 100$

Contribution $= \frac{₹\ 84{,}00{,}000 \times 25}{100} = ₹\ 21{,}00{,}000$

2) Financial leverage $= \frac{\text{EBIT}}{\text{EBT}}$

Or, $1.39 = \frac{₹\ 13,50,000}{\text{EBT}}$

EBT = ₹ 9,71,223

3) Income Statement

Particulars	(₹)
Sales	84,00,000
Less: Variable Cost (Sales - Contribution)	(63,00,000)
Contribution	21,00,000
Less: Fixed Cost	(7,50,000)
EBIT	13,50,000
Less: Interest (EBIT - EBT)	(3,78,777)
EBT	9,71,223
Less: Tax @ 30%	(2,91,367)
Profit after Tax (PAT)	6,79,856

i) Operating Leverage $= \frac{\text{Contribution}}{\text{Earning before interest and tax (EBIT)}}$

$= \frac{₹\ 21,00,000}{₹\ 13,50,000} = 1.556$ (approx.)

ii) Combined Leverage = Operating Leverage x Financial Leverage

= 1.556 × 1.39 = 2.163 (approx.)

Or, $\frac{\text{Contribution}}{\text{EBT}} = \frac{₹\ 21,00,000}{₹\ 9,71,223} = 2.162$ (approx.)

iii) Earnings per Share (EPS)

$\text{EPS} = \frac{\text{PAT}}{\text{No.of shares}} = \frac{₹\ 6,79,856}{50,000} = ₹\ 13.597$

iv) Earning Yield

$= \frac{\text{EPS}}{\text{Market Price}} \times 100 = \frac{₹\ 13.597}{₹\ 200} \times = 6.80\%$ (approx.)

Note: The question has been solved considering Financial Leverage given in the question as the base for calculating total interest expense including the interest of 12% Bonds of ₹30 Lakhs. The question can also be solved in other alternative ways.

3. Following data of MT Ltd. under Situations 1, 2 and 3 and Financial Plan A and B is given:

Installed Capacity (units)		3,600
Actual Production and Sales (units)		2,400
Selling price per unit (₹)		30
Variable cost per unit (₹)		20
Fixed Costs (₹):	Situation 1	3,000
	Situation 2	6,000
	Situation 3	9,000

Capital Structure:

Particulars	Financial Plan	
	A	B
Equity	₹ 15,000	₹ 22,500
Debt	₹ 15,000	₹ 7,500
Cost of Debt	**12%**	**12%**

Required:

i) CALCULATE the operating leverage and financial leverage.

ii) FIND out the combinations of operating and financial leverage which give the highest value and the least value. **(April 2021 MTP/ICAI SM modified /May 2011 modified)**

Ans.

i) Operating Leverage

	Situation 1 (₹)	Situation 2 (₹)	Situation 3 (₹)
Sales (S)			
2,400 units @ ₹ 30 per unit	72,000	72,000	72,000
Less: Variable Cost (VC) @ ₹ 20 per unit	48,000	48,000	48,000
Contribution (C)	24,000	24,000	24,000
Less: Fixed Cost (FC)	3,000	6,000	9,000
EBIT	21,000	18,000	15,000
Operating Leverage $= \frac{C}{EBIT}$	$\frac{₹\ 24,000}{₹\ 21,000}$ = 1.14	$\frac{₹\ 24,000}{₹\ 18,000}$ = 1.33	$\frac{₹\ 24,000}{₹\ 15,000}$ = 1.60

Financial Leverage

	Financial Plan	
	A (₹)	B (₹)
Situation 1		
EBIT	21,000	21,000
Less: Interest on debt (₹ 15,000 × 12%); (₹ 7,500 × 12%)	1,800	900
EBT	19,200	20,100
Financial Leverage = $\frac{EBIT}{EBT}$	$\frac{₹\ 21,000}{₹\ 19,200} = 1.09$	$\frac{₹\ 21,000}{₹\ 20,100} = 1.04$
Situation 2		
EBIT	18,000	18,000
Less: Interest on debt	1,800	900
EBT	16,200	17,100
Financial Leverage = $\frac{EBIT}{EBT}$	$\frac{₹\ 18,000}{₹\ 16,200} = 1.11$	$\frac{₹\ 18,000}{₹\ 17,100} = 1.05$
Situation 3		
EBIT	15,000	15,000
Less: Interest on debt	1,800	900
EBT	13,200	14,100
Financial Leverage = $\frac{EBIT}{EBT}$	$\frac{₹\ 15,000}{₹\ 13,200} = 1.14$	$\frac{₹\ 15,000}{₹\ 14,100} = 1.06$

ii) Combined Leverages

CL = OL × FL

	Financial Plan	
	A (₹)	B (₹)
a) Situation 1	1.14 × 1.09 = 1.24	1.14 × 1.04 = 1.19
b) Situation 2	1.33 × 1.11 = 1.48	1.33 × 1.05 = 1.40
c) Situation 3	1.60 × 1.14 = 1.82	1.60 × 1.06 = 1.70

The above calculations suggest that the highest value is in Situation 3 financed by Financial Plan A and the lowest value is ++-in Situation 1 financed by Financial Plan B.

4. Following information are related to four firms of the same industry:

FIRM	Change in Revenue	Change in Operating Income	Change in Earning per Share
P	27%	25%	30%
Q	25%	32%	24%
R	23%	36%	21%
S	21%	4 %	23%

Find out:

i) Degree of operating leverage, and

ii) Degree of combined leverage for all the firms.

(May 2015/May 2017 modified/March 2021 MTP)

Ans.

i) Degree of operating leverage

Degree of operating leverage = $\frac{Percentage\ change\ in\ net\ operating\ revenue}{Percentage\ increase\ in\ output}$

$P = \frac{25\%}{27\%} = 0.926\ times$

$Q = \frac{32\%}{25\%} = 1.280\ times$

$R = \frac{36\%}{23\%} = 1.57\ times$

$S = \frac{40\%}{21\%} = 1.905\ times$

ii) Degree of combined leverage

Degree of combined leverage = $\frac{Percentage\ change\ in\ EPS}{Percentage\ chnage\ in\ sales}$

$P = \frac{30\%}{27\%} = 1.11\ times$

$Q = \frac{24\%}{25\%} = 0.960\ times$

$R = \frac{21\%}{23\%} = 0.913\ times$

$S = \frac{23\%}{21\%} = 1.095\ times$

5. The capital structure of the Shiva Ltd. consists of the equity share capital of ₹20,00,000 (Share of ₹100 per value) and ₹20,00,000 of 10% Debentures, sales increased by 20% from 2,00,000 units to 2,40,000 units, selling price is ₹10 per unit; variable costs amount to ₹6 per unit and fixed expenses amount to ₹4,00,000. The income tax rate is assumed to be 50%.

a) You are required to calculate the following:

The percentage increase in earnings per share;

Financial leverage at 2,00,000 units and 2,40,000 units.

Operating leverage at 2,00,000 units and 2,40,000 units.

b) Comment on the behaviour of operating and Financial leverages in relation to increase in production from 2,00,000 units to 2,40,000 units.

(May 2019/ RTP November 2020/ICAI SM Modified)

Ans. **a)**

Sales in units	2,00,000 units	2,40,000 units
	(₹)	(₹)
Sales Value @ ₹10 Per Unit	20,00,000	24,00,000
Variable Cost @ ₹ 6 per unit	(12,00,000)	(14,40,000)
Contribution	8,00,000	9,60,000
Fixed expenses	(4,00,000)	(4,00,000)
EBIT	4,00,000	5,60,000
Debenture Interest	(2,00,000)	(2,00,000)
EBT	2,00,000	3,60,000
Tax @ 50%	(1,00,000)	(1,80,000)
Profit after tax (PAT)	1,00,000	1,80,000
No. of Share	20,000	20,000
Earnings per share (EPS)	5	9
i) The percentage Increase in EPS		$\frac{4}{5} \times 100$
ii) Financial Leverage $= \frac{\text{EBIT}}{\text{EBT}}$	$\frac{₹\ 4,00,000}{₹\ 2,00,000} = 2$	$\frac{₹\ 5,60,000}{₹\ 3,60,000} = 1.56$
iii) Operating leverage$= \frac{\text{Contribution}}{\text{EBT}}$	$\frac{₹\ 8,00,000}{₹\ 4,00,000} = 2$	$\frac{₹\ 9,60,000}{₹\ 5,60,000} = 1.71$

b) When production is increased from 2,00,000 units to 2,40,000 units both financial leverage and operating leverages reduced from 2 to 1.56 and 1.71 respectively. Reduction in financial leverage and operating leverages signifies reduction in business risk and financial risk.

6. The following details of RST Limited for the year ended 31st March, 2XX1 are given below:

Operating leverage	1.4
Combined leverage	2.8
Fixed Cost (Excluding interest)	₹ 2.04 lakhs
Sales	₹ 30.00 lakhs
12% Debentures of ₹ 100 each	₹ 21.25 lakhs
Equity Share capital of ₹ 10 each	₹ 17.00 lakhs
Income tax rate 30 per cent	

Required:

i) Calculate Financial leverage

ii) Calculate P/V ratio and Earning per Share (EPS)

iii) If the company belongs to an industry, whose assets turnover is 1.5, does it have a high or low assets leverage?

iv) At which level of sales the Earning before Tax (EBT) of the company will be equal to zero?

(May 2007/November 2017 modified/May 2018 modified)

Ans. **i) Financial leverage**

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

$2.8 = 1.4 \times FL$

$FL = 2$

Financial Leverage = 2

ii) P/V Ratio and EPS

P/V ratio $= \frac{C}{S} \times 100$

Operating leverage $= \frac{C}{C-F} \times 100$

$1.4 = \frac{C}{C-2,04,000}$

$1.4\ (C - 2,04,000) = C$

$1.4\ C - 2,85,600 = C$

$C = \frac{2,85,600}{0.4}$

$C = 7,14,000$

$P/V = \frac{7,14,000}{30,00,000} \times 100 = 23.8\%$

Therefore, P/V Ratio = 23.8%

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

EBT = Sales –Variable – Fixed Cost – Interest

= 30,00,000 – 22,86,000 – 2,04,000 – 2,55,000 = 2,55,000

PAT = EBT – Tax

= 2,55,000 – 76,500 = 1,78,500

$EPS = = \frac{1,78,500}{1,70,000} = 1.05$

iii) Assets turnover

$\text{Assets turnover} = \frac{\text{Sales}}{\text{Total Assets}} = \frac{30,00,000}{38,25,000} = 0.784$

0.784 < 1.5 means lower than industry turnover.

iv) EBT zero means 100% reduction in EBT. Since combined leverage is 2.8, sales have to be dropped by 100/2.8 = 35.71%. Hence new sales will be 30,00,000 × (100 – 35.71) = 19,28,700. Therefore, at 19,28,700 level of sales, the Earnings before Tax of the company will be equal to zero.

7. Calculate the degree of operating leverage, degree of financial leverage and the degree of combined leverage for following firms and interpret the results:

	P	Q	R
Outputs (Units)	2,50,000	1,25,000	7,50,000
Fixed Cost (₹)	5,00 ,000	2,50,000	10,00,000
Unit Variables cost (₹)	5	2	7.50
Unit Selling price (₹)	7.50	7	10.0
Interest Expense (₹)	75,000	25,000	__

(November 2010/November 2013)

Ans. Estimation of Degree of Operating Leverage (DOL), Degree of Financial Leverage (DFL) and Degree of Combined Leverage (DCL)

	P	Q	R
Output (in units)	2,50,000	1,25,000	7,50,000
Selling Price (per unit)	7.50	7	10
Sales Revenues	18,75,000	8,75,000	75,00,000
Less: Variable Cost	12,50,000	2,50,000	56,25,000
Contribution Margin Less:	6,25,000	6,25,000	18,75,000
Fixed Cost	5,00,000	2,50,000	10,00,000
EBIT	1,25,000	3,75,000	8,75,000
Less: Interest Expense EBT	75,000	25,000	-
	50,000	3,50,000	8,75,000
DOL = Contribution	5 Times	1.67 Times	2.14 Times

	EBIT			
		2.5 Times	1.07 Times	1.00 Times
	DFL = EBIT / EBT	12.5 Times	1.79 Times	2.14 Times
		Aggressive	Moderate	Moderate Policy
	DCL = DOL× DFL	Policy		
	Comment		Policy	with no financial leverage

8. The Capital structure of RST Ltd. is as follows:

Equity Share of ₹ 10 each	8,00,000
10% Preference Share of ₹ 100 each	5,00,000
12% Debentures of ₹ 100 each	7,00,000
	20,00,000

Additional Information:

- Profit after tax (Tax Rate 30%) are ₹ 2,80,000
- Operating Expenses (including Depreciation 96,800) are 1.5 times of EBIT
- Equity Dividend paid is 15%
- Market price of Equity Share is ₹ 23

Calculate:

i) Operating and Financial Leverage
ii) Cover for preference and equity dividend
iii) The Earning Yield Ratio and Price Earnings Ratio
iv) The Net Fund Flow

Note: All operating expenses (excluding depreciation) are variable.

(November 2014/May 2012 modified)

Ans. **Working Notes:**

Particulars	₹
Net Profit after Tax	2,80,000
Add: Tax @ 30%	1,20,000
EBT	4,00,000
Add: Interest on Debentures	84,000
EBIT	4,84,000
Add: Operating Expenses (1.5 times of EBIT)	7,26,000
Sales	12,10,000

i) Operating Leverage

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

$$= \frac{(12,10,000 - 6,29,200)}{4,84,000}$$

$$= \frac{5,80,800}{4,84,000} = 1.2\ times$$

Computation of tax:

Net profit after tax = 2,80,000; Tax rate = 30% it means 2,80,000 is the 70% value so 100% = 2,80,000/70% = 4,00,000

Tax amount = 4,00,000 – 2,80,000 = 1,20,000

Computation of contribution:

Contribution = Sales - variable Expenses (i.e., 1.5 time of EBIT - Depreciation)

Contribution = 12,10,000 – (484000 × 1.5 – 96,800)

Contribution = 6,29,200

Financial Leverage = $\frac{EBIT}{EBT}$

$= \frac{4,84,000}{4,00,000} = 1.21\ times$

OR

Financial Leverage = $\frac{EBIT}{EBT\left(\frac{Preference\ Dividend}{1-t}\right)}$

$= \frac{4,84,000}{4,00,000-\left(\frac{50,000}{1-0.30}\right)}$

$= \frac{4,84,000}{4,00,000-71,428.57}$

$= \frac{4,84,000}{3,28,571} = 1.47\ times$

ii) Cover for Preference Dividend

$= \frac{PAT}{Preference\ Share\ Dividend}$

$= \frac{2,80,000}{50,000} = 5.6\ times$

Cover for Equity Dividend

$= \frac{(PAT-Preference\ DIvidend)}{Equity\ Share\ Dividend}$

$= \frac{(2,80,000-50,000)}{1,20,000}$

$= \frac{2,30,000}{1,20,000} = 1.92\ times$

iii) Earning Yield Ratio

$= \frac{\text{EPS}}{\text{Market Price}} \times 100$

$\left(\frac{2,30,000}{\cancel{80,000}\ 23} \times 100\right)$

$= \frac{2.875}{23} \times 100 = 12.5\%$

Price Earnings Ratio (PE Ratio)$= \frac{\text{Market Price}}{\text{EPS}} = \frac{23}{2.875} = 8$ times

iv) Net Funds Flow

= Net PAT + Depreciation-Total Dividend

= 2,80,000 + 96,800 − (50,000 + 1,20,000)

= 3,76,800 −1,70,000

Net Funds Flow = 2,06,800

9. A company operates at a production level of 1,000 units. The contribution is ₹ 60 per unit, operating leverage is 6, combined leverage is 24. If tax rate is 30%, what would be its earnings after tax**?**

(November 2014/May 2012 modified)

Ans.

Computation of Earnings after tax

Contribution = ₹ 60 × 1,000 = ₹ 60,000

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

6 × Financial Leverage = 24

∴ Financial Leverage = 4

Operating Leverage =Contribution/EBIT=60,000/EBIT=6

∴EBIT=60,000/6=10,000

FL=EBIT/EBT=4

∴EBT=EBIT/4=10,000/4 =2,500

Since tax rate = 30%

Earnings after Tax (EAT) = EBT (1 - 0.30)

= 2,500 (0.70)

∴ Earning After Tax (EAT) = ₹1,750

10. The following particulars relating to Navya Ltd. for the year ended 31st March 2XX1 is given:

Output	1,00,000 units at norm l capacity
Selling price per unit	₹ 40
Variable cost per unit	₹ 20
Fixed cost	₹ 10,00,000

The capital structure of the company as on 31st March, 2XX1 is as follows:

Particulars	**₹**
Equity share capital (1,00,000 shares of ₹ 10 each)	10,00,000
Reserve and surplus	5,00,000
7% Debentures	10,00,000
Current liabilities	5,00,000
Total	**30,00,000**

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

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

i) Entirely by equity shares of ₹ 10 each at par.

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

iii) Entirely by 6% debentures of ₹ 100 each at par.

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

(Nov – 2021 – RTP)

Ans. **Statement showing Profitability of Alternative Schemes for Financing**

(₹ in '00,000)

Particulars	**Existing**	**Alternative Schemes**		
		(i)	**(ii)**	**(iii)**
Equity Share capital (existing)	10	10	10	10
New issues	-	10	5	-
	10	**20**	**15**	**10**
7% debentures	10	10	10	10
6% debentures	-	-	5	10
	20	**30**	**30**	**30**

	Debenture interest (7%)	0.7	0.7	0.7	0.7
	Debenture interest (6%)	-	-	0.3	0.6
		0.7	**0.7**	**1.0**	**1.3**
	Output (units in lakh)	1	1.5	1.5	1.5
	Contribution per. unit (₹) (Selling price - Variable Cost)	**20**	**22**	**22**	**22**
	Contribution (₹ lakh)	**20**	**33**	**33**	**33**
	Less: Fixed cost	10	15	15	15
	EBIT	**10**	**18**	**18**	**18**
	Less: Interest (as calculated above)	0.7	0.7	1.0	1.3
	EBT	**9.3**	**17.3**	**17**	**16.7**
	Less: Tax (40%)	3.72	6.92	6.8	6.68
	EAT	**5.58**	**10.38**	**10.20**	**10.02**
	Operating Leverage (Contribution /EBIT)	**2.00**	**1.83**	**1.83**	**1.83**
	Financial Leverage (EBIT/EBT)	**1.08**	**1.04**	**1.06**	**1.08**
	Combined Leverage (Contribution/EBT)	**2.15**	**1.91**	**1.94**	**1.98**
	EPS (EAT/No. of shares) (₹)	**5.58**	**5.19**	**6.80**	**10.02**
	Risk	**-**	**Lowest**	**Lower than option (3)**	**Highest**
	Return	**-**	**Lowest**	**Lower than option (3)**	**Highest**

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

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

11. The following data relate to RT Ltd:

	₹
Earning before interest and tax (EBIT)	10,00,000
Fixed cost	20,00,000
Earning Before Tax (EBT)	8 00,000

Required:

Calculate combined leverage **(May 2008)**

Ans. **Contribution:**

C = S – V and

EBIT = C – F

10,00,000 = C – 20,00,000

∴C = 30,00,000

Operating leverage = C / EBIT = 30,00,000/10,00,000 = 3 times

Financial leverage = EBIT/EBT = 10,00,000/8,00,000 = 1.25 times

Combined leverage = OL × FL = 3 × 1.25 = 3.75 times

12. From the following Financial data of Company A and Company B:
Prepare their Income statements.

	Company A	Company B
	₹	₹
Variable cost	56,000	60% of sales
Fixed cost	20,000	__
Interest expenses	12,000	9,000
Financial Leverage	5 : 1	__
Operating Leverage	__	4 : 1
Income tax rate	30%	30%
Sales	__	1,05,000

(November 2009)

Ans.

Income Statements of Company A and Company B

	Company A	Company B
	₹	₹
Sales	91,000	1,05,000
Less: Variable cost	56,000	63,000
Contribution	35,000	42,000
Less: Fixed Cost	20,000	31,500
Earnings before interest and tax (EBIT)	15,000	10,500
Less: Interest	12,000	9,000
Earnings before tax (EBT)	3,000	1,500
Less: Tax @ 30%	900	450
Earnings after tax (EAT)	2,100	1,050

Working Notes:

Company A

i) Financial Leverage $= \frac{\textbf{EBIT}}{\textbf{EBIT} - \textbf{Interest}}$

$$\mathbf{5} = \frac{\mathbf{EBIT}}{\mathbf{EBIT - 12{,}000}}$$

$5\ (EBIT - 12{,}000) = EBIT$

$4\ EBIT = 60{,}000$

$EBIT = ₹15{,}000$

ii) Contribution = EBIT + Fixed Cost

= 15,000 + 20,000 = ₹ 35,000

iii) Sales = Contribution + Variable cost

= 35,000 + 56,000 = ₹ 91,000

Company B

i) Contribution = 40% of Sales (as Variable Cost is 60% of Sales)

= 40% of 1,05,000 = ₹ 42,000

ii) Financial Leverage $= \frac{\text{Contibution}}{\text{EBIT}}$

$$4 = \frac{42{,}000}{\text{EBIT}}$$

$$\text{EBIT} = \frac{42{,}000}{4} = ₹\ 10{,}500$$

iii) Fixed Cost = Contribution − EBIT = 42,000 – 10,500 = ₹ 31,500

13. X Limited has estimated that for a new product its break-even point is 20,000 units if the item is sold for ₹ 14 per unit and variable cost ₹ 9 per unit.
Calculate the degree of operating leverage for sales volume 25,000 units and 30,000 units.
(November 2012)

Ans. Computation of Degree of Operating Leverage (DOL)
Selling Price = ₹ 14 per unit
Variable Cost = ₹ 9 per unit
Fixed Cost = BEP × (Selling price – Variable cost) = 20,000 × (14 - 9) = 20,000 × 5 = ₹1,00,000

Particulars	₹ (For 25,000 units)	₹ (For 30,000 units)
Sales (@ ₹14 /unit)	3,50,000	4,20,000
Less: Variable Cost (@₹ 9 unit)	2,25,000	2,70,000
Contribution	1,25,000	1,50,000
Less: Fixed Cost	1,00,000	1,00,000
EBIT	25,000	50,000
DOL = $\left(\frac{\text{Contrinution}}{\text{EBIT}}\right)$	$\left(\frac{1,25,000}{25,000}\right)$	$\left(\frac{1,50,000}{50,000}\right)$
DOL	5 times	3 times

14. From the following details of X Ltd., prepare the Income Statement for the year ended 31st December 2XX1:

Financial Leverage	2
Interest	₹ 2,000
Operating Leverage	3
Variable cost as a percentage of sales	7 %
Income tax rate	30%

(November 2015)

Ans.

In the books of X Ltd.
Income Statement

Particulars	Amount (₹)
Sales	48,000
(-) Variables cost (75%)	(36,000)
Contribution	12,000
(-) Fixed cost	(8,000)
EBIT	4,000
(-) Interest	(2,000)
EBT	2,000
(-) Tax @ 30%	(600)
PAT	1,400

Working Note:
1) Calculation for EBIT:

Financial Leverage $= \frac{EBIT}{EBT}$

$2 = \frac{EBIT}{EBIT - Interest}$

$2 = \frac{EBIT}{EBIT - 2,000}$

2 EBIT – 4,000 = EBIT
EBIT = 4,000

2) Calculation of Contribution:

Operating Leverage $= \frac{Contribution}{EBIT}$

$3 = \frac{Contribution}{4{,}000}$

Contribution = ₹ 12,000

3) Calculation for Sales & Variables Cost:

Variables cost as a percentage of sales = 75%

So, contribution is 25% of sales

Sales $= \frac{Contribution}{25\%}$

$= \frac{12{,}000}{25\%}$

Sales = 48,000

Variables Cost = ₹ 48,000 × 75%

Variable cost = ₹ 36,000

4)Fixed Cost:

Fixed Cost $= Contribution - EBIT$

= 12,000 – 4,000

= ₹ 8,000

15. Following information has been extracted from the accounts of newly incorporated Textyl Pvt. Ltd. for the Financial Year 2XX1-2XX2:

Sales	₹ 15,00,000
P/V ratio	70%
Operating Leverage	1.4 times
Financial Leverage	1.25 times

Using the concept of leverage, find out and verify in each case:

i) The percentage change in taxable income if sales increase by 15%.

ii) The percentage change in EBIT if sales decrease by 10%.

iii) The percentage change in taxable income if EBIT increase by 15%. **(May 2021 – RTP)**

Ans. **Workings:**

1) Contribution = Sales × P/V ratio

= ₹ 15,00,000 × 70% = ₹ 10,50,000

2) Operating Leverage $= \frac{\text{Contribution}}{\text{Earning before interest and tax (EBIT)}}$

Or, $1.4 = \frac{₹\ 10{,}50{,}000}{\text{EBIT}}$

EBIT = ₹ 7,50,000

3) Financial leverage $= \frac{\text{EBIT}}{\text{EBT}}$

Or, $1.25 = \frac{₹\ 7{,}50{,}000}{\text{EBT}}$

EBT = ₹ 6,00,000

4) Fixed Cost = Contribution − EBIT

= ₹ 10,50,000 − ₹ 7,50,000 = ₹ 3,00,000

5) Interest = EBIT − EBT

= ₹ 7,50,000 − ₹ 6,00,000 = ₹ 1,50,000

6) Income Statement

Particulars	Amount (₹)
Sales	15,00,000
Less: Variable cost (30% of ₹ 15,00,000)	4,50, 000
Contribution (70% of ₹ 15,00,000)	10,50,000
Less: Fixed costs	3,00,000
Earnings before interest and tax (EBIT)	7,50,000
Less: Interest	1,50,000
Earnings before tax (EBT)	6,00,000

i) Combined Leverage $= \frac{\text{Contribution}}{\text{EBT}} = \frac{₹\ 10,50,000}{₹\ 6,00,000} = 1.75$ times

Or, Combined Leverage = Operating Leverage × Financial Leverage

= 1.4 × 1.25 = 1.75 times

So, if sales is increased by 15% then taxable income (EBT) will be increased by 1.75 × 15% = 26.25%

Verification

Particulars	Amount (₹)
New Sales after 15% increase (₹ 15,00,000 + 15% of ₹ 15,00,000)	17,25,000
Less: Variable cost (30% of ₹ 17,25,000)	5,17,500
Contribution (70% of ₹ 17,25,000)	12,07,500
Less: Fixed costs	3,00,000
Earnings before interest and tax (EBIT)	9,07,500
Less: Interest	1,50,000
Earnings before tax after change (EBT)	7,57,500

Increase in Earnings before tax (EBT) = ₹ 7,57,500 - ₹ 6,00,000 = ₹ 1,57,500

So, percentage change in Taxable Income (EBT) $= \frac{₹\ 1,57,500}{₹\ 6,00,00} \times 100 = 26.25\%$, hence verified.

ii) Degree of Operating Leverage (Given) = 1.4 times

So, if sales is decreased by 10% then EBIT will be decreased by 1.4 × 10% = 14%

Verification

Particulars	Amount (₹)
New Sales after 10% decrease (₹ 15,00,000 - 10% of ₹ 15,00,000)	13,50,000
Less: Variable cost (30% of ₹ 13,50,000)	4,05,000
Contribution (70% of ₹ 13,50,000)	9,45,000
Less: Fixed costs	3,00,000
Earnings before interest and tax after change (EBIT)	6,45,000

Decrease in Earnings before interest and tax (EBIT) = ₹ 7,50,000 − ₹ 6,45,000 = ₹ 1,05,000

So, percentage change in EBIT $= \frac{₹\ 1,05,000}{₹\ 7,50,000} \times 100 = 14\%$, hence verified.

iii) Degree of Financial Leverage (Given) = 1.25 times

So, if EBIT increases by 15% then Taxable Income (EBT) will be increased by 1.25 × 15% = 18.75%

Verification

Particulars	Amount (₹)
New EBIT after 15% increase (₹ 7,50,000 + 15% of ₹ 7,50,000)	8,62,500
Less: Interest	1,50,000
Earnings before Tax after change (EBT)	7,12,500

Increase in Earnings before Tax = ₹ 7,12,500 - ₹ 6,00,000 = ₹ 1,12,500.

So, percentage change in Taxable Income (EBT) $= \frac{₹\ 1,12,500}{₹\ 6,00,000} \times 100 = 18.75\%$, hence verified.

16. The following data is available for Stone Ltd.:

Particulars	(₹)
Sales	5,00,000
(-) Variable cost @ 40%	2,00,000
Contribution	300,000
(-) Fixed cost	2,00,000
EBIT	1,00,000
(-) Interest	25,000
Profit before tax	75,000

Using the concept of leverage, find out

i) The percentage change in taxable income if EBIT increases by 10%.

ii) The percentage change in EBIT if sales increases by 10%. me

iii) The percentage change in taxable income if sales increases by 10%.

Also verify the results in each of the above case.

(Nov 2020)

Ans.

i) Degree of Financial Leverage $= \frac{\text{EBIT}}{\text{EBT}} = \frac{₹\ 1,00000}{₹\ 75,000} = 1.333$ times

So, If EBIT increases by 10% then Taxable Income (EBT) will be increased by 1.333 × 10 = 13.33% (approx.)

Verification

Particulars	Amount (₹)
New EBIT after 10% increase (₹ 1,00,000 + 10%)	1,10,000
Less: Interest	25,000
Earnings before Tax after change (EBT)	85,000

Increase in Earnings before Tax = ₹ 85,000 − ₹ 75,000 = ₹ 10,000

So, percentage change in Taxable Income (EBT) $= \frac{₹\ 10,000}{₹\ 75,000} \times 100 = 13.333\%$, hence verified

ii) Degree of Operating Leverage $= \frac{\text{Contribution}}{\text{EBIT}} = \frac{₹\ 3,00,000}{₹\ 1,00,000} = 3$ times

So, if sale is increased by 10% then EBIT will be increased by 3 × 10 = **30%**

Verification

Particulars	Amount (₹)
New Sales after 10% increase (₹ 5,00,000 + 10%)	5,50,000
Less: Variable cost (40% of ₹ 5,50,000)	2,20,000
Contribution	3,30,000
Less: Fixed costs	2,00,000
Earnings before interest and tax after change (EBIT)	1,30,000

Increase in Earnings before interest and tax (EBIT) = ₹ 1,30,000 - ₹ 1,00,000 = ₹ 30,000

So, percentage change in EBIT $= \frac{₹30,000}{₹\ 1,00,000} \times 100 = 30\%$, hence verified

iii) Degree of Combined Leverage $= \frac{\text{Contribution}}{\text{EBIT}} = \frac{₹\ 3,00000}{₹\ 75,000} = 4$ times

So, if sale is increased by 10% then Taxable Income (EBT) will be increased by 4 × 10 = 40%

Verification

Particulars	Amount (₹)
New Sales after 10% increase (₹ 5,00,000 + 10%)	5,50,000
Less: Variable cost (40% of ₹ 5,50,000)	2,20,000
Contribution	3,30,000
Less: Fixed costs	2,00,000
Earnings before interest and tax (EBIT)	1,30,000
Less: Interest	25,000
Earnings before tax after change (EBT)	1,05,000

Increase in Earnings before tax (EBT) = ₹ 1,05,000 - ₹ 75,000 = ₹ 30,000

So, percentage change in Taxable Income (EBT) $= \frac{₹\ 30,000}{₹\ 75,000} \times 100 = 40\%$, hence verified

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

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

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

Ans.

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

$DOL = \frac{Current\ sales(S) - Variables\ Costs(VC)}{Current\ EBIT}$

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

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

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

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

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

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

Particulars	Amount in ₹
EBIT (Earnings before Interest and Tax)	31,50,000
Earnings before Tax (EBT)	14,00,000

(ICAI SM)

Ans.

Operating Leverage (OL)

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

Financial Leverage (FL)

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

Combined Leverage (CL)

= 1.05 × 2.25 = 2.3625

Percentage Change in Earnings per share

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

∴% change in EPS = 23.625%.

Hence, if sale is increased by 10%, EPS will be increased by 23.625%.

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

Particulars	Company A	Company B
Margin of safety	0.20	0.25
Interest	₹ 3000	₹ 2000
Profit volume ratio	25%	33.33%
Financial Leverage	4	3
Tax rate	45%	45%

(ICAI SM)

Ans.

Income Statement

(Amount in ₹)

Particulars	Company A	Company B
Sales	80,000	36,000
Less: Variable Cost	60,000	24,000
Contribution	20,000	12,000
Less: Fixed Cost	16,000	9,000
EBIT	4,000	3,000
Less: Interest	3,000	2,000
EBT	1,000	1,000

Tax (45%)	450	450
	550	550

Working Notes:

i) Company A

Financial Leverage = EBIT/ (EBIT- Interest)

4/1 = EBIT/ (EBIT- ₹ 3,000)

4EBIT – ₹ 12,000 = EBIT

3EBIT = ₹ 12,000

EBIT = ₹ 4,000

Company B

Financial Leverage = EBIT/ (EBIT - Interest)

3/1 = EBIT/ (EBIT – ₹ 2,000)

3EBIT – ₹ 6000= EBIT

2EBIT = ₹ 6,000

EBIT = ₹ 3,000

ii) Company A

Operating Leverage = 1/Margin of Safety

= 1/0.20 = 5

Operating Leverage = Contribution/EBIT

5 = Contribution/₹ 4,000 Contribution = ₹ 20,000

Company B

Operating Leverage = 1/Margin of Safety

= 1/0.25 = 4

Operating Leverage = Contribution/EBIT

4 = Contribution/₹ 3,000 Contribution = ₹ 12,000

iii) Company A

Profit Volume Ratio = 25%(Given)

Profit Volume Ratio = Contribution/Sales * 100

25% = ₹ 20,000/Sales

Sales = ₹ 20,000/25%

Sales = ₹ 80,000

Company B

Profit Volume Ratio = 33.33%

Therefore, Sales = ₹ 12,000/33.33%

Sales = ₹ 36,000

20. The Sale revenue of TM excellence Ltd. @ ₹ 20 Per unit of output is ₹ 20 lakhs and Contribution is ₹ 10 lakhs. At the present level of output the DOL of the company is 2.5. The company does not have any Preference Shares. The number of Equity Shares are 1 lakh. Applicable corporate Income Tax rate is 50% and the rate of interest on Debt Capital is 16% p.a. What is the EPS (At sales revenue of ₹ 20 lakhs) and amount of Debt Capital of the company if a 25% decline in Sales will wipe out EPS. **(ICAI SM)**

Ans. **Calculation of Fixed Cost**

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

EBIT = Contribution – Fixed Cost

4 = 10 – Fixed Cost

Fixed Cost = 10-4 = ₹ 6 lakhs

Calculation of Degree of total Leverage (DTL)

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

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

Calculation of Degree of Financial Leverage (DFL)

DCL = DOL × DFL or 4 = 2.5 × DFL, So DFL = 1.6

Calculation of Interest and amount of Debt

$$DFL = \frac{EBIT}{EBIT - Interest} \; or \; 1.6 = \frac{4}{4 - Interest} \; or \; Interest = ₹\,1{,}50{,}000 \; lakhs$$

Debt × Interest rate = Amount of Interest Debt × 16% = ₹ 1,50,000

Debt = ₹ 9,37,500

Calculation of Earnings per share (EPS)

$$\text{EPS} = \frac{(EBIT - Interest)(1-t)}{N} = \frac{(4-1.5)0.5}{1} = ₹\,1.25$$

21. Betatronics Ltd. has the following balance sheet and income statement information:

Balance Sheet as on March 31st 2XX1

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

Income Statement for the year ending March 31st 2XX1

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

a) DETERMINE the degree of operating, financial and combined leverages at the current sales level, if all operating expenses, other than depreciation, are variable costs.

b) If total assets remain at the same level, but sales (i) increase by 20 percent and (ii) decrease by 20 percent, COMPUTE the earnings per share at the new sales level?

(ICAI SM)

Ans.

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

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

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

DCL = DOL×DFL = 1.27×1.38 = 1.75

b) Earnings per share at the new sales level

	Increase by 20%	Decrease by 20%
	(₹)	(₹)
Sales level	4,08,000	2,72,000
Less: Variable expenses	72,000	48,000
Less: Fixed cost	60,000	60,000
Earnings before interest and taxes	2,76,000	1,64,000
Less: Interest	60,000	60,000
Earnings before taxes	2,16,000	1,04,000
Less: Taxes (w.n.iii)	75,600	36,400
Earnings after taxes (EAT)	1,40,400	67,600
Number of equity shares	80,000	80,000
EPS	1.76	0.85

Working Notes:

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

ii) Variable Costs at:

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

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

iii) Tax rate = (Tax/Profit before tax) × 100

Tax rate = (56,000/1,60,000) × 100 = 35%

22. A firm's details are as under:

Sales (@100 per unit) ₹ 24,00,000

Variable Cost 50%

Fixed Cost ₹ 10,00,000

It has borrowed ₹ 10,00,000 @ 10% p.a. and its equity share capital is ₹ 10,00,000 (₹ 100 each). Consider tax @ 50%.

CALCULATE:

a) Operating Leverage

b) Financial Leverage

c) Combined Leverage

d) Return on Investment

e) If the sales increases by ₹ 6,00,000; what will the new EBIT?

(ICAI SM, Modified)

Ans.

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

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

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

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

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

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

e) Operating Leverage = 6

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

Δ EBIT = $\frac{6 \times 1}{4} = 1.5$

Increase in EBIT = ₹ 2,00,000 × 1.5 = ₹ 3,00,000

New EBIT = ₹ 5,00,000

23. Company P and Q are having same earnings before tax. However, the margin of safety of Company P is 0.20 and, for Company Q, is 1.25 times than that of Company P. The interest expense of Company P is ₹1,50,000 and, for Company Q, is 1/3rd less than that of Company P. Further, the financial leverage of Company P is 4 and, for Company Q, is 75% of Company P.

Other information is given as below:

Particulars	Company P	Company Q
Profit volume ratio	25%	33.33%
Tax rate	45%	45%

You are required to PREPARE Income Statement for both the companies. **(May 2022 RTP)**

Ans.

Income Statement

Particulars	Company P (₹)	Company Q (₹)
Sales	40,00,000	18,00,000
Less: Variable Cost	30,00,000	12,00,000
Contribution	10,00,000	6,00,000
Less: Fixed Cost	8,00,000	4,50,000
EBIT	2,00,000	1,50,000
Less: Interest	1,50,000	1,00,000
EBT	50,000	50,000
Tax (45%)	22,500	22,500
EAT	27,500	27,500

Workings:

i) Margin of Safety

For Company P = 0.20

For Company Q = 0.20 x 1.25 = 0.25

ii) Interest Expenses

For Company P = ₹ 1,50,000

For Company Q = ₹ 1,50,000 (1-1/3) = ₹ 1,00,000

iii) Financial Leverage

For Company P = 4

For Company Q = 4 x 75% = 3

iv) EBIT

For Company A

Financial Leverage	= EBIT/ (EBIT- Interest)
4	= EBIT/ (EBIT- ₹ 1,50,000)
4EBIT – ₹ 6,00,000	= EBIT
3EBIT	= ₹ 6,00,000
EBIT	= ₹ 2,00,000

For Company B

Financial Leverage	= EBIT/ (EBIT - Interest)
3	= EBIT/ (EBIT – ₹ 1,00,000)
3EBIT – ₹ 3,00,000	= EBIT
2EBIT	= ₹ 3,00,000
EBIT	= ₹ 1,50,000

v) Contribution

For Company A

Operating Leverage	= 1/Margin of Safety
	= 1/0.20 = 5
Operating Leverage	= Contribution/EBIT
5	= Contribution/₹ 2,00,000
Contribution	= ₹ 10,00,000

For Company B

Operating Leverage	= 1/Margin of Safety
	= 1/0.25 = 4
Operating Leverage	= Contribution/EBIT
4	= Contribution/₹ 1,50,000
Contribution	= ₹ 6,00,000

vi) Sales

For Company A

Profit Volume Ratio	= 25%
Profit Volume Ratio	= Contribution/Sales × 100
25%	= ₹ 10,00,000/Sales
Sales	= ₹ 10,00,000/25%
Sales	= ₹ 40,00,000

For Company B

Profit Volume Ratio	= 33.33%
Therefore, Sales	= ₹ 6,00,000/33.33%
Sales	= ₹ 18,00,000

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

i) CALCULATE operating leverage.

ii) If sales are up by 10%, then COMPUTE the impact on EBIT?

(ICAI SM)

Ans. **i) Statement of Profitability**

Particulars	₹
Sales Revenue (10,000 × 500)	50,00,000
Less: Variable Cost (10,000 × 200)	20,00,000
Contribution	30,00,000

Less: Fixed Cost	25,00,000
EBIT	5,00,000

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

ii) Operating Leverage (OL) = $\frac{\%\ Chainge\ in\ EBIT}{\%\ Change\ in\ Sales}$

6 = $\frac{\%\ Change\ in\ EBIT}{10\%}$

∴ ΔEBIT = 6*10%= 60%

25. Following are the selected financial information of A Ltd. and B Ltd. for the year ended March 31st, 2021:

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

You are required to FIND out:

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

(ICAI SM)

Ans.

Company A

i) Financial Leverage = $\frac{EBIT}{EBT\ i.e. EBIT \times Interest}$

So, 3 = $\frac{EBIT}{EBIT - 20,000}$

Or, 3 (EBIT – 20,000) = EBIT

Or, 2 EBIT = 60,000

Or, EBIT = 30,000

ii) Operating Leverage = $\frac{Contribution}{EBIT}$ $Or,\ 5 = \frac{Contribution}{₹30,000}$

Or, Contribution = ₹1,50,000

Sales = $\frac{Contribution}{P/V\ Ratio\ (1 - variable\ cost\ ratio)}$ = $\frac{₹1,50,000}{40\%} = ₹3,75,000$

iii) Fixed Cost = Contribution – EBIT

= ₹1,50,000 – 30,000

Or, Fixed cost = ₹1,20,000

Company B

i) Financial Leverage = $\frac{EBIT}{EBT\ i.e. EBIT \times Interest}$

So, 2 = $\frac{EBIT}{EBIT - 1,00,000}$

Or, 2 (EBIT – 1,00,000) = EBIT

Or, 2 EBIT – 2,00,000 = EBIT

Or, EBIT = ₹2,00,000

ii) Operating Leverage $= \frac{Contribution}{EBIT}$ $Or,\ 2 = \frac{Contribution}{₹2,00,000}$

Or, Contribution = ₹4,00,000

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

iii) Fixed Cost = Contribution – EBIT

= ₹4,00,000 – ₹2,00,000

Or, Fixed cost = ₹2,00,000

Income Statements of Company A and Company B

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

Comment based on Leverage

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

- ✓ Capacity of Company B to meet interest liability is better than that of companies A (from EBIT/Interest ratio)
  $\left[A = \frac{30,000}{20,000} = 1.5, B = \frac{2,00,000}{1,00,000} = 2\right]$
- ✓ Company B has the least financial risk as the total risk (business and financial) of company B is lower (combined leverage of Company A – 15 and Company B- 4)

26. Consider the following information for Mega Ltd.:

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

Required:

COMPUTE its earnings after tax **(ICAI SM)**

Ans. **Workings:**

1) Operating Leverage = $\frac{Conbtribution}{EBIt} = \frac{₹150 \times 2,500}{EBIt} = \frac{₹3,75,000}{EBIT} = 6$

∴ EBIT = $\frac{₹3,75,000}{6}$ = ₹62,500

2) Operating Leverage (OL) × Financial Leverage (FL)= Combined Leverage (CL) 6 × Financial Leverage = 24

∴ Financial Leverage = 4

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

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

Computation of Earnings after tax

Earnings after Tax (EAT) = EBT (1 − t) = ₹ 15,625 (1 − 0.30) = ₹ 15,625 × 0.70

∴ Earnings after Tax (EAT) = ₹ 10,938

27. The financial advisor of Sun Ltd. is confronted with following two alternative financing plans for raising ₹10 lakhs that is needed for plant expansion and modernization.

Alternative I: Issue 80% of funds with 14% Debenture (Face value (FV) ₹100] at par and redeem at a premium of 10% after 10 years and balance by issuing equity shares at $33\frac{1}{3}$% premium.

Alternative II: Raise 10% of funds required by issuing 8% Irredeemable Debentures [Face value (FV) ₹100] at par and the remaining by issuing equity shares at current market price of ₹125.

Currently the firm has an Earnings per share (EPS) of ₹21

The modernization and expansion programme is expected to increase the firm's Earning before interest and Taxation (EBIT) by ₹200,000 annually.

The firm's condensed Balance Sheet for the current year is given below:

Balance Sheet as on 31.3.2022

Liabilities	Amount (₹)	Assets	Amount (₹)
Current Liabilities	5,00,000	Current Assets	16,00,000
10% Long Term Loan	15,00,000	Plant & Equipment (Net)	34,00,000
Reserves & Surplus	10,00,000		
Equity Share Capital (FV: ₹100 each)	20,00,000		
Total	**50,00,000**	**Total**	**50,00,000**

However, the finance advisor is concerned about the effect that issuing of debt might have on the firm. The average debt ratio for firms in industry is 35%. He believes if this ratio is exceeded, the P/E ratio of the company will be 7 because of the potentially greater risk.

If the firm increases its equity capital by more than 10%, he expects the P/E ratio of the company will increase to 8.5 irrespective of the debt ratio.

Assume Tax Rate of 25%. Assume target dividend pay-out under each alternative to be 60% for the next year and growth rate to be 10% for the purpose of calculating Cost of Equity.

SUGGEST with reason which alternative is better on the basis of each of the below given criteria:

i) Earnings per share (EPS) & Market Price per share (MPS)

ii) Financial Leverage

iii) Weighted Average Cost of Capital & Marginal Cost of Capital (Using Book Value weights)

(Oct. 2022 MTP)

Ans. **Calculation of Equity Share capital and Reserves and surplus:**

Alternative 1:

Equity Share Capital = ₹20,00,000 + $\frac{₹2,00,000 \times 100}{133.3333}$ = ₹21,50,000

Reserves = ₹10,00,000 + $\frac{₹2,00,000 \times 33.3333}{133.3333}$ = ₹10,50,000

Alternative 2:

Equity Share Capital = ₹20,00,000 + $\frac{₹9,00,000 \times 100}{125}$ = ₹27,20,000

Reserves = ₹10,00,000 + $\frac{₹9,00,000 \times 25}{125}$ = ₹11,80,000

Capital Structure Plans **Amount in ₹**

Capital	Alternative 1	Alternative 2
Equity Share capital	21,50,000	27,20,000
Reserves and surplus	10,50,000	11,80,000
10% long term debt	15,00,000	15,00,000

14% Debentures	8,00,000	-
8% Irredeemable Debentures	-	1,00,000
Total Capital Employed	55,00,000	55,00,000

Computation of Present Earnings before interest and tax (EBIT)

EPS (₹)	21
No. of equity shares	20,000
Earnings for equity shareholders (I x II) (₹)	4,20,000
Profit Before Tax (III/75%) (₹)	5,60,000
Interest on long term loan (1500000 x 10%) (₹)	1,50,000
EBIT (IV + V) (₹)	7,10,000

EBIT after expansion = ₹7,10,000 +₹ 2,00,000 = ₹9,10,000

Evaluation of Financial Plans on the basis of EPS, MPS and Financial Leverage

Amount in ₹

Particulars	Alternative I	Alternate II
EBIT	9,10,000	9,10,000
Less: Interest: 10% on long term loan	(1,50,000)	(1,50,000)
14% on Debentures	(1,12,000)	Nil
8% on Irredeemable Debentures	Nil.	(8000)
PBT	6,48,000	7,52,000
Less: Tax @25%	(1,62,000)	(1,88,000)
PAT	4,86,000	5,64,000
No. of equity shares	21,500	27,200
EPS	22.60	20.74
Applicable P/E ratio (Working Note 1)	7	8.5
MPS (EPS X P/E ratio)	158.2	176.29
Financial Leverage EBIT/PBT	1.40	1.21

Working Note 1

	Alternative I	Alternative II
Debt:		
₹15,00,000 +₹8,00,000	23,00,000	-
₹15,00,000 +₹1,00,000	-	16,00,000
Total capital Employed (₹)	55,00,000	55,00,000
Debt Ratio (Debt/Capital employed)	=0.4182	=0.2909
	=41.82%	=29.09%
Change in Equity: ₹21,50,000-₹20,00,000	1,50,000	
₹27,20,000-₹20,00,000		7,20,000
Percentage change in equity	7.5%	36%
Applicable P/E ratio	7	8.5

Calculation of Cost of equity and various type of debt

	Alternative I	Alternative II
A) Cost of equity		
EPS	22.60	20.74
DPS (EPS X 60%)	13.56	12.44
Growth (g)	10%	10%

Po (MPS)	158.2	176.29
Ke= Do (1 + g)/ Po	$\frac{13.56}{158.20}$	$\frac{12.44\ (1.1)}{176.29}$
	=8.57%	=7.06%
B) Cost of Debt:		
10% long term debt	10% + (1-0.25)	10% +(1-0.25)
	= 7.5%	= 7.5%
14% redeemable debentures	$\frac{14(1-0.25)\ +\ (110-100/10)}{(110+100)/2}$	nil
	= 10.5 + 1 / 105	
	= 10.95%	
8% irredeemable debenture	NA	8000(1-0.25)/1,00,00 = 6%

Calculation of Weighted Average cost of capital (WACC)

	Alternative 1			**Alternative 2**		
Capital	**Weights**	**Cost (%)**	**WACC**	**Weights**	**Cost (%)**	**WACC**
Equity Share Capital	0.3909	8.57	3.35%	0.4945	706	3.19%
Reserves and Surplus	0.1909	8.57	1.64%	0.2145	706	1.51%
10% Long term Debt	0.2727	7.50	2.05%	0.2727	7.50	2.05%
14% Debenture	0.1455	10.95	1.59%			
8% Irredeemable Debentures	-			0.0182	6	0.11%
			8.63%			**7.16%**

Calculation Marginal Cost of Capital (MACC)

	Alternative 1			**Alternative 2**		
Capital	**Amount (weight)**	**Cost (%)**	**MACC**	**Amount (weight)**	**Cost (%)**	**MACC**
Equity Share Capital	₹ 1,50,000(0.15)	8.57	1.28%	₹7,20,000(0.72)	7.76	5.08%
Reserves and Surplus	₹ 50,000(0.05)	8.57	0.47%	₹1,80,000(0.18)	7.76	1.27%
14% Debenture	₹ 8,00,000(0.80)	10.95	0.43%	-		0.00%
8% Irredeemable Debentures	-			₹1,00,000(0.10)	6	0.60%
Total Capital Employed	₹10,00,000		**10.47%**	₹10,00,000		**6.95%**

Summary of solution:

	Alternate I	**Alternate II**
Earning per share (EPS)	22.60	20.74
Market price per share (MPS)	158.20	176.29
Financial leverage	1.4043	1.2101
Weighted Average cost of capital (WACC)	8.63%	7.16%
Marginal cost of capital (MACC)	10.47%	6.95%

Alternative 1 of financing will be preferred under the criteria of EPS, whereas Alternative II of financing will be preferred under the criteria of MPS, Financial leverage, WACC and marginal cost of capital.

28. Debu Ltd. currently has an equity share capital of ₹1,30,00,000 consisting of 13,00,000 Equity shares. The company is going through a major expansion plan requiring to raise funds to the tune of ₹78,00,000. To finance the expansion the management has following plans:

Plan-I:	Issue 7,80,000 Equity shares of ₹10 each
Plan-II:	Issue 5,20,000 Equity shares of ₹10 each and the balance through long-term borrowing at 12% interest p.a.
Plan-III:	Issue 3,90,000 Equity shares of ₹10 each and 39,000, 9% Debentures of ₹100 each.
Plan-IV:	Issue 3,90,000 Equity shares of ₹10 each and the balance through 6% preference shares.

EBIT of the company is expected to be ₹52,00,000 p.a.
Considering corporate tax rate @40%, you are required to-

i) CALCULATE EPS in each of the above plans.
ii) ASCERTAIN financial leverage in each plan and comment.

(Nov. 2022 RTP)

Ans.

Sources of Capital	Plan I	Plan II	Plan III	Plan IV
Present Equity Shares	13,00,000	13,00,000	13,00,000	13,00,000
New Issue	7,80,000	5,20,000	3,90,000	3,90,000
Equity share capital (₹)	2,08,00,000	1,82,00,000	1,69,00,000	1,69,00,000
No. of Equity shares	20,80,000	18,20,000	16,90,000	16,90,000
12% Long term loan (₹)	--	26,00,000	--	--
9% Debentures (₹)	--	--	39,00,000	--
6% Preference Shares (₹)	--	--	--	39,00,000

Computation of EPS and Financial Leverage

Sources of Capital	Plan I	Plan II	Plan III	Plan IV
EBIT (₹)	52,00,000	52,00,000	52,00,000	52,00,000
Less: Interest on 12% Loan (₹)	--	3,12,000	--	--
Less: Interest on 9% debentures (₹)	--	--	3,51,000	--
EBT (₹)	52,00,000	48,88,000	48,49,000	52,00,000
Less: Tax@ 40%	20,80,000	19,55,200	19,39,600	20,80,000
EAT (₹)	31,20,000	29,32,800	29,09,400	31,20,000
Less: Preference Dividends (₹)	--	--	--	2,34,000
a) Net Earnings available for equity shares (₹)	31,20,000	29,32,800	29,09,400	28,86,000
b) No. of equity shares	20,80,000	18,20,000	16,90,000	16,90,000
c) EPS (a ÷ b) (₹)	1.50	1.61	1.72	1.71
Financial leverage $\left(\frac{EBIT}{EBT}\right)$	1.00	1.06	1.07	1.08*

* Financial Leverage in the case of Preference dividend = $\left(\frac{EBIT}{(EBIT-Interest)-\left(\frac{D_p}{(1-t)}\right)}\right)$

$= \left(\frac{52,00,000}{(52,00,000-0)-\left(\frac{2,34,000}{(1-.40)}\right)}\right) = \left(\frac{52,00,000}{48,10,000}\right) = 1.08$

29. Information of A Ltd. is given below:

- ✓ Earnings after tax: 5% on sales
- ✓ Income tax rate: 50%
- ✓ Degree of Operating Leverage: 4 times

✓ 10% Debenture in capital structure: ₹3 lakhs
✓ Variable costs: ₹6 lakhs

Required:

i) From the given data complete following statement:

Sales	XXXX
Less: Variable costs	₹6,00,000
Contribution	XXXX
Less: Fixed costs	XXXX
EBIT	XXXX
Less: Interest expenses	XXXX
EBT	XXXX
Less: Income tax	XXXX
EAT	XXXX

ii) Calculate Financial Leverage and Combined Leverage

iii) Calculate the percentage change in earning per share, if sales increased by 5%.

(Dec. 2021)

Ans. **i)**

Working Notes

Earning after tax (EAT) is 5% of sales

Income tax is 50%

So, EBT is 10% of Sales

Since Interest Expenses is ₹30,000

EBIT = 10% of Sales + ₹30,000 ..... (Equation i)

Now Degree of operating leverage = 4

So, $\frac{\text{Contribution}}{\text{EBIT}} = 4$

Or, Contribution = 4 EBIT

Or, Sales – Variables Cost = 4 EBIT

Or, Sales – ₹6,00,000 = 4 EBIT ..... (Equation ii)

Replacing the value of EBIT of equation (i) in Equation (ii)

We get, Sales – ₹6,00,000 = 4 (10% of Sales + ₹30,000)

Or, Sales – ₹6,00,000 = 40% of Sales + ₹1,20,000

Or, 60% of Sales = ₹7,20,000

So, Sales = $\frac{₹\ 7,20,000}{60\%}$ = **₹12,00,000**

Contribution = Sales – Variable Cost = ₹12,00,000 – ₹6,00,000 = ₹6,00,000

EBIT = $\frac{₹\ 6,00,000}{4}$ **= ₹1,50,000**

Fixed Cost = Contribution – EBIT = ₹6,00,000 – ₹1,50,000 = ₹4,50,000

EBT = EBIT – Interest = ₹1,50,000 – ₹30,000 = **₹1,20,000**

EAT = 50% of ₹1,20,000 = ₹60,000

Income Statement

Particulars	(₹)
Sales	**12,00,000**
Less : Variable cost	6,00,000
Contribution	6,00,000

Less : Fixed cost		4,50,000
EBIT		**1,50,000**
Less: Interest		30,000
EBT		**1,20,000**
Less: Tax (50%)		60,000
EAT		60,000

ii)

Financial Leverage = $\frac{EBIT}{EBT} = \frac{1,50,000}{1,20,000}$ = **1.25 times**

Combined Leverage = Operating Leverage × Financial Leverage

= 4×1.25 = **5 <u>times</u>**

Or,

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

Combined Leverage = $\frac{Contribution}{\text{EBT}} = \frac{₹\ 6,00,000}{₹\ 1,20,000}$ = **5 <u>times</u>**

iii)

Percentage Change in Earnings per share

Combined Leverage = $\frac{\%\ Change\ in\ EPS}{\%\ \text{change in Sales}} = 5 = \frac{\%\ change\ in\ EPS}{5\%}$

∴% change in EPS = 25%

Hence, if sales increased by 5%, EPS will be increased by 25%.

30. The following information is available for SS Ltd.

Profit volume (PV) ratio	-	30%
Operating leverage	-	2.00
Financial leverage	-	1.50
Loan	-	₹ 1,25,000
Post-tax interest rate	-	5.6%
Tax rate	-	30%
Market Price per share (MPS)		₹140
Price Earnings Ratio (PER)		10

You are required to

1) Prepare the Profit-Loss statement of SS Ltd. And

2) Find out the number of equity shares.

(November 2022)

Ans. **Preparation of Profit – Loss Statement**

Working Notes:

1) Post tax interest	5.60%
Tax rate	30%
Pre tax interest rate = (5.6/70) x 100	8%
Loan amount	₹ 1,25,000
Interest amount = 1,25,000 x 8%	₹ 10,000

Financial Leverage (FL) = $\left(\frac{EBIT}{EBY}\right) = \left[\frac{EBIT}{(EBIT - Interest}\right] = \left[\frac{EBIT}{EBIT - 10,000}\right]$

1.5 = $\left[\frac{EBIT}{EBIT - 10,000}\right]$

1.5 EBIT – 15,000 = EBIT

1.5 EBIT – EBIT = 15,000

0.5 EBIT = 15,000

∴ EBIT = ₹30,000

EBT = EBIT – Interest = 30,000 – 10,000 = ₹20,000

2) Operating Leverage (OL) = $\frac{Contribution}{EBIT}$

$$2 = \frac{Contribution}{30{,}000}$$

Contribution = ₹60,000

3) Fixed cost = Contribution – Profit

= 60,000 – 30,000 = **₹30,000**

4) Sales = $\frac{Contribution}{PV\ Ratio}$

$= \frac{60{,}000}{30\%} = \mathbf{₹2,00,000}$

5) If PV ratio is 30%, then the variable cost is 70% on sales.

∴ **Variable cost** = 2,00,000 × 70% = **₹1,40,000**

Profit – Loss Statement

Particulars	₹
Sales	2,00,000
Less: Variable cost	1,40,000
Contribution	60000
Less: Fixed cost	30,000
EBIT	30,000
Less: Interest	10,000
EBT	20,000
Less: Tax @ 30%	6,000
EAT	**14,000**

2) Calculation of no. of Equity shares

Market Price per Share (MPS) = ₹140

Price Earnings Ratio (PER) = 10

WKT,

EPS = $\frac{MPS}{PER} = \frac{140}{10} = ₹14$

Total earnings (EAT) = ₹ 14,000

∴ No. of Equity Shares = 14,000 / 14 = **1,000**

Capital Structure
Assignment

<table>
<tr><th>Q. No.</th><th>Questions / Answers</th></tr>
<tr><td>1.</td><td>Kee Ltd. and Lee Ltd. are identical in every respect except for capital structure. Kee Ltd. does not employ debt in its capital structure, whereas Lee Ltd. employs 12% debentures amounting to ₹20 lakhs. Assuming that:
i) All assumptions of MM model are met;
ii) The income tax rate is 30%;
iii) EBIT is ₹5,00,000 and
iv) The equity capitalization rate of Kee Ltd. is 25%
CALCULATE the average value of both the Companies.
(May 2021/July 2021 modified/January 2021 modified/November 2020 modified)</td></tr>
<tr><td>Ans.</td><td>Kee Ltd. (pure Equity) i.e. unlevered company:
EAT = EBT (1 – t)
= EBIT (1 - 0.3) = ₹ 5,00,000 × 0.7 = ₹ 3,50,000
(Here, EBIT = EBT as there is no debt)

Value of unlevered company Kee Ltd. $= \frac{EAT}{Equity\ capitazation\ rate}$

$= \frac{₹\ 3,50,000}{25\%} = ₹\ 14,00,000$
Lee Ltd. (Equity and Debt) i.e levered company:
Value of levered company = Value of Equity + Value of Debt
= ₹14,00,000 + (₹20,00,000 × 0.3)
= ₹20,00,000</td></tr>
<tr><td>2.</td><td>Sun Ltd. Is considering two financing plans.
Details of which ae as under:
Fund's requirement – ₹100 Lakhs
i) Financial Plan
Plan | Equity | Debt
I | 100% | --
II | 25% | 75%
ii) Cost of debt – 12% p.a.
iii) tax Rate – 30%
iv) Equity Share ₹10 each, issued at a premium of ₹15 per share
v) Expected Earnings before Interest and taxes (EBIT) ₹40 Lakhs

You are required to compute.
i) EPS in each of the plan
ii) The Financial Break Even Point
iii) Indifference point between Plan I and II
(May 2018/ November 2017/ ICAI SM modified/Practical question 3 modified)</td></tr>
<tr><td>Ans.</td><td>i) Compute of Earnings per share (EPS)
<table>
<tr><th>Particulars</th><th>Plan - I</th><th>Plan - II</th></tr>
<tr><td>Earnings before interest and tax (EBIT)</td><td>40,00,000</td><td>40,00,000</td></tr>
<tr><td>Less: Interest Charges</td><td>--</td><td>(9,00,000)
(12%×₹75L)</td></tr>
<tr><td>Earnings Before tax (EBT)</td><td>40,00,000</td><td>31,00,000</td></tr>
</table></td></tr>
</table>

	Less: tax @ 30%	(12,00,000)	(9,30,000)
	Earning After Tax (EAT) (A)	28,00,000	21,70,000
	No. of Shares (B)	4,00,000	1,00,000
	EPS ₹ [(A) ÷ (B)]	7	21.70

ii) Calculation of Financial Break-even point

- ✓ Financial Break-even point is the earnings which are equal to the fixed finance charges

***Plan-I:**

- ✓ Under this plan is no interest, hence the Financial Break-even point will be zero.

***Plan-II:**

- ✓ Under this plan there is an interest payment of ₹9,00,000, hence, the financial Break-even point will be ₹9,00,000 (Interest charges)

iii) Computation of Indifference point between the plans.

- ✓ The indifference between two alternative methods of financing is calculating by applying the following formula.

$$\frac{(EBIT-I_1)(1-T)}{E_1} = \frac{(EBIT-I_2)(1-T)}{E_2}$$

Where,
EBIT = Earnings before interest and tax
I_1 = Fixed charges (interest) under Alternative
I_2 = Fixed charges (interest) under Alternative
T = Tax-rate
E_1 = Number of equity shares in Alternative 1
E_2 = Number of equity shares in Alternative 2

- ✓ Now, we can calculate indifference point between difference plans of financing.

$$\frac{(EBIT-0)(1-0.3)}{4,00,000} = \frac{(EBIT-9,00,000)(1-0.3)}{1,00,000}$$

2.8 EBIT – 25,20,000 = 0.7 EBIT
Or, 2.1 EBIT = 25,20,000
EBIT = 12,00,000

3. 'A' Ltd. and 'B' Ltd. are identical in every respect except capital structure. A Ltd. does not employ debts in its capital structure whereas B' Ltd. employs 12% Debentures amounting to ₹10 lakhs. Assuming that:
i) All assumptions of M-M model are met.
ii) Income-tax rate is 30%.
iii) EBIT is ₹2,50,000 and
iv) The Equity capitalization rate of 'A' Ltd. Is 20%.
Calculate the value of both the companies and also find out the Weighted Average Cost of Capital for both the companies.

(November 2014/May 2017 modified/November 2009 modified)

Ans. **i)** Calculate of Value of Firms 'A Ltd.' And 'B Ltd.' According to MM hypothesis market value of 'A Ltd.' (Unlevered)

$$V_u = \frac{EBIT(1-t)}{K_e}$$

$$= \frac{2,50,000(1-0.30)}{20\%}$$

$= \frac{1,75,000}{20\%} = ₹8,75,000$

Market Value of 'B Ltd.' (Leverage)

$V_E = V_u + DT$

$= 8,75,000 + (10,00,000 \times 0.30)$

$= 8,75,000 + 3,00,000 = ₹\ 11,75,000$

ii) Computation of Weighted Average Cost of Capital (WACC) WACC of 'A Ltd. = 20% ($K_e = K_0$)

WACC of 'B Ltd.'

Particulars	B Ltd.
EBIT	2,50,000
Interest to debt-holders	(1,20,000)
EBT	1,30,000
Taxes @ 30%	(39,000)
Income available to equity shareholders	91,000
Total value of Firm	11,75,000
Less: Market Value of Debt	(10,00,000)
Market Value of Equity	1,75,000
K_e = 91,000/1,75,000	0.52

For Computation of WACC B. Ltd.

Components of Costs	Amount	Weight	Cost of Capital	Weighted WACC
Equity	1,75,000	0.149	0.52	0.0775
Debt	10,00,000	0.851	0.084*	0.0715
Total	11,75,000		WACC	0.1490

K_d = 12% (1-0.3) = 12% × 0.7 = 8.4%

WACC = 14.90%.

4. **X Ltd. is considering the following two alternative financing plans:**

Particulars	Plan-I (₹)	Plan-II (₹)
Equity shares of ₹10 each	4,00,000	4,00,000
12% Debentures	2,00,000	--
Preference Shares of ₹100 each	--	2,00,000
	6,00,000	6,00,000

The indifference point between the plans is ₹2,40,000. Corporate tax rate is 30%. Calculate the rate of dividend on preference shares.

(November 2013/ ICAI SM modified/November 2020 RTP modified)

Ans.

Particulars	Plan 1	Plan 2
Depreciation	ESC = 4,00,000 Debt =2,00,000	FSC=4,00,000 PSC=2,00,000
EBIT (given)	2,40,000	2,40,000
Less: Interest @ 12% on 2,00,000	24,000	--
EBT	2,16,000	2,40,000
Less: Tax at 30%	64,800	72,000
EAT	1,51,200	1,68,000
Less: Preference Dividend	Nil	X
Residual earnings for equity shareholders	1,51,200	1,68,000-X

	Number of equity shares (4,00,000÷ 10)	40,000 shares	40,000 shares
	EPS = $\frac{Residual\ Earnings}{No.of\ equity\ shares}$	$\frac{1,51,200}{40,000} = 3.78$	$\frac{1,68,000 - X}{40,000} = 3.78$

For indifference between the above alternatives, EPS should be equal.

So, $\frac{1,51,200}{40,000\ shares} = 3.78 = \frac{1,68,000-X}{40,000\ shares}$

Or, 40,000 × 3.78 = 1,68,000-X

Or, X = 16,800

So, Rate of Preference Dividend = $\frac{16,800}{2,00,000} = 8.4\%$

5. India Limited requires ₹50,00,000 for a new Plant. This Plant is expected to yield earnings before interest and taxes of ₹10,00,000. While deciding about the financial plan, the company considers the objective of maximising earnings per share. It has three alternatives to finance the project- by raising debt of ₹5,00,000 or ₹20,00,000 or ₹30,00,000 and the balance, in case, by issuing equity shares. The company's share is currently selling at ₹150, but is expected to decline to ₹125 in case the funds are borrowed in excess of ₹20,00,000. The funds can be borrowed at the rate of 9 percent upto ₹5,00,000, at 14 percent over ₹5,00,000 and ₹20,00,000 and at 19 percent over ₹20,00,000. The tax rate applicable to the company is 40 percent. Which form of financing should company choose? Show EPS Amount upto two decimal points.

(November 2016/ ICAI SM modified/November 2018 modified)

Ans.

Calculation of EPS

Particulars	Alternative A	Alternative B	Alternative C
EBIT	10,00,000	10,00,000	10,00,000
Less: Interest (WN-1)	(45,000)	(2,55,000)	(4,45,000)
EBT	9,55,000	7,45,000	5,55,000
Less: Tax @ 40%	(3,82,000)	(2,98,000)	(2,22,000)
EAT	5,73,000	4,47,000	3,33,000
Division: Number of shares (WN-2)	30,000	20,000	16,000
EPS	**19.10**	**22.35**	**20.81**

Working Notes (WN):

Financing Alternatives B (i.e. Raising debt of ₹20 lakhs and issue of equity share capital of ₹30 lakhs) is the option which maximizes the earnings per share.

Working Notes (WN):

1) Calculate of interest on debt.

Alternative A	₹5,00,000×9%		₹45,000
Alternative B	₹5,00,000×9%	₹45,000	
	₹15,00,000×14%	₹2,10,000	₹2,55,000
Alternative C	₹5,00,000×9%	₹45,000	
	₹15,00,000×14%	₹2,10,000	
	₹10,00,000×19%	₹1,90,000	₹4,45,000

Note: Instead of slab, the relevant interest rate can be applied on total amount.

2) Number of equity shares to be issued

Alternative A = $\frac{₹45,00,000}{₹150\ (Market\ price\ of\ Share)} = 30,000\ shares$

Alternative B $= \frac{₹30,00,000}{₹150\ (Market\ price\ of\ Share)} = 20,000\ shares$

Alternative C $= \frac{₹20,00,000}{₹150\ (Revised\ Market\ price\ of\ Share)} = 16,000\ shares$

6. The management of Z Company Ltd. wants to raise its funds from market to meet out the financial demands of its long-term projects. The company has various combination of proposals to raise its funds. You are given the following proposals of the company.

i)

Proposals	% of Equity	% of Debts	% of Preferences Shares
P	100	--	--
Q	50	50	--
R	50	--	50

ii) Cost of debt – 10%
Cost of preferences shares – 10%
iii) Tax rate – 50%
iv) Equity shares of the face value of ₹10 each will be issued at a premium of ₹10 per share.
v) Total investment to be raised ₹40,00,000.
vi) Expected earning before interest and tax ₹18,00,000.

From the above proposals the management wants to take advice from you for appropriate plan after computing the following:

- ✓ Earning per share
- ✓ Financial break-even-point
- ✓ Compute the EBIT range among the plans for indifference. Also indicate if any of the plans dominate. **(May 2011/ ICAI SM modified)**

Ans. **i) Computation of Earnings per Share (EPS)**

Plans	P	Q	R
	Amount (₹)	Amount (₹)	Amount (₹)
Earnings before interest & tax (EBIT)	18,00,000	18,00,000	18,00,000
Less: Interest charges	--	2,00,000	--
Earnings before tax (EBT)	18,00,000	16,00,000	18,00,000
Less: Tax @ 50%	9,00,000	8,00,000	9,00,000
Earnings after tax (EAT)	9,00,000	8,00,000	9,00,000
Less: Preference share dividend	--	--	2,00,000
Earnings available for equity shareholders	9,00,000	8,00,000	7,00,000
No. of shares	2,00,000	10,00,000	7,00,000
E.P.S. (₹)	4.5	8	7

ii) Computation of Financial Break-even points

Proposal 'P' = 0
Proposal 'Q' = ₹20,00,000 (Interest charges)
Proposal 'R' = Earnings required for payment of preference share dividend i.e.
₹ 2,00,000 ÷ 0.5 (Tax Rate) = ₹4,00,000

iii) Computation of Indifference Point between the proposals

The Indifference Point

$\frac{(EBIT-I_1)(1-T)}{E_I} = \frac{(EBIT-I_2)(1-T)}{E_2}$

	Where, EBIT = Earnings before interest and tax I_1 = Fixed charges (Interest) under Proposal 'P' I_2 = Fixed charges (Interest) under Proposal 'Q' T = Tax Rate E_1 = Number of equity shares in Proposal P E_2 = Number of equity shares in Proposal Q **Combination of Proposals** **A) Indifference Point where EBIT of proposal "P" and or proposal 'Q' is equal** $\frac{(EBIT-0)(1-0.5)}{2,00,000} = \frac{(EBIT-2,00,000)(1-0.5)}{1,00,000}$ 0.5 EBIT (1,00,000) = (0.5 EBIT – 1,00,000) 2,00,000 EBIT = ₹4,00,000 **B) Indifference Point where EBIT of proposal 'P' and proposal 'R' is equal** $\frac{(EBIT-I_1)(1-T)}{E_I} = \frac{(EBIT-I_2)(1-T)}{E_2} - Preference\ share\ dividend$ $\frac{(EBIT-0)(1-0.5)}{2,00,000} = \frac{(EBIT-0)(1-0.5)-2,00,000}{1,00,000}$ $\frac{0.5\ EBIT}{2,00,000} = \frac{0.5\ EBIT-2,00,000}{1,00,000}$ 0.25 EBIT = 0.5 EBIT – 2,00,000 EBT = 2,00,000 ÷ 0.25 = ₹8,00,000 **C) Indifference Point where EBIT of proposal 'Q' and proposal 'R' are equal** $\frac{(EBIT-2,00,000)(1-0.5)}{2,00,000} = \frac{(EBIT-0)(1-0.5)-2,00,000}{1,00,000}$ 0.5 EBIT - 1,00,000 = 0.5 EBIT – 2,00,000 There is no indifference point between proposal 'a' and proposal 'R **Analysis:** It can be seen that Financial proposal 'Q' dominates proposal 'R', since the financial break-even point of the former is only ₹2,00,000 but in case of latter, it is ₹4,00,000.
7.	Alpha Limited requires funds amounting to ₹80 lakhs for its new project. To raise the funds, the company has following two alternatives: i) To issue Equity Shares (at par) amounting to ₹60 lakhs and borrow the balance amount at the interest of 12% p.a.; or ii) To issue Equity Shares (at par) and 12% Debentures in equal proportion. The Income-tax rate is 30%. Find out the point of indifference between the available two modes of financing and state which option will be beneficial in different situations. **(November 2014/ ICAI SM modified)**
Ans.	**i)** Let the par value of equity share is be ₹100 Amount =₹ 80 Lakhs Plan I = Equity of ₹60 lakhs +Debt of ₹20 lakhs Plan II = Equity of ₹40 lakhs +Debentures of ₹40 Lakhs.

Plan I: Interest Payable on Loan
=0.12 × 20,00,000 = 2,40,000
Plan II: Interest Payable on Debentures
= 0:12 × 40,00,000 =4,80,000

Computation of Point of indifference

$$\frac{(EBIT-I_1)(1-T)}{E_I} = \frac{(EBIT-I_2)(1-T)}{E_2}$$

$$\frac{(EBIT-2{,}40{,}000)(1-0.3)}{60{,}000} = \frac{(EBIT-4{,}80{,}000)(1-0.3)}{40{,}000}$$

2 (EBIT – 2,40,000) = 3 (EBIT – 4,80,000)
2 EBIT – 4,80,000 = 3 EBIT – 14,40,000
2 EBIT – 3 EBIT = -14,40,000 + 4,80,000
EBIT = 9,60,000

ii) Earnings per share (EPS) under Two Situations for both the Plans

Situation A (EBIT is assumed to be ₹ 9,50,000)		
Particulars	**Plan I**	**Plan II**
EBIT	9,50,000	9,50,000
Less; Interest @ 12%	2,40,000	4,80,000
EBT	7,10,000	4,70,000
Less: Taxes @ 30%	2,13,000	1,41,000
EAT	4,97,000	3,29,000
No. of Equity Shares	60,000	40,000
EPS	8.28	8.23

Comment: Situation A, when expected EBIT is less than the EBIT at indifference point then, Plan I is more viable as it has higher EPS. The advantage of EPS would be available from the use of equity capital and not debt capital.

Situation A (EBIT is assumed to be ₹ 9,70,000)		
Particulars	**Plan I**	**Plan II**
EBIT	9,70,000	9,70,000
Less; Interest @ 12%	2,40,000	4,80,000
EBT	7,30,000	4,90,000
Less: Taxes @ 30%	2,19,000	1,47,000
EAT	5,11,000	3,43,000
No. of Equity Shares	60,000	40,000
EPS	8.52	8.58

Comment: Situation B, when expected EBIT is more than the EBIT at indifference point then, Plan Il is more viable as it has higher EPS. The use of fixed-cost source of funds would be beneficial from the EPS Viewpoint. In this case, financial leverage would be favourable.

(**Note:** The problem can also be computed by assuming any other figure of EBIT which is more than 9,60,000 and any other figure less than 9,60,000. Alternatively, the answer may also be based on the factors/governing the capital structure like the cost, risk, control, Principles etc.)

8. Rupa Ltd.'s EBIT is ₹5,00,000. The company has 10%, ₹20 lakh debentures. The equity capitalization rate i.e. Ke is 16%.

You are required to CALCULATE:
i) Market value of equity and value of firm
ii) Overall cost of capital.

(ICAI SM)

Ans. **i) Statement showing value of firm**

Particulars	₹
EBIT	5,00,000
Less: Interest on debentures (10% of ₹ 20,00,000)	(2,00,000)
Earnings available for equity holders i.e. Net Income (NI)	3,00,000
Equity capitalization rate (K_e)	16%
Market value of equity (S) $= \frac{NI}{K_e} = \frac{3,00,000}{16.00} \times 100$	18,75,000
Market value of debt (D)	20,00,000
Total value of firm V = S + D	38,75,000

ii) Overall cost of capital $= \frac{\text{EBIT}}{\text{Value of firm}} = \frac{₹\ 5,00,000}{₹\ 38,75,000} = 12.90\%$

9. There are two company N Ltd. and M Ltd., having same earnings before interest and taxes i.e. EBIT of ₹20,000. M Ltd. is a levered company having a debt of ₹1,00,000 @ 7% rate of interest. The cost of equity of N Ltd. is 10% and of M Ltd. is 11.50%.
COMPUTE how arbitrage process will be carried on?

(ICAI SM)

Ans. **When value of levered firm is more than the value of unlevered firm:**

Particulars	Company	
	M Ltd.	N Ltd.
EBIT (NOI)	₹ 20,000	₹ 20,000
Debt (D)	₹ 1,00,000	---
K_e	11.50%	10%
K_d	7%	---

Value of equity (S) $= \frac{\text{NOI} - \text{Interest}}{\text{Cost of equity}}$

$S_M = \frac{20,000 - 7,000}{11.50\%} = ₹\ 1,13,043$

$S_N = \frac{20,000 - 7,000}{11.50\%} = ₹\ 1,13,043$

VM = 1,13,043 + 1,00,000 {V = S + D} = ₹ 2,13,043
VN = ₹ 2,00,000

Arbitrage Process:
If you have 10% shares of M Ltd., your value of investment in equity shares is 10% of ₹1,13,043 i.e. ₹ 11,304.30 and return will be 10% of (₹20,000 – ₹7,000) = ₹ 1,300.

Alternate Strategy will be:

Sell your 10% share of levered firm for ₹ 11,304.30 and borrow 10% of levered firms debt i.e. 10% of ₹ 1,00,000 and invest the money i.e. 10% in unlevered firms stock:

Total resources /Money we have = ₹11,304.30 + ₹10,000 = ₹21,304.3 and you invest 10% of ₹2,00,000 = ₹ 20,000

Surplus cash available with you is = ₹21,304.3 – ₹20,000 = ₹ 1,304.3

Your return = 10% EBIT of unlevered firm – Interest to be paid on borrowed funds i.e. = 10% of ₹ 20,000 – 7% of ₹ 10,000 = ₹2,000 – ₹700 = ₹1,300 i.e. your return is same i.e. ₹ 1,300 which you are getting from N Ltd. before investing in M Ltd. but still you have ₹ 1,304.3 excess money available with you. Hence, you are better off by doing arbitrage.

In the above example you have not invested entire amount received from "sale of shares of levered company plus amount borrowed". You maintained same level of earning and reduced investment. Alternatively, you could have invested entire amount in unlevered company. In that case your annual earnings would have increased. An example for the same is as follows:

10. Blue Ltd., an all equity financed company is considering the repurchase of ₹ 275 lakhs equity shares and to replace it with 15% debentures of the same amount. Current market value of the company is ₹ 1,750 lakhs with its cost of capital of 20%. The company's Earnings before Interest and Taxes (EBIT) are expected to remain constant in future years. The company also has a policy of distributing its entire earnings as dividend.

Assuming the corporate tax rate as 30%, you are required to CALCULATE the impact on the following on account of the change in the capital structure as per Modigliani and Miller (MM) Approach:

i) Market value of the company
ii) Overall Cost of capital
iii) Cost of equity **(November 2021 RTP/ May 2012 RTP)**

Ans. **Workings:**

$$\text{Market Value of Equity} = \frac{\text{Net income (NI) for equity holders}}{K_e}$$

$$₹\ 1{,}750 \text{ lakhs} = \frac{\text{Net income (NI) for equity holders}}{K_e}$$

Net Income to equity holders/EAT = ₹ 350 lakhs

$$\text{Therefore, } \frac{EAT}{(1-t)} = \frac{₹\ 350 \text{ lakhs}}{(1-0.3)} = ₹\ 500 \text{ lakhs}$$

Income Statement

Particulars	All Equity (₹ In lakhs)	Equity & Debt (₹ In lakhs)
EBIT (as calculated above)	500	500
Interest on ₹ 275 lakhs @ 15%	-	41.25
EBT	500	458.75
Tax @ 30%	150	137.63
Income available to equity holders	**350**	**321.12**

i) Market value of the company

Market value of levered firm = Value of unlevered firm + Tax Advantage
= ₹1,750 lakhs + (₹275 lakhs ×0.3)
= ₹1,832.5 lakhs

Change in market value of the company = ₹ 1,832.5 lakhs – ₹ 1,750 lakhs
= ₹ 82.50 lakhs

The impact is that the market value of the company has increased by ₹82.50 lakhs due to replacement of equity with debt.

ii) Overall Cost of Capital

Market Value of Equity = Market value of levered firm - Equity repurchased
= ₹ 1,832.50 lakhs – ₹ 275 lakhs = ₹ 1,557.50 lakhs
Cost of Equity (K_e) = (Net Income to equity holders / Market value of equity) × 100
= (₹ 321.12 lakhs / ₹ 1,557.50 lakhs) × 100 = 20.62%
Cost of debt (K_d) = I (1 - t) = 15 (1 - 0.3) = 10.50%

Components	Amount (₹ In lakhs)	Cost of Capital %	Weight	WACC (Ko) %
Equity Debt	1,557.50	20.62	0.85	17.53
	275.00	10.50	0.15	1.58
	1,832.50		1	19.11

The impact is that the Overall Cost of Capital or K_o has fallen by 0.89% (20% - 19.11%) due to the benefit of tax relief on debt interest payment.

iii) Cost of Equity

The impact is that cost of equity has risen by 0.62% (20.62% - 20%) due to the presence of financial risk i.e. introduction of debt in capital structure.

Note: Cost of Capital and Cost of equity can also be calculated with the help of following formulas, though there will be no change in the final answers.

Cost of Capital (K_o) = K_{eu} [1 – (t × L)]

Where,

K_{eu} = Cost of equity in an unlevered company

t = Tax rate

$L = \frac{\text{Debt}}{\text{Debt+Equity}}$

So, $K_o = 0.20\left[1 - \left(0.3 \times \frac{₹275 \text{ lakhs}}{₹ 1,832.5 \text{ lakhs}}\right)\right] = 0.191$ or 19.10% (approx.)

Cost of Equity $(K_e) = K_{eu} + (K_{eu} - K_d)\frac{\text{Debt}\ (1-t)}{\text{Equity}}$

Where,

K_{eu} = Cost of equity in an unlevered company

Kd = Cost of debt

t = Tax rate

So, $K_e = 0.20 + \left((0.20 - 0.15) \times \frac{₹275 \text{ lakhs}}{₹1,557.5 \text{ lakhs}}\right) = 0.2062$ or 20.62%

11. HN Limited is considering total investment of ₹20 lakhs. You are required to CALCULATE the level of earnings before interest and tax (EBIT) at which the EPS indifference point between the following financing alternatives will occur:

Equity share capital of ₹12,00,000 and 14% debentures of ₹8,00,000.

Or

Equity share capital of ₹8,00,000, 16% preference share capital of ₹4,00,000 and 14% debentures of ₹8,00,000.

Assume the corporate tax rate is 30% and par value of equity share is ₹10 in each case.

(MTP March 2021/ May 2020 RTP)

Ans.

Computation of level of earnings before interest and tax (EBIT)
In case alternative (i) is accepted, then the EPS of the firm would be:

$$EPS_{Alternative\ (i)} = \frac{(EBIT - Interest)(1 - tax\ rate)}{No.of\ equity\ shares} = \frac{(EBIT - 0.14 \times 8,00,000)(1 - 0.3)}{1,20,000\ shares}$$

In case the alternative (ii) is accepted, then the EPS of the firm would be

$$EPS_{Alternative\ (ii)} = \frac{(EBIT - Interest)(1 - tax\ rate) - PD}{No.of\ equity\ shares}$$
$$= \frac{(EBIT - 0.14 \times 8,00,000)(1 - 0.3) - 0.16 \times 4,00,000}{80,000\ shares}$$

In order to determine the indifference level of EBIT, the EPS under the two alternative plans should be equated as follows:

$$\frac{(EBIT - 0.14 \times 8,00,000)(1 - 0.3)}{1,20,000\ shares} = \frac{(EBIT - 0.14 \times 8,00,000)(1 - 0.3) - 0.16 \times 4,00,000}{80,000\ shares}$$

Or, $\frac{0.7\ EBIT - 78,000}{1,20,000} = \frac{0.7\ EBIT - 1,42,000}{80,000}$

Or, 1.40 EBIT – ₹ 1,56,800 = 2.10 EBIT – ₹ 4,27,200
Or, 0.70 EBIT = ₹ 2,70,400

Or, EBIT = $\frac{2,70,400}{0.7}$
Or, EBIT = ₹ 3,86,285.71 (approx..)

12.

RM Steels Limited requires ₹10,00,000 for construction of a new plant.
It is considering three financial plans:

i) The company may issue 1,00,000 ordinary shares at ₹10 per share;
ii) The company may issue 50,000 ordinary shares at ₹10 per share and 5000 debentures of ₹100 denominations bearing a 8 per cent rate of interest, and
iii) The company may issue 50,000 ordinary shares at ₹10 per share and 5,000 preference shares at ₹100 per share bearing a 8 per cent rate of dividend.

If RM Steels Limited's earnings before interest and taxes are ₹20,000; ₹40,000; ₹80,000; ₹1,20,000 and ₹2,00,000, you are required to compute the earnings per share under each of the three financial plans?
Which alternative would you recommend for RM Steels and why? Tax rate is 50%.

(May 2019)

Ans.

i) Computation of EPS under three financial plans
Plan i): equity Financing:

Particulars	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	20,000	40,000	80,000	1,20,000	2,00,000
Interest	0	0	0	0	0
EBT	20,000	40,000	80,000	1,20,000	2,00,000
Less: **Tax@50%**	10,000	20,000	40,000	60,000	1,00,000
PAT	10,000	20,000	40,000	60,000	1,00,000
No. of equity shares	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
EPS	**0.10**	**0.20**	**0.40**	**0.60**	**1.00**

Plan ii): Debt Equity Mix:

Particulars	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	20,000	40,000	80,000	1,20,000	2,00,000
Less: **Interest**	40,000	40,000	40,000	40,000	40,000
	(20,000)	0	40,000	80,000	1,60,000
Less: **Tax@50%**	10,000*	0	20,000	40,000	80,000
PAT	(10,000)	0	20,000	40,000	80,000
No. of equity share	50,000	50,000	50,000	50,000	50,000
EPS	**(0.20)**	**0**	**0.40**	**0.80**	**1.60**

*The company can set off losses against the overall business profit or may carry forward it to next financial year.

Plan iii) Preference Share-Equity Mix:

Particulars	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	20,000	40,000	80,000	1,20,000	2,00,000
Less: **Interest**	0	0	0	0	0
EBT	20,000	40,000	80,000	1,20,000	2,00,000
Less: **Tax@50%**	10,000	20,000	40,000	60,000	1,00,000
EAT	10,000	20,000	40,000	60,000	1,00,000
Less: Preference dividend	40,000*	40,000*	40,000	40,000	40,000
PAT after preference dividend	(30,000)	(20,000)	0	20,000	60,000
No. of equity shares	50,000	50,000	50,000	50,000	50,000
EPS	**(0.60)**	**(0.40)**	**0**	**0.40**	**1.20**

*In case of Preference shares, the company has to pay dividend to preference shareholders. Here, preference shares are assumed to be cumulative.

ii)

From the above EPS Calculations tables under the three financial plans we can see that when EBIT is ₹80,000 or more, Plan (ii) i.e., Debt-equity mix is preferable over the Plan (i) and Plan (ii), as rate of EPS is more under this plan.

On the other hand an EBIT of less than ₹80,000, Plan (i), Equity financing has higher EPS than plan (ii): and plan (iii). Plan (iii): Preference Share-Equity Mix is not acceptable at any level of EBIT, as EPS under this plan is lower.

The choice of the financing plan will depend on the performance of the company and other macro-economic conditions. If the company is expected to have higher operating profit plan (ii): Debt - Equity mix is preferable. Moreover, debt financing gives more benefit due to availability of tax shield.

13. Zordon Ltd. has net operating income of ₹5,00,000 and total capitalization of ₹50,00,000 during the current year. The company is contemplating to introduce debt financing in capital structure and has various options for the same. The following information is available at different levels of debt value:

Debt value (₹)	Interest rate (%)	Equity capitalization rate (%)
0	-	10.00
5,00,000	6.0	10.50
10,00,000	6.0	11.00
15,00,000	6.2	11.30
20,00,000	7.0	12.40
25,00,000	7.5	13.50
30,00,000	8.0	16.00

Assuming no tax and that the firm always maintains books at book values, you are REQUIRED to calculate:

i) Amount of debt to be employed by firm as per traditional approach.

ii) Equity capitalization rate, if MM approach is followed.

(May 2021 RTP)

Ans.

i) Amount of debt to be employed by firm as per traditional approach

Calculation of Equity, W_d and W_e

Total Capital (₹) (a)	Debt (₹) (b)	W_d (b)/(a)	Equity value (₹) (c) = (a) - (b)	W_e (c)/(a)
50,00,000	0	-	50,00,000	1.0
50,00,000	5,00,000	0.1	45,00,000	0.9
50,00,000	10,00,000	0.2	40,00,000	0.8
50,00,000	15,00,000	0.3	35,00,000	0.7
50,00,000	20,00,000	0.4	30,00,000	0.6
50,00,000	25,00,000	0.5	25,00,000	0.5
50,00,000	30,00,000	0.6	20,00,000	0.4

Statement of Weighted Average Cost of Capital (WACC)

K_e (1)	W_e (2)	K_d (3)	W_d (4)	$K_e W_e$ (5) = (1) x (2)	$K_d W_d$ (6) = (3) x (4)	K_o (7) = (5) + (6)
0.100	1.0	-	-	0.100	-	0.100
0.105	0.9	0.060	0.1	0.095	0.006	0.101
0.110	0.8	0.060	0.2	0.088	0.012	0.100
0.113	0.7	0.062	0.3	0.079	0.019	0.098
0.124	0.6	0.070	0.4	0.074	0.028	0.102
0.135	0.5	0.075	0.5	0.068	0.038	0.106
0.160	0.4	0.080	0.6	0.064	0.048	0.112

So, amount of Debt to be employed = ₹ 15,00,000 as WACC is minimum at this level of debt i.e. 9.8%.

ii) As per MM approach, cost of the capital (K_o) remains constant and cost of equity increases linearly with debt.

$$\text{Value of a firm} = \frac{\text{Net Operating Income (NOI)}}{K_0}$$

$$K_0 = \frac{₹\ 5,00,000}{₹\ 50,00,000} = 10\%$$

Statement of Equity Capitalization rate (k_e) under MM approach

Debt (₹)	Equity (₹)	Debt/Equity	Ko	Kd	$K_o - K_d$	$K_e = K_o + (K_o - K_d)$ Debt / Equity
(1)	(2)	(3) = (1)/ (2)	(4)	(5)	(6) = (4) -(5)	(7) = (4) + (6) × (3)
0	50,00,000	0	0.10	-	0.100	0.100
5,00,000	45,00,000	0.11	0.10	0.060	0.040	0.104
10,00,000	40,00,000	0.25	0.10	0.060	0.040	0.110
15,00,000	35,00,000	0.43	0.10	0.062	0.038	0.116
20,00,000	30,00,000	0.67	0.10	0.070	0.030	0.120
25,00,000	25,00,000	1.00	0.10	0.075	0.025	0.125
30,00,000	20,00,000	1.50	0.10	0.080	0.020	0.130

14. DETERMINE the optimal capital structure of a company from the followinginformation:

Options	Cost of Debt(Kd) in %	Cost of Equity (Ke) in %	Percentage of Debt on totalvalue (Debt +Equity)
1	11	13.0	0.0
2	11	13.0	0.1
3	11.6	14.0	0.2
4	12.0	15.0	0.3
5	13.0	16.0	0.4
6	15.0	18.0	0.5
7	18.0	20.0	0.6

(ICAI SM)

Ans. Note that the ratio given in this question is not debt to equity ratio. Rather it is the debt to value ratio. Therefore, if the ratio is 0.6, it means that capital employed comprises 60% debt and 40% equity.

$$K_0 = \frac{K_d \times D + K_e \times S}{D + S}$$

In this question total of weight is equal to 1 in all cases, hence we need not to divide by it.

1) K_0 = 11% × 0 + 13% × 1 = 13%
2) K_0 = 11% × 0.1 + 13% ×0.9 = 12.8%
3) K_0 = 11.6% × 0.2 + 14% × 0.8 = 13.52%
4) K_0 = 12% × 0.3 + 15% × 0.7 = 14.1%
5) K_0 = 13% × 0.4 + 16% × 0.6 = 14.8%
6) K_0 = 15% × 0.5 + 18% × 0.5 = 16.5%
7) K_0 = 18% × 0.6 + 20% × 0.4 = 18.8%

Decision: 2nd option is the best because it has lowest WACC.

15. Amita Ltd's operating income (EBIT) is ₹ 5,00,000. The firm's cost of debt is 10% and currently the firm employs ₹ 15,00,000 of debt. The overall cost of capital of the firm is 15%. You are required to CALCULATE:

i) Total value of the firm.
ii) Cost of equity.

(ICAI SM)

Ans.

i) Statement showing value of the firm

Particulars	₹
Net operating income/EBIT	5,00,000
Less: Interest on debentures (10% of ₹ 15,00,000)	(1,50,000)
Earnings available for equity holders	3,50,000
Total cost of capital (K_0) (given)	15%
Value of the firm V= EBIT / Ko = ₹ 5,00,000 / 0.15	33,33,333

ii) Calculation of cost of equity

Particulars	₹
Market value of debt (D)	15,00,000
Market value of equity (s) S = V – D = ₹33,33,333 – ₹15,00,000	18,33,333

$$K_e = \frac{\text{Earnings available for equity holders}}{\text{Value of equity(S)}}$$

$$\text{Or, } = \frac{\text{EBIT– Interest paid on debt}}{\text{Market value of equity}} = \frac{₹\ 3,50,000}{₹\ 18,33,333} = 19.09\%$$

Or

$$K_0 = K_e\left(\frac{S}{V}\right) + K_d\left(\frac{D}{V}\right)$$

$$K_e = K_0\left(\frac{V}{S}\right) - K_d\left(\frac{D}{V}\right)$$

$$= 0.15\ \left(\frac{33,33,333}{18,33,333}\right) - 0.10\left(\frac{15,00,000}{18,33,333}\right)$$

$$= \frac{1}{18,33,333}(0.15 \times 33,33,333) - 0.10\left(\frac{15,00,000}{18,33,333}\right)$$

$$= \frac{1}{18,33,333}(0.15 \times 33,33,333) - (0.10 \times 15,00,000)$$

$$= \frac{1}{18,33,333}\ 5,00,000 - 1,50,000 = 19.09\%$$

16. Alpha Limited and Beta Limited are identical except for capital structures. Alpha Ltd. has 50 per cent debt and 50 per cent equity, whereas Beta Ltd. has 20 per cent debt and 80 per cent equity. (All percentages are in market-value terms). The borrowing rate for both companies is 8 per cent in a no-tax world, and capital markets are assumed to be perfect.

a) i) If you own 2 per cent of the shares of Alpha Ltd., DETERMINE your return if the company has net operating income of ₹3,60,000 and the overall capitalisation rate of the company, K_0 is 18 per cent?

ii) CALCULATE the implied required rate of return on equity?

b) Beta Ltd. has the same net operating income as Alpha Ltd. (i) DETERMINE the implied required equity return of Beta Ltd.? (ii) ANALYSE why does it differ from that of Alpha Ltd.?

(ICAI SM)

Ans.

a) Value of the Alpha Ltd. $= \frac{NOI}{K_o} = \frac{₹\ 3,60,000}{18\%} = ₹\ 20,00,000$

i) Return on Shares on Alpha Ltd.

Particulars	₹
Value of the company	20,00,000
Market value of debt (50%)	10,00,000
Market value of shares (50%)	10,00,000

Particulars	₹
Net operating income	3,60,000
Interest on debt (8% × ₹10,00,000)	80,000
Earnings available to shareholders	2,80,000
Return on 2% shares (2% × ₹2,80,000)	5,600

ii) Implied required rate of return on equity $= \frac{₹\ 2,80,000}{₹\ 10,00,000} = 28\%$

b) Calculation of Implied rate of return

Particulars	₹
Total value of company	20,00,000
Market value of debt (20% × ₹20,00,000)	4,00,000
Market value of equity (80% × ₹20,00,000)	16,00,000
	₹
Net operating income	3,60,000
Interest on debt (8%× ₹4,00,000)	32,000
Earnings available to shareholders	3,28,000

Implied required rate of return on equity $= \frac{₹\ 3,28,000}{₹\ 16,00,000} = 20.5\%$

It is lower than the Alpha Ltd. because Beta Ltd. uses less debt in its capital structure. As the equity capitalisation is a linear function of the debt-to-equity ratio when we use the net operating income approach, the decline in required equity return offsets exactly the disadvantage of not employing so much in the way of "cheaper" debt funds.

17. Following data is available in respect of two companies having same business risk: Capital employed = ₹ 2,00,000, EBIT = ₹ 30,000

K_e = 12.5%

Sources	Levered Company (₹)	Unlevered Company (₹)
Debt (@10%)	1,00,000	Nil
Equity	1,00,000	200000

Investor is holding 15% shares in levered company. CALCULATE increase in annual earnings of investor if he switches his holding from Levered to Unlevered company.

(ICAI SM)

Ans.

1) Valuation of firms

Particulars	Levered Firm (₹)	Unlevered Firm (₹)
EBIT	30,000	30,000
Less: Interest	10,000	Nil

Earnings available to Equity Shareholder/K_e	20,000	30,000
	12.5%	12.5%
Value of Equity	1,60,000	2,40,000
Debt	1,00,000	Nil
Value of Firm	2,60,000	2,40,000

Value of Levered company is more than that of unlevered company. Therefore investor will sell his shares in levered company and buy shares in unlevered company. To maintain the level of risk he will borrow proportionate amount and invest that amount also in shares of unlevered company.

2) Investment & Borrowings

Sell shares in Levered company (1,60,000×15%)	24,000
Borrow money (1,00,000 ×15%)	15,000
Buy shares in Unlevered company	39,000

3) Change in Return

Income from shares in Unlevered company (39,000 × 12.5%)	4,875
Less: interest on loan (15,000 × 10%)	1,500
Net Income from unlevered firm	3,375
Income from Levered firm (24000 × 12.5%)	3,000
Incremental Income due to arbitrage	375

18. Following data is available in respect of two companies having same business risk: Capital employed = ₹ 2,00,000, EBIT = ₹ 30,000

Sources	Levered Company (₹)	Unlevered Company (₹)
Debt (@10%)	1,00,000	Nil
Equity	1,00,000	200000
Ke	20 %	12.5%

Investor is holding 15% shares in Unlevered company. CALCULATE increase in annual earnings of investor if he switches his holding from Unlevered to Levered Company.

(ICAI SM)

Ans. **1) Valuation of firms**

Particulars	Levered Firm (₹)	Unlevered Firm (₹)
EBIT	30,000	30,000
Less: interest	10,000	Nil
Earnings available to Equity Shareholder/K_e	20,000	30,000
	20%	12.5%
Value of Equity	1,00,000	2,40,000
Debt	1,00,000	Nil
Value of Firm	2,00,000	2,40,000

Value of Unlevered company is more than that of Levered company therefore, investor will sell his shares in unlevered company and buy shares in levered company. Market value of Debt and Equity of Levered company are in the ratio of ₹ 1,00,000: ₹1,00,000, i.e., 1:1. To maintain the level of risk he will lend proportionate amount (50%) and invest balance amount (50%) in shares of Levered company.

19. Suppose that a firm has an all-equity capital structure consisting of 1,00,000 ordinary shares of ₹10 per share. The firm wants to raise ₹2,50,000 to finance its investments and is considering three alternative methods of financing – (i) to issue 25,000 ordinary shares at ₹10 each, (ii) to borrow ₹2,50,000 at 8 per cent rate of interest, (iii) to issue 2,500 preference shares of ₹100 each at an 8 per cent rate of dividend.
If the firm's earnings before interest and taxes after additional investment are ₹ 3,12,500 and the tax rate is 50 per cent, FIND the effect on the earnings per share under the three financing alternatives.

(ICAI SM)

Ans. **EPS under alternative financing plans:**

Particulars	Equity Financing (₹)	Debt Financing (₹)	Preference Financing (₹)
EBIT	3,12,500	3,12,500	3,12,500
Less: Interest	0	20,000	0
PBT	3,12,500	2,92,500	3,12,500
Less: Taxes 50%	1,56,250	1,46,250	1,56,250
PAT	1,56,250	1,46,250	1,56,250
Less: Preference dividend	0	0	20,000
Earnings available to ordinary shareholders	1,56,250	1,46,250	136,250
Shares outstanding	1,25,000	1,00,000	1,00,000
EPS	1.25	1.46	1.36

The firm is able to maximize the earnings per share when it uses debt financing. Though the rate of preference dividend is equal to the rate of interest, EPS is high in case of debt financing because interest charges are tax deductible while preference dividends are not. With increasing levels of EBIT, EPS will increase at a faster rate with a high degree of leverage.
We know that market price per share is equal to earning per share multiplied by price earning (PE) ratio. If PE ratio is same for all three plans then the plan which has highest EPS will also have highest MPS and it will be selected. On the other hand if PE ratio for equity plan is 10 times, for debt plan it is 8 times and for preference plan it is 7 times then:

EPS	1.25	1.46	1.36
PE ratio	x10	x8	x7
MPS	12.50	11.68	9.52

Now despite lower EPS, equity plan will be selected because it has highest MPS.
However, if a company is not able to earn a rate of return on its assets higher than the interest rate (or the preference dividend rate), debt (or preference financing) will have an adverse impact on EPS. Suppose the firm in illustration above has an EBIT of ₹75,000/-, then EPS under different methods will be as follows:

EPS under alternative financing methods: Unfavourable EBIT:

Particulars	Equity Financing (₹)	Debt Financing (₹)	Preference Financing (₹)
EBIT	75,000	75,000	75,000
Less: Interest	0	20,000	0
PBT	75,000	55,000	75,000

Less: Taxes 50%	37,500	27,500	37,500
PAT	37,500	27,500	37,500
Less: Preference dividend	0	0	20,000
Earnings available to ordinary shareholders	37,500	27,500	17,500
Shares outstanding	1,25,000	1,00,000	1,00,000
EPS	0.30	0.275	0.175

It is obvious that under unfavourable conditions, i.e. when the rate of return on the total assets is less than the cost of debt, the earnings per share will fall with the degree of leverage.

20. Best of Luck Ltd., a profit-making company, has a paid-up capital of ₹ 100 lakhs consisting of 10 lakhs ordinary shares of ₹10 each. Currently, it is earning an annual pre-tax profit of ₹60 lakhs. The company's shares are listed and are quoted in the range of ₹50 to ₹80. The management wants to diversify production and has approved a project which will cost ₹50 lakhs and which is expected to yield a pre-tax income of ₹40 lakhs per annum. To raise this additional capital, the following options are under consideration of the management:

1) To issue equity share capital for the entire additional amount. It is expected that the new shares (face value of ₹10) can be sold at a premium of ₹15.
2) To issue 16% non-convertible debentures of ₹100 each for the entire amount.
3) To issue equity capital for ₹25 lakhs (face value of ₹10) and 16% non- convertible debentures for the balance amount. In this case, the company can issue shares at a premium of ₹40 each.

CALCULATE the additional capital that can be raised, keeping in mind that the management wants to maximise the earnings per share to maintain its goodwill. The company is paying income tax at 50%. **(ICAI SM)**

Ans. **Calculation of Earnings per share under the three options:**

Particulars	**Options**		
	Option I: Issue Equity shares only	**Option II: Issue 16% Debentures only**	**Option III: Issue Equity Shares and 16% Debentures of equal amount**
Number of Equity Shares (nos):			
- Existing	10,00,000	10,00,000	10,00,000
- Newly issued	2,00,000 $\left(\frac{₹\ 50,00,000}{₹\ (10+15)}\right)$	--	50,000 $\left(\frac{₹\ 25,00,000}{₹\ (10+40)}\right)$
Total	12,00,000	10,00,000	10,50,000
16% Debentures ₹	---	50,00,000	25,00,000

Particulars	**₹**	**₹**	**₹**
Profit Before Interest and Tax:			
- Existing pre-tax profit	60,00,000	60,00,000	60,00,000
- From new projects	40,00,000	40,00,000	40,00,000
	1,00,00,000	1,00,00,000	1,00,00,000

	Less: Interest on 16% Debentures	---	8,00,000 (16%× ₹50,00,000)	4,00,000 (16% × ₹25,00,000)
	Profit Before Tax	1,00,00,000	92,00,000	96,00,000
	Tax at 50%	50,00,000	46,00,000	48,00,000
	Profit After Tax	50,00,000	46,00,000	48,00,000
	Earnings Per Share (EPS) $\left(\frac{\text{PAT}}{\text{No. of Shares}}\right)$	4.17 $\left(\frac{₹\ 50,00,000}{₹\ 12,00,000}\right)$	4.60 $\left(\frac{₹\ 46,00,000}{₹\ 10,00,000}\right)$	4.57 $\left(\frac{₹\ 48,00,000}{₹\ 10,50,000}\right)$

Advise: Option II i.e. issue of 16% Debentures is most suitable to maximize the earnings per share.

21. **The following data are presented in respect of Quality Automation Ltd.:**

Particulars	Amount (₹)
Profit before interest and tax	52,00,000
Less: Interest on debentures @ 12%	12,00,000
Profit before tax	40,00,000
Less: Income tax @ 50%	20,00,000
Profit After tax	20,00,000
No. of equity shares (of ₹ 10 each)	8,00,000
EPS	2.5
P/E Ratio	10
Market price per share	25

The company is planning to start a new project requiring a total capital outlay of ₹40,00,000. You are informed that a debt equity ratio (D/D+E) higher than 35% push the K_e up to 12.5% means reduce PE ratio to 8 and rises the interest rate on additional amount borrowed at 14%. FIND OUT the probable price of share if:

i) The additional funds are raised as a loan.

ii) The amount is raised by issuing equity shares.

(Note: Retained earnings of the company is ₹1.2 crore) **(ICAI SM)**

Ans. In this question EBIT after proposed extension is not given. Therefore, we can assume that existing return on capital employed will be maintained.

Working notes:

1) Return on Capital Employed $= \frac{\textbf{EBIT}}{\textbf{Capital Employed}} = \frac{₹\ \textbf{52,00,000}}{₹\ \textbf{3,00,00,000}} = \textbf{17.33}\%$

Capital Employed = Debt + Equity

= 1,00,00,000 + (80,00,000 + 1,20,00,000) = ₹3,00,00,000

2) Proposed EBIT = Proposed Capital Employed × Return on capital employed

= (3,00,00,000 + 40,00,000) × 17.33% = ₹58,92,200

(if you take return on capital employed in full digits then accurate EBIT will be 58,93,333)

3) Debt Equity ratio $= \frac{Debt}{Debt\ Equity}$

<u>Option1: Loan option</u>

Debt = 1,00,00,000 + 40,00,000 = ₹1,40,00,000

Equity = ₹ 2,00,00,000

Debt Equity ratio $= \frac{1.4\ cr.}{1.4\ cr.+2\ cr.} = 41.18\%$

Debt equity ratio has crossed the limit of 35% hence PE ratio in this case will be 8 times and additional borrowing will be at the rate of 14%

Option2: Equity option

Debt = 1,00,00,000

Equity = 2,00,00,000 + 40,00,000 = ₹2,40,00,000

Debt Equity ratio $= \frac{1\ cr.}{1\ cr.+2.4\ cr.} = 29.41\%$

Debt equity ratio has not crossed the limit of 35% hence PE ratio in this case will remain at 10 times.

4) Number of equity shares to be issued in case of equity option@ ₹25 per share = ₹40,00,000 / ₹25 = 1,60,000

Calculation of EPS and MPS under two financial options Particulars

Particulars	Financial Options	
	Option I	Option II
	14% additional loan of 40,00,000(₹)	8,00,000equity share @ ₹10 i.e 1,60,000 equity shares @25(₹)
Profit before interest and Tax (PBIT))	58,92,200	58,92,200
Less: Interest on old debentures @12%	12,00,000	12,00,000
Less: Interest on additional loan(new) @ 14% on ₹ 40,00,000	5,60,000	Nil
Profit before tax	41,32,200	46,92,000
Less: Taxes @ 50%	20,66,100	23,46,100
Earnings for equity shareholders (EAT/Profit after tax)	20,66,100	23,46,100
Number of Equity Shares	8,00,000	9,60,000
Earnings per Share (EPS)	2.58	2.44
Price/ Earnings ratio	8	10
Probable per share (MPS)	20.66	24.44

Decision: Though loan option has higher EPS but equity option has higher MPS therefore company should raise additional fund through equity option.

22. Yoyo Limited presently has ₹36,00,000 in debt outstanding bearing an interest rate of 10 per cent. It wishes to finance a ₹40,00,000 expansion programme and is considering three alternatives: additional debt at 12 percent interest, preference shares with an 11 per cent dividend, and the issue of equity shares at ₹16 per share. The company presently has 8,00,000 shares outstanding and is in a 40 per cent tax bracket.

a) If earnings before interest and taxes are presently ₹15,00,000, DETERMINE earnings per share for the three alternatives, assuming no immediate increase in profitability?

b) ANALYSE which alternative do you prefer? COMPUTE how much would EBIT need to increase before the next alternative would be best? **(ICAI SM)**

Ans. **a)**

Particulars	Alternatives		
	Alternative–I: Take additional Debt	Alternative-II: Issue 11% Preference Shares	Alternative-III: Issue further Equity Shares
	₹	₹	₹
EBIT	15,00,000	15,00,000	15,00,000
Interest on Debts:			
- on existing debt	(3,60,000)	(3,60,000)	(3,60,000)

@10%			
- on new debt @ 12%	(4,80,000)	---	---
Profit before taxes	6,60,000	11,40,000	11,40,000
Taxes @ 40%	(2,64,000)	(4,56,000)	(4,56,000)
Profit after taxes	3,96,000	6,84,000	6,84,000
Preference shares dividend	---	(4,40,000)	---
Earnings available to equity Shareholders	3,96,000	2,44,000	6,84,000
Number of shares	8,00,000	8,00,000	10,50,000
Earnings per share	0.495	0.305	0.651

b) For the present EBIT level, equity shares are clearly preferable. EBIT would need to increase by ₹2,376 - ₹1,500 = ₹876 before an indifference point with debt is reached. One would want to be comfortably above this indifference point before a strong case for debt should be made. The lower the probability that actual EBIT will fall below the indifference point, the stronger the case that can be made for debt, all other things remain the same.

23. One-third of the total market value of Sanghmani Limited consists of loan stock, which has a cost of 10 per cent. Another company, Samsui Limited, is identical in every respect to Sanghmani Limited, except that its capital structure is all-equity, and it's cost of equity is 16 per cent. According toModigliani and Miller, if we ignored taxation and tax relief on debt capital, COMPUTE the cost of equity of Sanghmani Limited?

(ICAI SM)

Ans. Here we are assuming that MM Approach 1958: Without tax, where capital structure has no relevance with the value of company and accordingly overall cost of capital of both levered as well as unlevered company is same. Therefore, the two companies should have similar WACCs. Because Samsui Limited is all-equity financed, its WACC is the same as its cost of equityfinance, i.e., 16 per cent. It follows that Sanghmani Limited should have WACC equal to 16 per cent also.

Therefore, Cost of equity in Sanghmani Ltd. (levered company) will be calculated as follows:

$K_0 = \frac{2}{3} \times K_e + \frac{1}{3} \times K_d = 16\%$ (i.e. equal to WACC of Samsui Ltd.)

Or, $16\% = \frac{2}{3} \times K_e + \frac{1}{3} \times 10\%$ $\quad Or, K_e = 19$

24. The following data relates to two companies belonging to the same risk class:

Particulars	Bee Ltd.	Cee Ltd.
12% Debt	₹ 27,00,000	-
Equity Capitalization Rate	-	18
Expected Net Operating Income	₹ 9,00,000	₹ 9,00,000

You are required to:

1) DETERMINE the total market value, Equity capitalization rate and weighted average cost of capital for each company assuming no taxes as per M.M. Approach.
2) DETERMINE the total market value, Equity capitalization rate and weighted average cost of capital for each company assuming 40% taxes as per M.M. Approach.

(May 2022 RTP)

Ans.

1) Assuming no tax as per MM Approach.

Calculation of Value of Firms 'Bee Ltd.' and 'Cee Ltd' according to MM Hypothesis

Market Value of 'Cee Ltd' [Unlevered(u)]

Total Value of Unlevered Firm (V_u) = [NOI/k_e] = 9,00,000/0.18 = ₹ 50,00,000

K_e of Unlevered Firm (given) = 0.18

K_0 of Unlevered Firm (Same as above = k_e as there is no debt) = 0.18

Market Value of 'Bee Ltd' [Levered Firm (I)]

Total Value of Levered Firm (V_L) = V_u + (Debt× Nil)
= ₹ 50,00,000 + (27,00,000 × nil)
= ₹ 50,00,000

Computation of Equity Capitalization Rate and Weighted Average Cost of Capital (WACC)

Particulars	Bee Ltd.
Net Operating Income (NOI)	9,00,000
Less: Interest on Debt (I)	3,24,000
Earnings of Equity Shareholders (NI)	5,76,000
Overall Capitalization Rate (K_0)	0.18
Total Value of Firm (V = NOI/ K_0)	50,00,000
Less: Market Value of Debt	27,00,000
Market Value of Equity (S)	23,00,000
Equity Capitalization Rate [K_e = NI /S]	0.2504
Weighted Average Cost of Capital (K_0)*	0.18
K_0 = (K_e ×S/V) + (K_d ×D/V)	

***Computation of WACC Bee Ltd.**

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	23,00,000	0.46	0.2504	0.1152
Debt	27,00,000	0.54	0.12*	0.0648
Total	50,00,000			0.18

*K_d = 12% (since there is no tax)

WACC = 18%

2) Assuming 40% taxes as per MM Approach

Calculation of Value of Firms 'Bee Ltd.' and 'Cee Ltd' according to MM Hypothesis

Market Value of 'Cee Ltd' [Unlevered(u)]

Total Value of unlevered Firm (V_u) = [NOI (1 - t)/K_e] = 9,00,000 (1 – 0.40)] / 0.18
= ₹ 30,00,000

K_e of unlevered Firm (given) = 0.18

K_0 of unlevered Firm (Same as above = K_e as there is no debt) = 0.18

Market Value of 'Bee Ltd' [Levered Firm (I)]

Total Value of Levered Firm (VL) = V_u + (Debt× Tax)
= ₹ 30,00,000 + (27,00,000 × 0.4)
= ₹ 40,80,000

Computation of Weighted Average Cost of Capital (WACC) of 'Cee Ltd. '

= 18% (i.e. K_e = K_0)

Computation of Equity Capitalization Rate and Weighted Average Cost of Capital (WACC) of Bee Ltd.

Particulars	Bee Ltd. (₹)
Net Operating Income (NOI)	9,00,000
Less: Interest on Debt (I)	3,24,000
Earnings Before Tax (EBT)	5,76,000
Less: Tax @ 40%	2,30,400
Earnings for equity shareholders (NI)	3,45,600
Total Value of Firm (V) as calculated above	40,80,000
Less: Market Value of Debt	27,00,000
Market Value of Equity (S)	13,80,000
Equity Capitalization Rate [K_e = NI/S]	0.2504
Weighted Average Cost of Capital (K_0)* K_0 = (K_e×S/V) + (K_d×D/V)	13.23

***Computation of WACC Bee Ltd.**

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	13,80,000	0.338	0.2504	0.0846
Debt	27,00,000	0.662	0.072*	0.0477
Total	40,80,000			0.1323

*K_d= 12% (1- 0.4) = 12% × 0.6 = 7.2%
WACC = 13.23%

25. Blue Ltd., an all equity financed company is considering the repurchase of ₹275 lakhs equity shares and to replace it with 15% debentures of the same amount. Current market value of the company is ₹1,750 lakhs with its cost of capital of 20%. The company's Earnings before Interest and Taxes (EBIT) are expected to remain constant in future years. The company also has a policy of distributing its entire earnings as dividend.
Assuming the corporate tax rate as 30%, you are required to CALCULATE the impact on the following on account of the change in the capital structure as per Modigliani and Miller (MM) Approach:
1) Market value of the company
2) Overall Cost of capital
3) Cost of equity **(Nov. 2021 RTP)**

Ans. **Workings:**

Market Value of Equity $= \frac{Net\ Income\ (NI) for\ equity\ holders}{K_e}$

₹1,750 $= \frac{Net\ Income\ (NI) for\ equity\ holders}{0.20}$

Net Income to equity holders/EAT = ₹ 350 lakhs

Therefore, EBIT = $\frac{EAT}{(1-t)} = \frac{₹350\ lakhs}{(1-0.3)} = ₹500\ lakhs$

Income Statement

Particulars	All Equity (₹ In lakhs)	Equity & Debt (₹ In lakhs)
EBIT (as calculated above)	500	500
Interest on ₹ 275 lakhs @ 15%	-	41.25
EBT	-	458.75
Tax @ 30%	500	137.63
Income available to equity holders	150	321.12
	350	

1) Market value of the company

Market value of levered firm = Value of unlevered firm + Tax Advantage
= ₹ 1,750 lakhs + (₹ 275 lakhs x 0.3)
= ₹ 1,832.5 lakhs

Change in market value of the company = ₹ 1,832.5 lakhs – ₹ 1,750 lakhs
= ₹ 82.50 lakhs

The impact is that the market value of the company has increased by ₹ 82.50 lakhs due to replacement of equity with debt.

2) Overall Cost of Capital

Market Value of Equity = Market value of levered firm - Equity repurchased
= ₹ 1,832.50 lakhs – ₹ 275 lakhs = ₹ 1,557.50 lakhs

Cost of Equity (K_e) = (Net Income to equity holders / Market value of equity) × 100
= (₹ 321.12 lakhs / ₹ 1,557.50 lakhs) × 100 = 20.62%

Cost of debt (K_d) = I (1 - t) = 15 (1 - 0.3) = 10.50%

Components	Amount (₹ In lakhs)	Cost of Capital %	Weight	WACC (K_0) %
Equity Debt	1,557.50	20.62	0.85	17.53
	275.00	10.50	0.15	1.58
	1,832.50		1	19.11

The impact is that the Overall Cost of Capital or Ko has fallen by 0.89% (20% - 19.11%) due to the benefit of tax relief on debt interest payment.

3) Cost of Equity

The impact is that cost of equity has risen by 0.62% (20.62% - 20%) due to the presence of financial risk i.e. introduction of debt in capital structure.

Note: Cost of Capital and Cost of equity can also be calculated with the help of following formulas, though there will be no change in the final answers.

Cost of Capital (K_0) = K_{eu} [1 – (t x L)]

Where,

K_{eu} = Cost of equity in an unlevered company

t = Tax rate

L = $\frac{Debt}{Debt+Equity}$

So, $K_0 = 0.20\left[1 - \left(0.3 \times \frac{₹275\ lakhs}{₹1{,}832.5\ lakhs}\right)\right]$ = 0.191 or 19.10% (approx.)

Cost of Equity (K_e) = $K_{eu} + (K_{eu} + K_d)\frac{Debt\ (1-t)}{Equity}$

Where,

K_{eu} = Cost of equity in an unlevered company

K_d = Cost of debt

t = Tax rate

So, $K_e = 0.20 + \left[(0.20 - 0.15) \times \frac{₹275\ lakhs\ (1-0.3)}{₹1{,}557.5\ lakhs}\right]$ = 0.2062 or 20.62%%

26. There are two companies U Ltd. and L Ltd. having same NOI of ₹20,000 except that L Ltd. is a levered company having a debt of ₹1,00,000@7% and cost of equity of U Ltd. & L Ltd. are 10% and 18% respectively.

COMPUTE how arbitrage process will work.

(ICAI SM)

Ans.

Particulars	Company	
	U Ltd.	**L Ltd.**
NOI (EBIT)	₹ 20,000	₹ 20,000
Debt (D)	–	₹ 1,00,000
K_d	–	7%
K_e	10%	18%
Value of equity capital (S) $\left(\frac{EBIT-Interest}{K_e}\right)$	₹ 2,00,000 $\left(\frac{20,000}{0.10}\right)$	₹ 72,222 $\left(\frac{20,000-7,000}{0.18}\right)$
Total value of the firm (V) = S + D	₹ 2,00,000	₹ 1,72,222 (₹ 72,222 + ₹1,00,000)

Arbitrage Process:

If you have 10% shares of unlevered firm i.e. investment of 10% of ₹ 2,00,000 = ₹ 20,000 and Return @ 10% on ₹ 20,000. Investment will be 10% of earnings available for equity i.e. 10% × ₹ 20,000 = ₹ 2,000.

Alternative strategy will be:

Sell your shares in unlevered firm for ₹ 20,000 and buy 10% shares of levered firm's equity plus debt.

10% equity of levered firm	₹ 7,222
10% debt of levered firm	₹ 10,000
Total investment in levered firm	₹ 17,222

Your resources are ₹ 20,000

Surplus cash available = Surplus – Investment = ₹ 20,000 – ₹ 17,222 = ₹ 2,778

Your return on investment is:

7% on debt of ₹ 10,000	₹ 700
10% on equity i.e. 10% of earnings available for equity holders (10% × ₹ 13,000)	₹ 1,300
Total return	₹ 2,000

In both the cases the return received is ₹ 2,000 and still you have excess cash of ₹2,778.

27. Aaina Ltd. is considering a new project which requires a capital investment of ₹9 crores. Interest on term loan is 12% and Corporate Tax rate is 30%.

CALCULATE the point of indifference for the project considering the Debt Equity ratio insisted by the financing agencies being 2:1.

(ICAI SM)

Ans. **The capital investment can be financed in two ways i.e.**

i) By issuing equity shares only worth ₹ 9 crore or

ii) By raising capital through taking a term loan of ₹ 6 crores and ₹ 3 crores through issuing equity shares (as the company has to comply with the 2 : 1 Debt Equity ratio insisted by financing agencies).

In first option interest will be Zero and in second option the interest will be ₹ 72,00,000

Point of Indifference between the above two alternatives =

$$\frac{EBIT \times (1-t)}{No.of\ Equity\ Shares\ (N_1)} = \frac{(EBIT-Interest) \times (1-t)}{No.of\ Equity\ Shares\ (N_2)}$$

Or, $\frac{EBIT\ (1-0.30)}{90,00,000\ shares} = \frac{(EBIT - ₹72,00,000) \times (1-0.30)}{30,00,000\ shares}$

Or, 0.07 EBIT = 2.1 EBIT – ₹1,51,20,000

EBIT = ₹1,08,00,000

EBIT at point of Indifference will be ₹ 1.08 crore.

(The face value of the equity shares is assumed as ₹ 10 per share. However, indifference point will be same irrespective of face value per share).

28. The financial advisor of Sun Ltd is confronted with following two alternative financing plans for raising ₹10 lakhs that is needed for plant expansion and modernization

Alternative I: Issue 80% of funds with 14% Debenture [Face Value (FV) ₹100] at par and redeem at a premium of 10% after 10 years and balance by issuing equity shares at $33\frac{1}{3}$% premium.

Alternative II: Raise 10% of funds required by issuing 8% Irredeemable Debenture [Face value (FV) ₹100] at par and the remaining by issuing equity shares at current market price of ₹125.

Currently, the firm has an Earnings per share (EPS) of ₹21

The modernization and expansion programme is expected to increase the firm's Earnings before interest and Taxation (EBIT) by ₹2,00,000 annually

The firm's condensed Balance sheet for the current year is given below:

Balance Sheet as on 31.3.2022

Liabilities	Amount (₹)	Assets	Amount (₹)
Current Liabilities	5,00,000	Current Assets	16,00,000
10% Long Term Loan	15,00,000	Plant & Equipment (Net)	34,00,000
Reserves & Surplus	10,00,000		
Equity share Capital (FV: ₹100 each)	20,00,000		
Total	**50,00,0000**	**Total**	**50,00,000**

However, the finance advisor is concerned about the effect that issuing of debt might have on the firm. The average debt ratio for firms in industry is 35%. He believes if this ratio is exceeded the, P/E ratio of the company will be 7 because of the potentially greater risk.

If the firm increases its equity capital by more than 10%, he expects the P/E ratio of the company will increase to 8.5 irrespective of the debt ratio.

Assume Tax Rate of 25%. Assume target dividend pay-out under each alternative to be 60% for the next year and growth rate to be 10% for the purpose of calculating Cost of Equity

SUGGEST with reason which alternative is better on the basis of each of the below given criteria.

i) Earnings per share (EPS) & Market Price per share (MPS)
ii) Financial Leverage
iii) Weighted Average Cost of Capital & Marginal Cost of Capital (using Book Value weights)

(Oct. 2022 MTP)

Ans. **Calculation of Equity Share capital and Reserves and surplus:**

Alternative 1:

Equity Share capital = ₹20,00,000 + $\frac{₹2,00,000 \times 100}{133.3333}$ =₹21,50,000

Reserves = ₹10,00,000 + $\frac{₹2,00,000 \times 33.3333}{133.3333}$ =₹10,50,000

Alternative 2:

Equity Share capital = ₹20,00,000 + $\frac{₹9,00,000 \times 100}{125}$ = ₹27,20,000

Reserves = ₹10,00,000 + $\frac{₹9,00,000 \times 25}{125}$ = ₹11,80,000

Capital Structure Plans

Amount in ₹

Capital	Alternative 1	Alternative 2
Equity Share capital	21,50,000	27,20,000
Reserves and surplus	10,50,000	11,80,000
10% long term debt	15,00,000	15,00,000
14% Debentures	8,00,000	-
8% Irredeemable Debentures	-	1,00,000
Total Capital Employed	55,00,000	55,00,000

Computation of Present Earnings before interest and tax (EBIT)

EPS (₹)	21
No. of equity shares	20,000
Earnings for equity shareholders (I x II) (₹)	4,20,000
Profit Before Tax (III/75%) (₹)	5,60,000
Interest on long term loan (1500000 x 10%) (₹)	1,50,000
EBIT (IV + V) (₹)	7,10,000

EBIT after expansion = ₹7,10,000 +₹ 2,00,000 = ₹9,10,000

Evaluation of Financial Plans on the basis of EPS, MPS and Financial Leverage

Amount in ₹

Particulars	Alternative I	Alternate II
EBIT	9,10,000	9,10,000
Less: Interest: 10% on long term loan	(1,50,000)	(1,50,000)
14% on Debentures	(1,12,000)	Nil
8% on Irredeemable Debentures	Nil.	(8000)
PBT	6,48,000	7,52,000
Less: Tax @25%	(1,62,000)	(1,88,000)
PAT	4,86,000	5,64,000
No. of equity shares	21,500	27,200
EPS	22.60	20.74
Applicable P/E ratio (Working Note 1)	7	8.5
MPS (EPS X P/E ratio)	158.2	176.29
Financial Leverage EBIT/PBT	1.40	1.21

Working Note 1

Particulars	Alternative I	Alternative II
Debt:		
₹15,00,000 +₹8,00,000	23,00,000	-
₹15,00,000 +₹1,00,000	-	16,00,000
Total capital Employed (₹)	55,00,000	55,00,000
Debt Ratio (Debt/Capital employed)	=0.4182	=0.2909
	=41.82%	=29.09%
Change in Equity: ₹21,50,000-₹20,00,000	1,50,000	
₹27,20,000-₹20,00,000		7,20,000
Percentage change in equity	7.5%	36%
Applicable P/E ratio	7	8.5

Calculation of Cost of equity and various type of debt

Particulars	Alternative I	Alternative II
A) Cost of equity		
EPS	22.60	20.74
DPS (EPS X 60%)	13.56	12.44
Growth (g)	10%	10%
P_0 (MPS)	158.2	176.29
K_e= Do (1 + g)/ P_0	$\frac{13.56\ (1.1)}{158.2}$	$\frac{12.44\ (1.1)}{176.29}$
	=9.43%	=7.76%
B) Cost of Debt:		
10% long term debt	10% + (1-0.25)	10% +(1-0.25)
	= 7.5%	= 7.5%
14% redeemable debentures	$\frac{14(1-0.25)+(110-100/10)}{110+100/2}$	nil
	= 10.5 + 1 / 10.5	
	= 10.95%	
8% irredeemable debenture	NA	8000(1-0.25)/1,00,00 = 6%

Calculation of Weighted Average cost of capital (WACC)

Particulars	Alternative 1			Alternative 2		
Capital	Weights	Cost (%)	WACC	Weights	Cost (%)	WACC
Equity Share Capital	0.3909	9.43	3.69%	0.4945	7.76	3.84%
Reserves and Surplus	0.1909	9.43	1.80%	0.2145	7.76	1.66%
10% Long term Debt	0.2727	7.50	2.05%	0.2727	7.50	2.05%
14% Debenture	0.1455	10.95	1.59%			
8% Irredeemable Debentures	-	-		0.0182	6	0.11%
			9.12%			7.66%

Calculation Marginal Cost of Capital (MACC)

Particulars	Alternative 1			Alternative 2		
Capital	Amount(weight)	Cost (%)	MACC	Amount (weight)	Cost (%)	MACC
Equity Share Capital	₹ 1,50,000(0.15)	9.43	1.41%	₹7,20,000(0.72)	7.76	5.59%
Reserves and Surplus	₹ 50,000(0.05)	9.43	0.47%	₹1,80,000(0.18)	7.76	1.40%
14% Debenture	₹ 8,00,000(0.80)	10.95	8.76%	-		0.00%
8% Irredeemable Debentures	-			₹1,00,000(0.10)	6	0.60%
Total Capital Employed	₹10,00,000		10.65%	₹10,00,000		7.58%

Summary of solution:

Particulars	Alternate I	Alternate II
Earning per share (EPS)	22.60	20.74
Market price per share (MPS)	158.20	176.29
Financial leverage	1.4043	1.2101

Weighted Average cost of capital (WACC)	9.12%	7.66%
Marginal cost of capital (MACC)	10.65%	7.58%

Alternative 1 of financing will be preferred under the criteria of EPS, whereas Alternative II of financing will be preferred under the criteria of MPS, Financial leverage, WACC and marginal cost of capital.

29. The following are the costs and values for the firms A and B according to the traditional approach.

Particulars	Firm A	Firm B
Total value of firm, V (in ₹)	50,000	60,000
Market value of debt, D (in ₹)	0	30,000
Market value of equity, E (in ₹)	50,000	30,000
Expected net operating income (in ₹)	5,000	5,000
Cost of debt (in ₹)	0	1,800
Net Income (in ₹)	5,000	3,200
Cost of equity, K_e = NI/V	10.00%	10.70%

i) Compute the Equilibrium value for Firm A and B in accordance with the M-M approach. Assume that (a) taxes do not exist and (b) the equilibrium value of K_e is 9.09%.

ii) Compute Value of Equity and Cost of Equity for both the firms. **(Nov. 2022)**

Ans. **a)**

i) Computation of Equilibrium value of Firms A & B under MM Approach:

As per MM approach K_0 is equal to K_{eu}

$\therefore K_0 = K_{eu} (1 - t) = 9.09 (1 - 0) = 9.09$

Particulars	A	B
EBIT (NOI) (₹)	5000	5000
KO (%)	9.09	9.09
Equilibrium value (₹) (NOI/Ko) X 100	55005.5	55005.5

ii) Computation of value of equity and cost of equity of Firms A & B

Particulars	A	B
Equilibrium value (₹)	55,005.5	55,005.5
Less: Value of Debt	-	30,000
Value of Equity	55,005.5	25,005.5

Cost of Equity of Firm A (unlevered) = 9.09

Cost of Debt of Firm B (K_d) (levered) = (1800/30000) × 100 = 6%

Cost of Equity of Firm B (Levered) = $K_0 + (K_0 - K_d) \times$ (Debt / Equity)

= 9.09 + (9.09 – 6) x (30000/25005.5)

= 9.09 + 3.09 x 1.2 = 9.09 + 3.71 = 12.80%

(OR)

Cost of Equity of Firm B (Levered) = $\left(\frac{Nil}{Value\ of\ Equity}\right) \times 100$

= $\left(\frac{3,200}{2,5005.5}\right) \times 100 = 12.8\%$

30. The particulars relating to Raj Ltd. for the year ended 31st March, 2022 are given as follows:

Output (units at normal capacity)	1,00,000
Selling price per unit	₹40
Variable cost per unit	₹20
Fixed cost	₹10,00,000

The capital structure of the company as on 31st March, 2022 is as follows:

Particulars	Amount in ₹
Equity share capital (1,00,000 shares of ₹10 each)	10,00,000
Reserves and surplus	5,00,000
Current liabilities	5,00,000
Total:	20,00,000

Raj Ltd. has decided to undertake an expansion project to use the market potential that will involve ₹20 lakhs. The company expects an increase in output by 50%. Fixed cost will be increased by ₹5,00,000 and variable cost per unit will be decreased by 15%. The additional output can be sold at the existing selling price without any adverse impact on the market.
The following alternative schemes for financing the proposed expansion program are planned:

		(Amount in ₹)
Alternative	**Debt**	**Equity Shares**
1	5,00,000	Balance
2	10,00,000	Balance
3	14,00,000	Balance

Current market price per share is ₹200.

Slab wise interest rate for fund borrowed is as follows:

Fund limit	Applicable interest rate
Up-to ₹5,00,000	10%
Over ₹5,00,000 and up-to ₹10,00,000	15%
Over ₹10,00,000	20%

Find out which of the above-mentioned alternatives would you recommend for Raj Ltd. with reference to the EPS, assuming a corporate tax rate is 40%?

(May 2022)

Ans.

Alternative 1 = Raising Debt of ₹ 5 lakh + Equity of ₹ 15 lakh
Alternative 2 = Raising Debt of ₹ 10 lakh + Equity of ₹ 10 lakh
Alternative 3 = Raising Debt of ₹ 14 lakh + Equity of ₹ 6 lakh

Calculation of Earnings per share (EPS)

Particulars	FINANCIAL ALTERNATIVES		
	Alternative 1	Alternative 2	Alternative 3
	(₹)	(₹)	(₹)
Expected EBIT [W. N. (a)]	19,50,000	19,50,000	19,50,000
Less: Interest [W. N. (b)]	(50,000)	(1,25,000)	(2,05,000)
Earnings before taxes (EBT)	19,00,000	18,25,000	17,45,000
Less: Taxes @ 40%	7,60,000	7,30,000	6,98,000
Earnings after taxes (EAT)	11,40,000	10,95,000	10,47,000
Number of shares [W. N. (d)]	1,07,500	1,05,000	1,03,000
Earnings per share (EPS)	10.60	10.43	10.17

Conclusion: Alternative 1 (i.e. Raising Debt of ₹ 5 lakh and Equity of ₹ 15 lakh) is recommended which maximises the earnings per share.

Working Notes (W.N.):

a) Calculation of Earnings before Interest and Tax (EBIT)

Particulars		
Output (1,00,000 + 50%)	(A)	1,50,000
Selling price per unit		₹ 40
Less: Variable cost per unit (₹ 20 – 15%)		₹ 17
Contribution per unit	(B)	₹ 23
Total contribution	(A x B)	₹ 34,50,000
Less: Fixed Cost (₹ 10,00,000 + ₹ 5,00,000)		₹ 15,00,000
EBIT		₹ 19,50,000

b) Calculation of interest on Debt

Alternative		(₹)	Total (₹)
1	(₹ 5,00,000 x 10%)		50,000
2	(₹ 5,00,000 x 10%)	50,000	
	(₹ 5,00,000 x 15%)	75,000	1,25,000
3	(₹ 5,00,000 x 10%)	50,000	
	(₹ 5,00,000 x 15%)	75,000	
	(₹ 4,00,000 x 20%)	80,000	2,05,000

c) Number of equity shares to be issued

Alternative 1 = $\frac{(₹20,00,000-5,00,000)}{₹200\ (Market\ price\ per\ share)} = \frac{₹15,00,000}{₹200} = 7{,}500\ shares$

Alternative 2 = $\frac{(₹20,00,000-10,00,000)}{₹200\ (Market\ price\ per\ share)} = \frac{₹10,00,000}{₹200} = 5{,}000\ shares$

Alternative 3 = $\frac{(₹20,00,000-14,00,000)}{₹200\ (Market\ price\ per\ share)} = \frac{₹6,00,000}{₹200} = 3{,}000\ shares$

d) Calculation of total equity shares after expansion program

Particulars	Alternative 1	Alternative 2	Alternative 3
Existing no. of shares	1,00,000	1,00,000	1,00,000
Add: issued under expansion program	7,500	5,000	3,000
Total no. of equity shares	1,07,500	1,05,000	1,03,000

31. Earnings before interest and tax of a company are ₹4,50,000. Currently the company has 80,000 Equity shares of ₹10 each, retained earnings of ₹12,00,000. It pays annual interest of ₹1,20,000 on 12% Debentures. The company proposes to take up an expansion scheme for which it needs additional fund of ₹6,00,000. It is anticipated that after expansion, the company will be able to achieve the same return on investment as at present. It can raise fund either through debts at rate of 12% p.a. or by issuing Equity shares at par. Tax rate is 40%.

Required:

Compute the earning per share if:

i) The additional funds were raised through debts.

ii) The additional funds were raised by issue of Equity shares.

Advise whether the company should go for expansion plan and which sources of finance should be preferred.

(Dec. 2021)

Ans. **Working Notes:**

1) Capital employed before expansion plan:

Particulars	(₹)
Equity shares (₹ 10 × 80,000 shares)	8,00,000
Debentures {(₹ 1,20,000/12) × 100}	10,00,000
Retained earnings	12,00,000
Total capital employed	30,00,000

2) Earnings before interest and tax (EBIT) = 4,50,000

3) Return on Capital Employed (ROCE):

ROCE = $\frac{EBIT}{Capital\ Employed} \times 100 = \frac{₹4,50,000}{₹30,00,000} \times 100 = 15\%$

4) Earnings before interest and tax (EBIT) after expansion scheme:

After expansion, capital employed = ₹ 30,00,000 + ₹ 6,00,000 = ₹ 36,00,000

Desired EBIT = 15% × ₹36,00,000 = ₹ 5,40,000

i) & ii) Computation of Earnings Per Share (EPS) under the following options:

Particulars	Present situation	Expansion scheme Additional funds raised as	
		Debt (i)	Equity (ii)
	(₹)	(₹)	(₹)
Earnings before Interest and Tax (EBIT)	4,50,000	5,40,000	5,40,000
Less: Interest - Old Debt	1,20,000	1,20,000	1,20,000
- New Debt	--	72,000 (₹ 6,00,000 × 12%)	--
Earnings before Tax (EBT)	3,30,000	3,48,000	4,20,000
Less: Tax (40% of EBT)	1,32,000	1,39,200	1,68,000
PAT/EAT	1,98,000	2,08,800	2,52,000
No. of shares outstanding	80,000	80,000	1,40,000
Earnings per Share (EPS)	2.475 $\left(\frac{₹1,98,000}{80,000}\right)$	2.610 $\left(\frac{₹2,08,000}{80,000}\right)$	1.800 $\left(\frac{₹2,52,000}{1,40,000}\right)$

Advise to the Company: When the expansion scheme is financed by additional debt, the EPS is higher. Hence, the company should finance the expansion scheme by raising debt.

32. MR Ltd. is having the following capital structure, which is considered to be optimum as on 31.03.2022.

Equity share capital (50,000 shares)	₹8,00,000
12% Pref. share capital	₹50,000
15% Debentures	₹1,50,000
	₹10,00,000

The earnings per share (EPS) of the company were ₹2.50 in 2021 and the expected growth in equity dividend is 10% per year. The next year's dividend per share (DPS) is 50% of EPS of the year 2021. The current market price per share (MPS) is ₹25.00. The 15% new debentures can be issued by the company. The company's debentures are currently selling at ₹96 per debenture. The new 12% Pref. share can be sold at a net price of ₹91.50 (face value ₹100 each). The applicable tax rate is 30%.

You are required to calculate

a) After tax cost of
- **i)** New debt,
- **ii)** New pref. share capital and
- **iii)** Equity shares assuming that new equity shares come from retained earnings.

b) Marginal cost of capital

How much can be spent for capital investment before sale of new equity shares assuming that retained earnings for next year investment is 50% of 2021?

(Nov. 2022)

Ans.

a)

i) After tax cost of new Debt:

$K_d = I = \frac{(1-t)}{P_1} = 15\,\frac{(1-0.3)}{96}$

= 0.1094 (or) 10.94%

ii) After tax cost of New Preference share capital:

$K_p = \frac{PD}{P_0} = 15\,\left(\frac{12}{91.5}\right) = 0.1311\ (or)\ \mathbf{13.11\%}$

iii) After tax cost of Equity shares:

$K_e = \left(\frac{D_1}{P_0}\right) + g = \left[\frac{2.50 \times 50\%}{25}\right] + 0.10$

= 0.15 (or) 15%

b) Marginal Cost of Capital

Type of capital	Proportions	Specific cost	Product
Equity Shares	0.80	0.15	0.12
Preference Shares	0.05	0.1311	0.0066
Debentures	0.15	0.1094	0.0164
∴ Marginal cost of capital			**0.1430**

c) Amount that can be spend for capital investment

Retained earnings = 50% of EPS x No. of outstanding Equity shares

= 1.25 × 50,000

= ₹ 62,500

Proportion of equity (Retained earnings here) capital is 80% of total capital.

Therefore, ₹ 62,500 is 80% of total capital.

∴ Amount of Capital Investment = $\frac{62,500}{0.80} = \mathbf{₹78,125}$

Dividend Decisions
Assignment

Q. No. 1.

The following information is given:

Dividend per share (DPS)	₹ 9
Cost of capital (Ke)	19%
Internal rate of return on investment	24%
Retention Ratio	25%

CALCULATE the market price per share by using:

i) Walter's formula

ii) Gordon's formula (Dividend Growth model)

(March 2021 MTP / May 2011 / May 2019 modified/ICAI SM/ RTP November 2020)

Ans.

Working

Calculation of Earnings per share (EPS):

$$\text{EPS} = \frac{\text{DPS}}{\text{Dividend Payout Ratio}}$$

$$\text{EPS} = \frac{₹9}{1-0.25} = ₹12$$

Market price per share by

i) Walter's model:

$$P = \frac{D+\frac{r}{K_e}(E-D)}{K_e}$$

$$= \frac{₹9+\frac{0.24}{0.19}(₹12-₹9)}{0.19}$$

$$= ₹67.31$$

ii) Gordon's model (Dividend Growth model):

$$P_0 = \frac{D_0\,(1+g)}{K_e-g}$$

Where,

P_0 = Present market price per share.

g = Growth rate (br) = 0.25 × 0.24 = 0.06

b = Retention ratio

k = Cost of Capital

r = Internal rate of return (IRR)

D_0 = Dividend per share

E = Earnings per share

$$= \frac{₹9\,(1+0.06)}{0.19-0.06}$$

$$= \frac{₹9.54}{0.13} = ₹73.38$$

Alternatively,

$$P_0 = \frac{E\,(1-b)}{k-br}$$

$$P_0 = \frac{12\,(1-0.25)}{0.19-0.06} = \frac{9}{0.13} = ₹69.23$$

Q. No. 2.

Aakash Ltd. has 10 lakh equity shares outstanding at the start of the accounting year 2XX1. The existing market price per share is ₹ 150. Expected dividend is ₹ 8 per share. The rate of capitalization appropriate to the risk class to which the company belongs is 10%.

i) CALCULATE the market price per share when expected dividends are: (a) declared, and (b) not declared, based on the Miller – Modigliani approach.

ii) CALCULATE number of shares to be issued by the company at the end of the accounting year on the assumption that the net income for the year is ₹ 3 crore, investment budget is ₹ 6 crores, when (a) Dividends are declared, and (b) Dividends are not declared.

iii) PROOF that the market value of the shares at the end of the accounting year will remain unchanged irrespective of whether (a) Dividends are declared, or (ii) Dividends are not declared. **(Nov 2008 RTP/May 2013 modified/ Nov. 2014 modified/2 ICAI SM)**

Ans.

i) Calculation of market price per share

According to Miller – Modigliani (MM) Approach:

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

Where,

Existing market price (P_0) = ₹ 150

Expected dividend per share (D_1) = ₹ 8

Capitalization rate (K_e) = 0.10

Market price at year end (P_1) = to be determined

a) If expected dividends are declared, then

$$₹150 = \frac{P_1 + ₹8}{1 + 0.10}$$

$$\therefore P_1 = ₹157$$

b) If expected dividends are not declared, then

$$₹150 = \frac{P_1 + 0}{1 + 0.10}$$

$$\therefore P_1 = ₹165$$

ii) Calculation of number of shares to be issued

Particulars	(a) Dividends are declared (₹ lakh)	(b) Dividends are not Declared (₹ lakh)
Net income	300	300
Total dividends	(80)	-
Retained earnings	220	300
Investment budget	600	600
Amount to be raised by new issues	380	300
Relevant market price (₹ per share)	157	165
No. of new shares to be issued (in lakh) (₹ 380 ÷ 157; ₹ 300 ÷ 165)	2.42	1.82

iii) Calculation of market value of the shares

Particulars	(a) Dividends are declared	(b) Dividends are not Declared
Existing shares (in lakhs)	10.00	10.00
New shares (in lakhs)	2.42	1.82
Total shares (in lakhs)	12.42	11.82
Market price per share (₹)	157	165
Total market value of shares at the end of the year (₹ in lakh)	12.42 × 157 **= 1,950 (approx.)**	11.82 × 165 **= 1,950 (approx.)**

Hence, it is proved that the total market value of shares remains unchanged irrespective of whether dividends are declared, or not declared.

3. M Ltd. belongs to a risk class for which the capitalisation rate is 10%. It has 25,000 outstanding shares and the current market price is ₹100. It expects a net profit of ₹2,50,000 for the year and the Board is considering dividend of ₹5 per share.
M Ltd. requires to raise ₹5,00,000 for an approved investment expenditure. Show, how does the MM approach affect the value of M Ltd., if dividends are paid or not paid.

(May 2008/ 2 ICAI SM/MTP Dec 2021)

Ans.

A) When dividend is paid

a) Price per share at the end of year 1

Ke =10%, Po = 100, D1 = 5

$$\textbf{Po} = \frac{P1+D1}{1+Ke}$$

$$100 = \frac{1}{1.10}\ (₹5\ +\ P_1)$$

$$110 = ₹5 + P_1$$

$$P_1 = 105$$

b) Amount required to be from issue of new shares

₹5,00,000 – (2,50,000 – 1,25,000)

₹5,00,000 – 1,25,000 = ₹3,75,000

c) Number of additional shares to be issued

$\frac{3,75,000}{105} - \frac{75,000}{21}$ shares or say 3,572 shares

d) Value of M Ltd.

(Number of shares × Expected Price per share)

i.e. (25,000 + 3,572) × ₹105 = ₹30,00,060

B) When dividend is not paid

a) Price per share at the end or year 1

Ke =10% , Po = 100 , D1 = 0

$$\textbf{Po} = \frac{P1+D1}{1+Ke}$$

$$100 = \frac{P_1}{1.10}$$

$$P_1 = 110$$

b) Amount required to be raised from issue of new shares

₹5,00,000 – 2,50,000 = 2,50,000

c) Number of additional shares to be issued

$\frac{2,50,000}{110} = \frac{25,000}{11}$ shares or say 2,273 shares.

d) Value of M Ltd.

(25,000 + 2,273) × ₹110

= ₹30,00,030

Conclusion:

Whether dividend is paid or not, the value remains the same.

4. You are requested to find out the approximate dividend payment ratio as to have the Share Price at ₹56 by using Walter Model, based on following information available for a Company.

Particulars	**Amount ₹**
Net Profit	50 lakhs
Outstanding 10% Preference Share	80 lakhs
Number of Equity Shares	5 lakhs
Return on Investment	15%
Cost of Capital (after Tax) (K_e)	12%

(May 2017/ November 2020 modified/ ICAI SM/RTP)

Ans.

Calculation of Dividend Pay-out ratio

$= \frac{Dividend\ Paid\ Per\ Share}{Earning\ Per\ share} \times 100$

$= \frac{15.12}{8.4} \times 100$

$= 180\%$

1) Calculation of Earning Per Share

$= \frac{Net\ Profit - Preference\ Dividend}{No.of\ Equity\ Shares}$

$= \frac{50,00,000 - 8,00,000}{5,00,000}$

$= 8.4$

2) Calculation of Dividend Per Share

$P_0 = \frac{D + \frac{r}{K_e}(E-D)}{K_e}$

$56 = \frac{D + \frac{0.15}{0.12}(8.4-D)}{0.12}$

$56 \times 0.12 + 1.25\ D$

$6.72 - 10.5 = -0.25\ D$

$D = \frac{-3.78}{-0.25}$

$D = 15.12$

5. The following information relates to Maya Ltd:

Earnings of the company	₹10,00,000
Dividend pay-out ratio	60%
No. of shares outstanding	2,00,000
Rate of return on investment	15%
Equity capitalisation rate	12%

i) What would be the market value per share as per Walter's model?

ii) What is the optimum dividend pay-out ratio according to Walter's model and the market value of company's share at that pay-out ratio.

(November 2010/ ICAI SM /July 2021 modified/RTP May 2020 modified)

Ans.

i) Computation of market-value per share as per Walter's Model

$p = \frac{D + (E-D)(Y/K_e)}{K_e}$

Where, p = Market price per share,

E = Earning per share = ₹5

D = Dividend per share = ₹3

Y = Return earned on investment = 15%

K_e = Cost of equity capital = 12%

$\therefore p = \frac{3 + (5-3) \times \frac{0.15}{0.12}}{0.12} = \frac{3 + 2 \times \frac{.15}{.12}}{0.12} = ₹45.83$

ii) Optimum Dividend Pay-out Ratio

As per Walter's model when the return on investment is more than the cost of equity capital the price per share increases as the dividend pay-out ratio decreases. Therefore, the optimum dividend pay-out ratio becomes zero. Therefore, when the payment-ratio becomes zero, the market value of the company's share will be:

$= \frac{0 + (5-0) \times \frac{.15}{.12}}{0.12} = ₹52.08$

(**Note:** as per Gordon's model, when r > Ke, optimum dividend payout ratio is zero)

6. Following information relating to Jee Ltd. are given:

Earnings of the company	₹10,00,000
Dividend paid	₹6,00,000
No. of shares outstanding	2,00,000
Price earnings Ratio	10
Rate of return on investment	20%

You are required to calculate:

i) Current Market price of the share.

ii) Capitalisation rate of its class.

iii) What should be the optimum pay-out ratio?

iv) What should be the market price per share at optimal pay-out ratio? (use Walter's Model).

(November 2019/November 2018/ICAI SM)

Ans.

i) Current Market Price of the Share:

$$\text{EPS} = \frac{Earnings\ of\ the\ company}{No.of\ shares\ outstanding} = \frac{₹10,00,000}{2,00,000\ Shares} = ₹5$$

$$\text{PE Ratio} = \frac{Market\ Price}{EPS}$$

$$10 = \frac{Market\ Price}{₹5}$$

Current Market Price = ₹50

The value of the share as per Walter's model may be found as follows:

Walter's model is given by:

$$P_0 = \frac{D+\frac{r}{K_e}(E-D)}{K_e}$$

Where,

P = Market price per share.

E = Earnings per share = ₹5

D = Dividend per share = ₹3

R = Return earned on investment = 20%

K_e = Cost of equity capital = 10% or 0.10

$$P = \frac{3+\frac{0.20}{0.10}(5-3)}{0.10} = ₹70$$

ii) Capitalisation rate of its risk class:

$$\text{Capitalisation rate} = \frac{Earnings}{Market\ Price \times No.of\ shares} \times 100 = \frac{₹10,00,000}{₹50 \times 2,00,000} \times 100$$

Capitalisation rate = 10%.

iii) According to Walter's model when the rate of return on investment (20%) is more than the cost of equity capital i.e. capitalisation rate (10%), the price per share increases as the dividend pay-out ratio decreases. Hence, the optimum dividend pay-out ratio in this case is nil.

iv) Market price per share at optimal pay-out ratio:

$$\therefore P = \frac{0+\frac{0.20}{0.10}(5.0)}{0.10} = ₹100$$

7. A firm had been paid dividend at ₹2 per share last year. The estimated growth of the dividends from the company is estimated to be 5% p.a. Determine the estimated market price of the equity share if the estimated growth rate of dividends (i) rises to 8%, and (ii) falls 3%, Also find out the present market price of the share, given that the required rate of return of the equity investors is 15.5%. **(November 2009/ICAI SM)**

Ans.	In this case company has paid dividend of ₹2 per share during the last year. **The growth rate (g) is 5%.** Then, the current year dividend (D_1), with the expected rate of 5% will be ₹2.10. The share price is $P_0 = \frac{D_1}{K_e - g}$ $= \frac{₹2.10}{0.155-0.05}$ = ₹20 **In case the growth rate to 8%** then the dividend for the current year. (D_1) would be ₹2.16 and market price would be – $= \frac{₹2.16}{0.155-0.08}$ = ₹28.80 **In case growth rate falls to 3%** then the dividend for the current year (D_1) would be ₹2.06 and market price would be – $= \frac{₹2.06}{0.155-0.03}$ = ₹16.48 **Conclusion:** So, the market price of the share is expected of vary in response to change in expected growth rate is dividends.
8.	In December, 2XX1 AB Co.'s share sold for ₹146 per share. A long-term earnings growth rate of 7.5% is anticipated. AB Co. is expected to pay dividend of ₹3.36 per share. **i)** What rate of return an investor can expect to earn assuming that dividends are expected to grow along with earnings at 7.5% per year in perpetuity? **ii)** It is expected that AB Co. will earn about 10% on book Equity and shall retain 60% of earnings. In this case, whether, there would be any change in growth rate and cost of Equity? **(May 2012/ ICAI SM)**
Ans.	**i)** As per **Dividend Discount Model** approach the firm's expected or required return on equity is computed as follows: $K_e = \frac{Expected\ dividend\ at\ the\ end\ of\ the\ year\ (D_1)}{Current\ Market\ Price\ (P_0)}$ + Expected Growth Rate of Dividend Therefore, K_e = + 7.5% $\frac{3.36}{146}$ = 0.0230 + 0.075 = 0.095 $Or\ \ K_e$ = 9.80% **ii) When rate or return of retained earnings (r) is 10% and retention ratio (b) is 60%, new growth rate will be as follows.** g = br i.e. = 0.10 × 0.60 = 0.06 **Thus** dividend will also get changed and to calculate this, first we shall calculate previous retention ratio (b_1) and then EPS assuming that rate of return on retained earnings (r) is same. **With previous Growth Rate of 7.5% and r = 10% the retention ratio comes out to be:** 0.075 = b_1 × 0.10 b_1 = 0.75 and pay-out ratio = 0.25 **With 0.25 pay-out ratio the EPS will be as follows:** $\frac{3.36}{0.25}$ = 13.44 **With new 0.40 (1 – 0.60) pay-out ratio the new dividend will be** D_1 = 13.44 × 0.40 = 5,376

Accordingly new K_e will be

$K_e = \frac{5,376}{146} + 6.0\%$

Or, $K_e = 9.68\%$

9. The following information is supplied to you:

Particulars	(₹)
Total Earnings	2,00,000
No. of equity shares (of ₹ 100 each)	20,000
Dividend paid	1,50,000
Price/ Earnings ratio	12.5

Applying Walter's Model:

i) ANALYSE 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 your decision change if the P/E ratio is 8 instead of 12.5? ANALYSE.

(RTP May 2021/ICAI SM/ November 2014)

Ans.

i) The EPS of the firm is ₹ 10 (i.e., ₹ 2,00,000/ 20,000) and r = 2,00,000/ (20,000 shares × ₹100) = 10%. The P/E Ratio is given at 12.5 and the cost of capital, Ke, may be taken at the inverse of P/E ratio. Therefore, Ke is 8 (i.e., 1/12.5). The firm is distributing total dividends of ₹ 1,50,000 among 20,000 shares, giving a dividend per share of ₹ 7.50. the value of the share as per Walter's model may be found as follows:

$$P = \frac{D + \frac{r}{K_e}(E-D)}{K_e} = \frac{7.5 + \frac{0.1}{0.08}(10-7.5)}{0.08} = ₹132.81$$

The firm has a dividend pay-out of 75% (i.e., ₹ 1,50,000) out of total earnings of ₹ 2,00,000. Since, the rate of return of the firm, r, is 10% and it is more than the Ke of 8%, therefore, by distributing 75% of earnings, the firm is not following an optimal dividend policy. The optimal dividend policy for the firm would be to pay zero dividend and in such a situation, the market price would be-

$$= \frac{0 + \frac{0.1}{0.08}(10-0)}{0.08} = ₹156.25$$

So, theoretically the market price of the share can be increased by adopting a zero pay-out.

ii) The P/E ratio at which the dividend policy will have no effect on the value of the share is such at which the Ke would be equal to the rate of return, r, of the firm. The Ke would be 10% (= r) at the P/E ratio of 10. Therefore, at the P/E ratio of 10, the dividend policy would have no effect on the value of the share.

iii) If the P/E is 8 instead of 12.5, then the Ke which is the inverse of P/E ratio, would be 12.5 and in such a situation ke> r and the market price, as per Walter's model would be:

$$P = \frac{D + \frac{r}{K_e}(E-D)}{K_e} = \frac{7.5 + \frac{0.1}{0.125}(10-7.5)}{0.125} = ₹76$$

10. The earnings per share of a company is ₹ 30 and dividend pay-out ratio is 60%. Multiplier is 2.

DETERMINE the price per share as per Graham & Dodd model.

(ICAI SM)

Ans.

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

$P = 2\left(30 \times 0.6 + \frac{30}{3}\right)$

P = 2 (18 + 10) ₹56

11. Aakash Ltd. has 10 lakh equity shares outstanding at the start of the accounting year 2XX1. The existing market price per share is ₹ 150. Expected dividend is ₹ 8 per share. The rate of capitalization appropriate to the risk class to which the company belongs is 10%.

i) CALCULATE the market price per share when expected dividends are: (a) declared, and (b) not declared, based on the Miller – Modigliani approach.

ii) CALCULATE number of shares to be issued by the company at the end of the accounting year on the assumption that the net income for the year is ₹ 3 crore, investment budget is ₹ 6 crores, when (a) Dividends are declared, and (b) Dividends are not declared.

iii) PROOF that the market value of the shares at the end of the accounting year will remain unchanged irrespective of whether (a) Dividends are declared, or (ii) Dividends are not declared.

(RTP November 2021)

Ans.

i) Calculation of market price per share

According to Miller – Modigliani (MM) Approach:

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

Where,

Existing market price (P_0) = ₹ 150

Expected dividend per share (D_1) = ₹ 8

Capitalization rate (K_e) = 0.10

Market price at year end (P_1) = to be determined

a) If expected dividends are declared, then

$$₹150 = \frac{P_1 + ₹8}{1 + 0.10}$$

$\therefore P_1$ = ₹157

b) If expected dividends are not declared, then

$$₹150 = \frac{P_1 + 0}{1 + 0.10}$$

$\therefore P_1$ = ₹165

ii) Calculation of number of shares to be issued

Particulars	(a) Dividends are declared (₹ lakh)	(b) Dividends are not Declared (₹ lakh)
Net income	300	300
Total dividends	(80)	-
Retained earnings	220	300
Investment budget	600	600
Amount to be raised by new issues	380	300
Relevant market price (₹ per share)	157	165
No. of new shares to be issued (in lakh) (₹ 380 ÷ 157; ₹ 300 ÷ 165)	2.42	1.82

iii) Calculation of market value of the shares

Particulars	(a) Dividends are declared	(b) Dividends are not Declared
Existing shares (in lakhs)	10.00	10.00
New shares (in lakhs)	2.42	1.82
Total shares (in lakhs)	12.42	11.82
Market price per share (₹)	157	165
Total market value of shares at the end of the year (₹ in lakh)	12.42 × 157 **= 1,950 (approx.)**	11.82 × 165 **= 1,950 (approx.)**

Hence, it is proved that the total market value of shares remains unchanged irrespective of whether dividends are declared, or not declared.

12. The following data is available in respect of N Ltd. for the year ended 31st March, 2021:

Particulars	₹ (in Crore)
Share capital (@ ₹ 10 per share)	25.00
Reserves	15.00
Profit after tax (PAT)	3.70
Dividends paid	3.00
P/E ratio	26.70

Using Walter's Model:

i) COMMENT on the firm's dividend policy;

ii) DETERMINE the optimum pay-out ratio and

iii) DETERMINE the P/E ratio at which dividend pay-out will have no effect on share price.

(MTP April, 2021)

Ans.

1) Earnings per share (E) $= \frac{\text{PAT}}{\text{No.of shares}} = \frac{₹3.7 \text{ shares}}{2.5 \text{ crore shares}} = ₹1.48$

2) Return of Investment (r) $= \frac{\text{PAT}}{\text{Net worth}} \times 100 = \frac{₹3.7 \text{ crores}}{₹(25+15)} \times 100 = 9.25\%$

3) Dividend per share (D) $= \frac{\text{Dividend paid}}{\text{No.of shares}} = \frac{₹3 \text{ crores}}{2.5 \text{ crores shares}} = ₹1.2$

Dividend pay-out ratio $= \frac{\text{Dividend}}{\text{PAT}} \times 100 = \frac{₹3 \text{ crores}}{₹3.7 \text{ crores}} \times 100 = 81.08\%$

4) Current Market Price (P_0) = P/E × E = 26.7 × ₹1.48 = ₹39.52

5) Growth rate (g) = b × r = (1 – 0.8108) × 0.0925 = 1.75%

6) Cost of Capital (K_e) $= \frac{D(1+g)}{P_0} + g = \frac{₹1.2(1+0.0175)}{₹39.52} + 0.0175 = 4.84\%$

i) The value of the shares as per Walter's model:

$$P = \frac{D + \frac{r}{K_e}(E-D)}{K_e}$$

$$= \frac{1.2 + \frac{0.0925}{0.0484}(₹1.48 - 1.2)}{0.0484} = ₹35.85$$

The firm has a dividend pay-out of 81.08% (i.e., ₹ 3 crores) out of Profit after tax of ₹ 3.7 crores with value of the share at ₹ 35.85. The rate of return on investment (r) is 9.25% and it is more than the Ke of 4.84%, therefore, by distributing 81.08% of earnings, the firm is not following an optimal dividend policy.

ii) Under Walter's model, when return on investment is more than cost of capital (r > Ke), the market share price will be maximum if 100% retention policy is followed. So, the optimal pay-out ratio would be to pay zero dividend and in such a situation, the market price would be:

$$P = \frac{0 + \frac{0.0925}{0.0484}(₹1.48 - 0)}{0.0484} = ₹58.44$$

iii) The P/E ratio at which dividend pay-out will have no effect on share price is at which the Ke would be equal to the rate of return (r) of the firm i.e. 9.25%.

So, $K_e = \frac{D(1+g)}{P_0} + g$

$0.0925 = \frac{₹1.2(1+0.0175)}{P_0} + g$

$\therefore P_0 = ₹16.28$

If P_0 is ₹ 16.28, then, P/E Ratio will be:

$= \frac{P_0}{E} = \frac{₹16.28}{₹1.48} = 11$ times

Therefore, at the P/E ratio of 11, the dividend pay-out will have no effect on share price.

13. Stop-go Ltd., an all equity financed company, is considering the repurchase of ₹200 lakhs equity and to replace it with 15% debentures of the same amount. Current market value of the company is ₹1,140 lakhs and it's cost of capital is 20%. It's Earnings before Interest and Taxes (EBIT) are expected to remain constant in future. Its entire earnings are distributed as dividend. Applicable tax rate is 30 per cent.

You are required to calculate the impact on the following on account of the change in the capital structure as per Modigliani and Miller (MM) Hypothesis;

i) The market value of the company

ii) It's cost of capital, and

iii) It's cost of equity **(May 2018)**

Ans.

Value of a company (V) = Value of Equity (S) + Value of Debt (D)

₹1,140 L $= \frac{Net\ Income\ (NI)}{Ke} + ₹200\ L$

Or, Net Income (NI) = 0.20 (₹1,140 L – ₹200 L)

Market Value of Equity = ₹1,140 L

Ke = 20%

$\frac{Net\ Income\ (NI) for\ equity-holders}{Ke}$ = Market Value of Equity

$\frac{Net\ Income\ (NI) for\ equity-holders}{0.20}$ = ₹1,140 L

Net income for equity holders = ₹228 L

EBIT = ₹325.71 L

(₹ in Lakhs)

Particulars	All Equity	Debt and Equity
EBIT	325.71	325.71
(-) Interest to debit-hollers	-	(30.00)
EBT	325.71	295 71
Taxes @ 30%	(97.71)	(88.71)
Income available to equity shareholders	228.00	207.00
Income to debt holders plays income available to shareholders	228.00	237.00

Present value of tax-shield benefits = ₹200 L × 0.30
= ₹60 L

i) Value of Restructured Company

= ₹1,140 L + ₹60 L = ₹1,200 L

The impact is that the market value of the company has increased by ₹60 lakhs (₹1,200 – ₹1,140)

ii) Cost of Capital

Cost of debt (after tax) = 15% (1 – 0.3) = 10.5%

Components of Costs	Amount	Cost of Capital %	Weight	WACC (%)
Equity	1,000 L	20.70	0.83	17.18
Debt	200 L	10.50	0.17	1.79
				18.97

** The impact is that the WACC has fallen by 1% (20% - 19%) due to the benefit of tax relief on debt interest payment.

iii) Cost of Equity (Ke)

Total Value = ₹1,200 L
Less: Value of Debt = (₹200 L)
Value of Equity = ₹1,000 L
Ke = $\frac{207L}{1{,}000\ L} \times 100$
Ke = 20.70%

*** The impact is that cost of equity has risen by 0.7% i.e. (20.7% - 20%) due to the presence of financial risk.

14. The following data relate to two companies belonging to the same risk class:

Particulars	A Ltd.	B Ltd.
Expected Net Operating Income	₹18,00,000	₹18,00,000
12% Debt	₹54,00,000	
Equity Capitalisation Rate	--	18%

Required:

a) Determine the total market value, Equity capitalisation rate and weighted average cost of capital for each company assuming no taxes as per M.M. Approach.

b) Determine the total market value, Equity capitalization rate and weighted average cost of capital for each company assuming 40% taxes as per M.M. Approach.

(November 2018)

Ans.

a)

i) Market value of A Ltd. (Levered)

$V_u = \frac{EBIT\ (1-t)}{Ke}$

✓ Market value of B Ltd. (Unlevered)

$V_u = \frac{₹18{,}00{,}000\ (1-t)}{18\%} = ₹1{,}00{,}00{,}000$

✓ Market Value of A Ltd. (Levered)

$V_g = V_u$ + TB
= ₹1,00,00,000 + ₹54,00,000 × Nil
= ₹1,00,00,000

ii) Calculation of Equity Capitalisation Rate of A Ltd. and B Ltd.

✓ Ke for A Ltd.

$V_g = \frac{EBIT - Interest}{Ke}$

$46{,}00{,}000 = \frac{₹18{,}00{,}000 - ₹6{,}48{,}000}{Ke}$

Ke = 25.04%

✓ Ke for B Ltd. = 18%

iii) Calculation of WACC:

✓ B Ltd. = Ke = WACC = 18%

✓ A Ltd.

Particulars	A Ltd.
EBIT	18,00,000
(-) Interest	(6,48,000)
EAT / Income available to Equity Shareholders	11,52,000
Total Value of firm	1,00,00,000
Less: Market Value of debt	(54,00,000)
Market Value of Equity	46,00,000
Return on Equity (Ke) = ₹11,52,000 / ₹46,00,000	0.2504

Computation of WACC of A Ltd.

Component	Amount	Weight	Cost of Capital	WACC
Equity	46,00,000	0.48	0.2504	0.1152
Debt	54,00,000	0.54	0.12*	0.0648
Total	**1,00,00,000**	**1.00**		**0.18**

K_d = 12%

WACC = 18%

b)

- ✓ **Calculation of Total Market Value of A Ltd. and B Ltd. as per MM Approach:**
- ✓ **Market Value of B Ltd. (Unlevered)**

$V_u = \frac{EBIT\ (1-t)}{Ke}$

$= \frac{₹18,00,000\ (1-0.4)}{18\%} = ₹60,00,000$

- ✓ **Market Value of A Ltd. (Levered)**

$V_g = V_u$ + TB

= ₹60,00,000 + (₹54,00,000 × 40%)

= ₹60,00,000 + ₹21,00,000

= ₹81,60,000

ii) Calculation of Equity Capitalisation rate of A Ltd. and B Ltd.

- ✓ K_e for Ltd.

$V_g = \frac{EBIT-Interest}{Ke}$

$₹81,60,000 = \frac{₹18,00,000-₹6,48,000}{Ke}$

K_e = 14.12%

- ✓ K_e for B Ltd. = 18%

iii) Calculation of WACC:

- ✓ B Ltd. = K_e = WACC = 18%
- ✓ A Ltd.

Particulars	A Ltd. (₹)
EBIT	18,00,000
(-) Interest	(6,48,000)
EBT	11,52,000
(-) Tax @ 40%	(4,60,800)
Income available to Equity Shareholders	6,91,200
Total Value of Firm	81,60,000
Less: Market Value of debt	(54,00,000)
Market value of Equity	27,60,000
Return on Equity (K_e) = (₹6,91,200 / ₹21,60,000)	0.32

Computation of WACC of A Ltd.

Component	Amount	Weight	Cost of Capital	WACC
Equity	27,60,000	0.34	0.32	0.1088
Debt	54,00,000	0.66	0.072*	0.0475
Total	**81,60,000**	1.00		**0.1563**

K_d = 12% × (1 – 0.40) = 7.2%

WACC = 15.63%

15. X Ltd. earns ₹6 per share having a capitalisation rate of 10 percent and has a return on investment of 20%. According to Walter's model, what should be the price of the share at 25% dividend pay-out? **(November 2012 RTP)**

Ans. **Walter Model is as follow:**

$$V_e = \frac{D + \frac{R_a}{R_e}(E - D)}{R_e}$$

V_e = Market value of the share

R_a = Return on retained earnings

R_e = Capitalisation rate

E = Earnings per share

D = Dividend per share

Therefore, if Walter Model is applied – Market value of the share

$$V_e = \frac{₹1.50 + \frac{0.20}{0.10}(₹6.00 - ₹1.50)}{0.10}$$

Or

$$V_e = \frac{₹1.50 + \frac{0.20}{0.10}(₹4.50)}{0.10}$$

Or

$$V_e = \frac{₹1.50 + ₹9.00}{0.10} = \frac{₹10.50}{0.10} = ₹105$$

16. DEF Ltd. has been regularly paying a dividend ₹19,20,000 per annum for several years and it is expected that same dividend continue at this level in near future. There are 12,00,000 equity shares of ₹10 each and the share is traded at par.

The company has an opportunity to invest ₹8,00,000 in one year's time as well as further ₹8,00,000 in two years' time in a project as it is estimated that the project will generate cash inflow of ₹3,60,000 per annum in three years' time which will continue for ever. This investment is possible if dividend is reduced for next two years.

Whether the company should accept the project? Also analyse the effect on the market price of the share, if the company decides to accept the project. **(May 2012)**

Ans. **First let us compute cost of Equity (K_e) / PE Ratio**

D_1 $= \frac{19,20,000}{12,00,000} = 1.6$

P_0 $= 10$

K_e $= \frac{D}{P} = \frac{₹1.6}{10} = 16\%$

P/E $= \frac{10}{1.6} = 6.25$

Now we shall compute NPV of the project

$$\text{NPV} = \frac{-8,00,000}{(1+0.16)} + \frac{-,80,00,000}{(1+0.16)^2} + \frac{3,60,000}{0.16} \times \frac{1}{(1+0.16)^3}$$

= - 6,89,655 – 5,94,530 + 14,41,480

= 1,57,295

Conclusion:

As NPV of the project is positive, the value of the firm will increase by ₹1,57,295 and spread over the number of shares and the market price per share will increase by 13 paisa.

17. Following Financial Data for Platinum Ltd. are available:

For the year 2XX1:	**(₹ in lakhs)**
Equity Shares (₹10 each)	100
8% Debentures	125
10% Bonds	50

Reserves and Surplus	200
Total Assets	500
Assets Turnover Ratio	1.1
Effective Tax Rate	30%
Operating Margin	10%
Required rate of return of investors	15%
Dividend pay-out ratio	20%
Current market price of shares	₹13

You are required to:

i) Draw income statement for the year

ii) Calculate the sustainable growth rate

iii) Compute the fair price of the company's share using dividend discount model, and

iv) Draw your opinion on investment in the company's share at current price.

(November 2012)

Ans.

Working Note:

Asset turnover ratio = 1.1

Total Assets = ₹500 lakhs

Turnover ₹500 lakhs × 1.1 = ₹550 lakhs

Interest = ₹125 lakhs × 0.08 + ₹50 lakhs × 0.10

= ₹15 lakh

Operating Margin = 10%

Hence operating cost = (1 – 0.10) ₹550 lakhs = ₹495 lakh

Dividend = 20%

Tax rate = 30%

i) Income statement

Particulars	(₹ Lakhs)
Sale	550.00
Operating Exp.	495.00
EBIT	55.00
Interest	15.00
EBT	40.00
Tax @ 30%	12.00
EAT	28.00
Dividend @ 20%	5.60
Retained Earnings	22.40

ii) Computation of sustainable Growth Rate

SGR = G = ROE (1 -b)

ROE = $\frac{PAT}{NW}$ and NW = ₹100 lakhs + ₹200 lakhs = ₹300 lakhs

ROE = $\frac{₹28\ lakhs}{₹300\ lakhs} \times 100 = 9.33\%$

SGR = 0.0933 (1 – 0.20) = 7.47%

iii) Computation of fair price of share using Dividend Discount Model

$P_0 = \frac{D_0\ (1+g)}{K_e - g}$

Dividends = $\frac{₹5.6\ lakhs}{10\ lakhs} = ₹0.56$

Growth Rate = 7.47%

Hence $P_0 = \frac{₹0.56\ (1+0.0747)}{0.15-0.0747} = \frac{₹0.6018}{0.0753} = ₹7.99\ say\ ₹8.00$

iv) Conclusion:

Since the current market price of share is ₹13.00, the share is overvalued.

Therefore, the investor should not invest in the company.

18. The following information is collected from the annual reports of J Ltd.:

Profit before tax	₹2.50 crore
Tax rate	40 percent
Retention ratio	40 percent
Number of outstanding shares	50,00,000
Equity capitalisation shares	12 percent
Rate of return on investment	15 percent

What should be the market price per share according to Gordon's model of dividend policy? **(May 2015)**

Ans.

Profit after tax = ₹2.5 crore – 40% = ₹1.5 crore

Profit per share

= ₹1.5 crore/50,00,000 share

(EPS) = ₹3

Gordon's formula = $P_0 = \frac{E\ (1-b)}{k-br}$

P_0 = Present market price

E = EPS

k = cost of capital

b = Retention ratio

r = IRR

br = Growth Rate

$\therefore\ P_0 = \frac{₹3\ (1-0.40)}{0.12-(0.4\times0.15)}$

$= \frac{1.8}{0.12-0.06}$

= ₹30

19. The following information is taken from ABC Ltd.

Net Profit for the year	₹30,00,000
12% Preference share capital	₹1,00,00,000
Equity share capital (Share of ₹10 each)	₹60,00,000
Internal rate of return on investment	22%
Cost of Equity Capital	18%
Retention Ratio	75%

Calculate the market price of the share using:

1) Gordon's Model

2) Walter's Model **(January 2021)**

Ans.

Market price per share by-

1) Gordon's Model:

Present market price per share (P_0)* = $\frac{\mathbf{D_0(1+g)}}{\mathbf{K_e-g}}$

OR

Present market price per share (P_0) = $\frac{\mathbf{D_1}}{\mathbf{K_e-g}}$

Where,

P_0 = Present market price per share.

g = Growth rate (br) = 0.75 ×0.22 = 0.165

b = Retention ratio (i.e., % of earnings retained)
r = Internal rate of return (IRR)
D_0 = E × (1-b) = 3 × (1-0.75) = 0.75
E = Earnings per share
$P_0 = \frac{0.75\ (1+0.165)}{0.18-0.165} = \frac{0.874}{0.015} =$ **₹ 58.27**

* Alternatively, P_0 can be calculated as $\frac{E(1-b)}{k-br} =$ ₹ 50.

2) Walter's Model:

$$P = \frac{D+\frac{r}{K_e}(E-D)}{K_e}$$

$$= \frac{0.75+\frac{0.22}{0.18}(3-0.75)}{0.18} = ₹19.44$$

Workings:

1) Calculation of Earnings per share

Particulars	Amount (₹)
Net Profit for the year	30,00,000
Less: Preference dividend (12% of ₹ 1,00,00,000)	(12,00,000)
Earnings for equity shareholders	18,00,000
No. of equity shares (₹ 60,00,000/₹ 10)	6,00,000
Therefore, Earnings per share $(\frac{\text{Earning for equity shareholders}}{\text{No.of equity shares}})$	₹ 18,00,000/6,00,000 **= ₹ 3.00**

2) Calculation of Dividend per share

Particulars	Amount (₹)
Earnings per share	₹ 3
Retention Ratio (b)	**75%**
Dividend pay-out ratio (1-b)	**25%**
Dividend per share (Earnings per share × Dividend pay-out ratio)	₹ 3 × 0.25 = **₹ 0.75**

20. XYZ Ltd. earns ₹ 10/ share. Capitalization rate and return on investment are 10% and 12% respectively.
DETERMINE the optimum dividend pay-out ratio and the price of the share at the pay-out.
(ICAI SM)

Ans. Since r > K_e , the optimum dividend pay-out ratio would 'Zero' (i.e. D = 0),

$$P = \frac{D+\frac{r}{K_e}(E-D)}{K_e}$$

$$P = \frac{0+\frac{0.12}{0.10}(10-0)}{0.10} = ₹120$$

The optimality of the above payout ratio can be proved by using 25%, 50%, 75% and 100% as pay-out ratio:

At 25% pay-out ratio

$$P = \frac{2.5+\frac{0.12}{0.10}(10-2.5)}{0.10} = ₹115$$

At 50% pay-out ratio

$$P = \frac{5+\frac{0.12}{0.10}(10-5)}{0.10} = ₹110$$

At 75% pay-out ratio

$P = \frac{7.5+\frac{0.12}{0.10}(10-7.5)}{0.10} = ₹105$

At 100% pay-out ratio

$P = \frac{10+\frac{0.12}{0.10}(10-10)}{0.10} = ₹100$

21. 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. (K_e)	16%

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

Ans.

Particulars	₹ in lakhs
Net Profit	30
Less: Preference dividend	12
Earning for equity shareholders	18
Therefore earning per share	18/3 = ₹6.00

Price per share according to Gordon's Model is calculated as follows:

$P_0 = \frac{E_1(1-b)}{K_e - br}$

Here, E1 = 6, K_e = 16%

i) When dividend pay-out is 25%

$P_0 = \frac{6 \times 0.025}{0.16\ (0.75 \times 0.2)} = \frac{1.5}{0.16-0.15} = 150$

ii) When dividend pay-out is 50%

$P_0 = \frac{6 \times 0.05}{0.16\ (0.5 \times 0.2)} = \frac{3}{0.16-0.10} = 50$

iii) When dividend pay-out is 100%

$P_0 = \frac{6 \times 1}{0.16\ (0 \times 0.2)} = \frac{6}{0.16-} = 37.50$

22. X Ltd. is a no growth company, pays a dividend of ₹ 5 per share. If the cost of capital is 10%, COMPUTE the current market price of the share? **(ICAI SM)**

Ans. $P_0 = \frac{D}{K_e} = \frac{5}{0.10} = ₹50$

23. XYZ is a company having share capital of ₹10 lakhs of ₹10 each. It distributed current dividend of 20% per annum. Annual growth rate in dividend expected is 2%. The expected rate of return on its equity capital is 15%. CALCULATE price of share applying Gordon's growth Model. **(ICAI SM)**

Ans. $P = \frac{D_0(1+g)}{K_e - g}$

$= \frac{2(1+0.02)}{0.15-0.02} = ₹15.69$

24. Given the last year's dividend is ₹9.80, speed of adjustment = 45%, target pay-out ratio 60% and EPS for current year ₹ 20. COMPUTE current year's dividend using Linter's model. **(ICAI SM)**

Ans. $D_1 = D_o + [(EPS \times \text{Target payout}) - D_o] \times Af$

$D_1 = 9.80 + [(20 \times 60\%) - 9.80] \times 0.45$

$D_1 = 9.80 + 0.99 = ₹10.79$

25. Taking an example of three different firms i.e. growth, normal and declining,CALCULATE the share price using Gordon's model:

Factors	Growth Firm r > K_e	Normal Firm r = K_e	Declining Firm r < K_e
r (rate of return on retained earnings)	15%	10%	8%
K_e (Cost of Capital)	10%	10%	10%
E (Earning Per Share)	₹ 10	₹ 10	₹ 10
b (Retained Earnings)	0.6	0.6	0.6
1- b (Dividend Payout)	0.4	0.4	0.4

(ICAI SM)

Ans.

$P_0 = \frac{E_1 (1-b)}{K_e - br}$

i) Situation-1: Growth Firm r > K_e

$P_0 = \frac{10\ (1-0.6)}{0.10\ 0.10 \times 0.6} = \frac{4}{0.10-0.6} = ₹400$

ii) Situation-2: Normal Firm r = K_e

$P_0 = \frac{10\ (1-0.6)}{0.10\ 0.10 \times 0.6} = \frac{4}{0.10-0.06} = ₹100$

iii) Situation-2: Normal Firm r < K_e

$P_0 = \frac{10\ (1-0.6)}{0.10\ 0.08 \times 0.6} = \frac{4}{0.10-0.048} = ₹76.92$

If the retention ratio (b) is changed from 0.6 to 0.4, the new share price will be as follows:

Growth Firm

$P_0 = \frac{10\ (1-0.4)}{0.10\ 0.15 \times 0.4} = \frac{4}{0.10-0.06} = ₹150$

Normal Firm

$P_0 = \frac{10\ (1-0.4)}{0.10\ 0.10 \times 0.4} = \frac{4}{0.10-0.04} = ₹100$

Declining Firm

$P_0 = \frac{10\ (1-0.4)}{0.10\ 0.08 \times 0.4} = \frac{4}{0.10-0.032} = ₹88.24$

From the above analysis it can be concluded that.

When r > k, the market value increases with retention ratio.

When r < k, the market value of share stands to decrease.

When r = k, the market value is not affected by dividend policy.

The conclusion of the Gordon's model is similar to that of Walter's model.

26. The dividend pay-out ratio of H Ltd. is 40%. If the company follows traditional approach to dividend policy with a multiplier of 9, COMPUTE P/E ratio. **(ICAI SM)**

Ans. The P/E ratio i.e. price earnings ratio can be computed with the help of the following formula:

P/E ratio = $\frac{MPS}{EPS}$

Since the D/P ratio is 40%,D = 40% of E i.e. 0.4E

Hence,
Market price per share (P) using Graham & Dodd's model =

$P_0 = m\left(\frac{E}{3}\right)$

Where,

P_0 = Market price per share

D = Dividend per share

E = Earnings per share

m = a multiplier

$P_0 = 9\left(0.4E + \frac{E}{3}\right)$

$P_0 = 9\left(\frac{1.2E+E}{3}\right) = 3\ (2.2E)$

$P_0 = 6.6E$

$\frac{P}{E}$ = 6.6 i.e. P/E ratio is 6.6 times

27. A&R Ltd. is a large-cap multinational company listed in BSE in India with a face value of ₹ 100 per share. The company is expected to grow @ 15% p.a. for next four years then 5% for an indefinite period. The shareholders expect 20% returnon their share investments. Company paid ₹120 as dividend per share for the FY2020-21. The shares of the company traded at an average price of ₹ 3,122/- onlast day. FIND out the intrinsic value of per share and state whether shares are overpriced or under-priced. **(ICAI SM)**

Ans. **As per Dividend discount model, the price of share is calculated as follows:**

$$P = \frac{D_1}{(1+K_e)^1} + \frac{D_2}{(1+K_e)^2} + \frac{D_3}{(1+K_e)^3} + \frac{D_4}{(1+K_e)^4}\frac{D_4\ (1+g)}{(K_e-g)} \times \frac{1}{(1+K_e)^5}$$

Where,

P = Price per share

K_e = Required rate of return on equity

g = Growth rate

$$P = \frac{₹120 \times 1.15}{(1+0.2)^1} + \frac{₹138 \times 1.15}{(1+0.2)^2} + \frac{₹158 \times 1.15}{(1+0.2)^3} + \frac{₹182 \times 1.15}{(1+0.2)^4} + \frac{₹209.88\ (1+0.05)}{(0.2-0.05)} \times \frac{1}{(1+0.2)^5}$$

P= 115 +110.2 + 105.6 + 101.2 + 590.42 = ₹1,022.42

Intrinsic value of share is ₹ 1,022.42 as compared to latest market price of ₹ 3,122/-. Market price of a share is overpriced by ₹2,099.58.

28. The details about tow companies R Ltd. And S Ltd. having same operating risk are given below:

Particulars	R Ltd.	S Ltd.
Profit before interest and tax	₹ 10 Lakhs	₹ 10 Lakhs
Equity share capital ₹ 10 each	₹ 17 Lakhs	₹ 50 Lakhs
Long term borrowings @ 10%	₹ 33 Lakhs	-
Cost of Equity (K_e)	18%	15%

1) Calculate the value of equity of both the companies on the basis of M.M. Approach without tax.
2) Calculate the total value of both the companies on the basis of M.M. Approach without tax.

(July 2021)

Ans.

1) Value of Equity = $\frac{EBIT-I}{K_e}$

R Ltd. = $\frac{EBIT-I}{K_e} = \frac{10,00,000-10\%\ of\ 33,00,00}{18\%}$

S Ltd. = $\frac{EBIT-I}{K_e} = \frac{10,00,000-0}{15\%}$

2) Value of Companies:

Value of S Ltd. (V_{UL}) = EBIT ÷ K_O = 10,00,000 ÷ 15%

= 66,66,667

Value of R Ltd. (V_L) = Value of S Ltd. (V_{UL}) = 66,66,667

Note: Alternatively Value of R. Ltd. can be calculated as: V = S + D (V = 37,22,222 + 33,00,000 = 70,22,222).

29. The following figures have been collected from the annual report of ABC Ltd. for the current financial year:

Net Profit	₹ 75 lakhs
Outstanding 12% preference shares	₹ 250 lakhs
No. of equity shares	7.50 lakhs
Return on Investment	20%
Cost of capital i.e. (Ke)	16%

1) COMPUTE the approximate dividend pay-out ratio so as to keep the share price at ₹42 by using Walter's model?
2) DETERMINE the optimum dividend pay-out ratio and the price of the share at such pay-out.
3) PROVE that the dividend pay-out ratio as determined above in (b) is optimum by using random pay-out ratio. **(May 2022 RTP)**

Ans. **1)**

Particulars	**₹ in lakhs**
Net Profit	75
Less: Preference dividend	30
Earning for equity shareholders	45
Earning per share	= 45/7.5 = ₹ 6.00

Let, the dividend per share be D to get share price of ₹ 42

$$P = \frac{D+\frac{r}{K_e}(E-D)}{K_e}$$

$$₹42 = \frac{D+\frac{0.20}{0.16}(6-D)}{0.16}$$

$$6.72 = \frac{0.16D+1.2-0.20D}{0.16}$$

$$0.04D = 1.2 - 1.0752$$

$$D = 3.12$$

$$D/P = \frac{DPS}{EPS} \times 100 = \frac{3.12}{6} \times 100 = 52\%$$

So, the required dividend pay-out ratio will be = 52%

2)

Since $r > K_e$, the optimum dividend pay-out ratio would 'Zero' (i.e. D = 0),

Accordingly, value of a share:

$$P = \frac{D+\frac{r}{K_e}(E-D)}{K_e}$$

$$P = \frac{0+\frac{0.20}{0.16}(6-0)}{0.16} = ₹46.875$$

3)

The optimality of the above pay-out ratio can be proved by using 25%, 50%, 75% and 100% as pay- out ratio:

At 25% pay-out ratio

$P = \frac{1.5+\frac{0.20}{0.16}(6-1.5)}{0.16}$ = ₹44.531

At 50% pay-out ratio

$P = \frac{3+\frac{0.20}{0.16}(6-3)}{0.16}$ = ₹42.188

At 75% pay-out ratio

$P = \frac{4.5+\frac{0.20}{0.16}(6-4.5)}{0.16}$ = ₹39.844

At 100% pay-out ratio

$P = \frac{6+\frac{0.20}{0.16}(6-6)}{0.16}$ = ₹37.50

From the above it can be seen that price of share is maximum when dividend pay-out ratio is 'zero' as determined in (b) above.

30. Aakash Ltd. has 10 lakh equity shares outstanding at the start of the accounting year 2021. The existing market price per share is ₹150. Expected dividend is ₹8 per share. The rate of capitalization appropriate to the risk class to which the company belongs is 10%.

1) CALCULATE the market price per share when expected dividends are: (a) declared, and (b) not declared, based on the Miller – Modigliani approach.

2) CALCULATE number of shares to be issued by the company at the end of the accounting year on the assumption that the net income for the year is ₹3 crore, investment budget is ₹6 crores, when (a) Dividends are declared, and (b) Dividends are not declared.

3) PROOF that the market value of the shares at the end of the accounting year will remain unchanged irrespective of whether (a) Dividends are declared, or (ii) Dividends are not declared. **(Nov. 2021 RTP)**

Ans.

1) Calculation of market price per share

According to Miller – Modigliani (MM) Approach:

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

Where,

Existing market price (P_0) = ₹ 150

Expected dividend per share (D_1) = ₹ 8

Capitalization rate (K_e) = 0.10

Market price at year end (P_1) = to be determined

a) If expected dividends are declared, then

$₹150 = \frac{P_1 + ₹8}{1 + 0.10}$

$\therefore P_1$ = ₹157

b) If expected dividends are not declared, then

$₹150 = \frac{P_1 + 0}{1 + 0.10}$

$\therefore P_1$ = ₹165

2) Ca**lculation of number of shares to be issued**

Particulars	**(a)** **Dividends are declared (₹ lakh)**	**(b)** **Dividends are not Declared (₹ lakh)**
Net income	300	300
Total dividends	(80)	-
Retained earnings	220	300

	Investment budget	600	600
	Amount to be raised by new issues	380	300
	Relevant market price (₹ per share)	157	165
	No. of new shares to be issued (in lakh) (₹ 380 ÷ 157; ₹ 300 ÷ 165)	2.42	1.82

3) Calculation of market value of the shares

Particulars	(a) Dividends are declared	(b) Dividends are not Declared
Existing shares (in lakhs)	10.00	10.00
New shares (in lakhs)	2.42	1.82
Total shares (in lakhs)	12.42	11.82
Market price per share (₹)	157	165
Total market value of shares at the end of the year (₹ in lakh)	12.42 × 157 **= 1,950 (approx.)**	11.82 × 165 **= 1,950 (approx.)**

Hence, it is proved that the total market value of shares remains unchanged irrespective of whether dividends are declared, or not declared.

31. The following information regarding the equity shares of M Ltd. is given below:

Market price	₹ 58.33
Dividend per share	₹ 5
Multiplier	7

According to the Graham & Dodd approach to the dividend policy, COMPUTE the EPS.

(ICAI SM)

Ans. Price per share (P) = m $\left(D + \frac{E}{3}\right)$

₹58.33 = 7 $\left(5 + \frac{E}{3}\right)$

105 + 7E = 175

Or, 7E = 175 -105 = ₹10

Therefore, EPS = ₹10

32. The following information is given below in case of Aditya Ltd.:

Earnings per share = ₹ 60

Capitalisation rate = 15%

Return on investment = 25%

Dividend pay-out ratio = 30%

i) COMPUTE price per share using Walter's Model.

ii) WHAT would be optimum dividend payout ratio per share under Gordon's Model.

(ICAI SM)

Ans. **i) As per Walter's Model, Price per share is computed by using the following formula:**

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e}$$

Where,

P = Market Price of the share. E = Earnings per share.

D = Dividend per share.

K_e = Cost of equity/ rate of capitalization/ discount rate.

r = Internal rate of return/ return on investment

	Applying the above formula, price per share $P = \frac{18+\frac{0.25}{0.15}(60-18)}{0.15}$ Or, $P = \frac{18+70}{0.15} = ₹586.67$ **ii) As per Gordon's model, when r > K_e, optimum dividend pay-out ratio is 'Zero'.**
33.	Ordinary shares of a listed company are currently trading at ₹ 10 per share with two lakh shares outstanding. The company anticipates that its earnings for next year will be ₹ 5,00,000. Existing cost of capital for equity shares is 15%. The company has certain investment proposals under discussion which will cause an additional 26,089 ordinary shares to be issued if no dividend is paid or an additional 47,619 ordinary shares to be issued if dividend is paid. Applying the MM hypothesis on dividend decisions, CALCULATE the amount of investment and dividend that is under consideration by the company. **(Nov. 2020 RTP)**
Ans.	P_0 = ₹10 n = 2,00,000, E = ₹5,00,000 K_e = 15%, Δn = 26,089, I = ? $P_0 = \frac{P_1}{1+K_e}$ $10 = \frac{P_1}{1.15}$ $\therefore P_1 = 11.5$ $\Delta n = \frac{I-E+nD_1}{P_1}$ $26.089 = \frac{I-5,00,000}{11.5}$ I = 8,00,024 Now, P_0 = ₹10, n = 2,00,000, E = ₹5,00,000, I = 8,00,024, K_e = 15%, Δn = 47,619, D_1 = ? $P_0 = \frac{P_1+D_1}{1+K_e}$ $10 = \frac{P_1+D_1}{1.15}$ $P_1 + D_1 = 11.5$ $\therefore P_1 = 11.5 - D_1$ _____ 1 $\because \Delta n = \frac{I-E+nD_1}{P_1}$ $47,619 = \frac{8,00,024-5,00,000+2,00,000\,D_1}{P_1}$ $47,619\,P_1 = 2,00,000\,D_1 + 3,00,024$ From 1, $47,619\,(11.5 - D_1) = 2,00,000\,D_1 + 3,00,024$ $5,47,618.5 - 47,619\,D_1 = 2,00,000\,D_1 + 3,00,024$ $\therefore 2,47,594.5 = 2,00,000\,D_1 + 47,619\,D_1$

	$\therefore 2,47,594.5 = 2,47,619\ D_1$ $\therefore D_1 = \frac{2,47,594.5}{2,47,619} = 0.99 \approx ₹1$ $\therefore P_1 = 11.5 - D_1$ $P_1 = 11.5 - 1$ $P_1 = 10.5$ $\because n.P_0 = \frac{(n+\Delta n)P_1 - I + E}{1+K_e}$ $= \frac{(2,00,000+47,619)\ (10.5) - 8,00,024 + 5,00,000}{1.15}$ $n.P_0 = ₹19,99,979 \approx ₹20,00,000$ Using direct calculation $n.P_0 = 2,00,000 \times 10 = ₹20,00,000$

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THANK YOU TEAM CNC