Security Valuation [16 Marks]

PART I Bond Valuation [Imp]

PART II Equity Valuation

PART III Money Market Instruments

I BONDS

1. Bond valuation
2. Bond yield
3. Bond Risk
4. option Embedded Bond
5. yield Curve [Term structure]

1. Bond Valuation

Intrinsic Value of Bond is calculated as under

IV_0 = P.V. of future Cash Inflows disc. at required yield

After calculation of IV_0, we compare with price of Bond & decide whether Bond should be purchased or not?

If $IV_0 < CMP$	Overpriced	Not Buy
If $IV_0 > CMP$	Underpriced	Buy
If $IV_0 = CMP$	Correctly priced	Do Nothing

Types of Bonds

1. Zero Coupon Bond (ZCB)
2. Perpetual Bond
3. Conventional Bond
4. Non Conventional Bond

Example – 01

Face value of bond = ₹ 5,000

Life = 5 Years

Current market price = ₹ 2,200

No coupon payment

Yield on similar bond = 15% p.a.

Whether bond should be bought or not?

(Page No. 01)

Since Bond is underpriced, hence it should be purchased.

ICB

- No Coupon
- Issued at deep discount
- Redeemable at F.V.

IV_0

$$IV_0 = \frac{5000}{(1.15)^5} = ₹2486$$

or

$$5000 \times (PVf, 15, 5)$$

$$5000 \times 0.497 = 2485$$

Example – 02

Face value = ₹ 1,000 ✓

Coupon = 12% p.a. ₹ 120

Life = 5 Years ✓

Redeemable at 10% premium at the end of year 5

Required rate of return = 15%

Calculate value of bond.

(Page No. 01)

Intrinsic Value of Bond

$$IV_0 = (₹120 \times PVAF_{15\%, 5}) + (₹1100 \times PVf_{15\%, 5})$$

$$= (₹120 \times 3.352) + (1000 \times 0.497)$$

$$= ₹899.24$$

Example – 03

Face value of bond = ₹ 100

Coupon rate = 10% p.a. Semi Annually

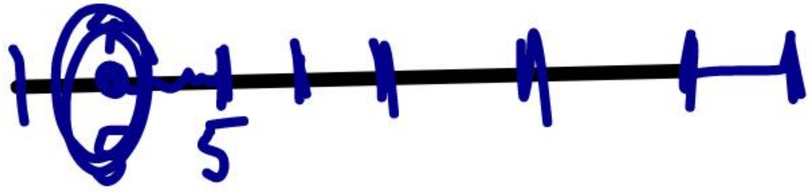
Life = 5 Years

Yield on similar bond = 8% p.a.

Redeemable at par

Calculate issue price of bond.

(Page No. 01)



₹5

[10 times

Issue price of Bond

Issue price = (₹5 × PVAf, 4%, 10) + (₹100 × PVf, 4%, 10)

= (₹5 × 8.111) + (100 × 0.676)

= ₹ 108.155

Example – 04

Face value = ₹ 1,000

Life = 5 Years

Coupon = 1 – 3 10%

= 4 – 5 12%

Redeemable at par

3rd Year = ₹ 500

5th Year = ₹ 500

Yield = 15% Value of bond = ?

Calculation of I.V0

PARTICULARS	YEAR	PVF (15%)	Amt	P.V.
Coupon	1	0.870	100	87
	2	0.756	100	75.60
Coupon + R.V.	3	0.657	600	394.20
	4	0.572	60	34.32
	5	0.497	560	278.32
IV_0 =				869.44

Example – 05

Face value of bond = ₹ 1,000

Coupon = 12% ₹ 120

Yield of similar bond = 10%

Value of perpetual bond = ?

(Page No. 02)

In perpetual Bond, IVo is calculated as under

$$I.V. = \frac{\text{Coupon}}{\text{Yield}} = \frac{120}{10\%} = ₹1200$$

QUESTION – 01

M/s Agfa Industries is planning to issue a debenture series on the following terms:

Face Value	₹ 100
Term of maturity	10 years

Yearly coupon rate

Years	
1 – 4	9%
5 – 8	10%
9 – 10	14%

The current market rate on similar debentures is 15 per cent per annum. The Company proposes to price the issue in such a manner that it can yield 16 per cent compounded rate of return to the investors. The Company also proposes to redeem the debentures at 5 per cent premium on maturity. Determine the issue price of the debentures.

(Study Material & Practice Manual)

(Page No. 02)

Issue price of debenture

	YEAR	PVF (16%)	Amount	P.V.
Interest	1-4	2.798	9	25.18
	5-8	1.545	10	15.45
	9-10	0.490	14	6.86
Redeemable Value	10	0.227	105	23.84
Issue price				₹71.33

QUESTION – 02

Bright Computers Limited is planning to issue a debenture series with a face value of ₹ 1,000 each for a term of 10 years with the following coupon rates:

Years	
1 – 4	8%
5 – 8	9%
9 – 10	13%

The current market rate on similar debenture is 15% p.a. The company proposes to price the issue in such a way that a yield of 16% compounded rate of return is received by the investors. The redeemable price of the debenture will be at 10% premium on maturity. What should be the issue price of debenture?

PV @ 16% for 1 to 10 years are: 0.862, 0.743, 0.641, 0.552, 0.476, 0.410, 0.354, 0.305, 0.263, 0.227 respectively.

QUESTION – 03

Nominal value of 10% bonds issued by a company is ₹100. The bonds are redeemable at ₹ 110 at the end of year 5. Determine the value of the bond if required yield is (i) 5%, (ii) 5.1%, (iii) 10% and (iv) 10.1%.

(Practice Manual, Study Material)

(Page No. 04)

Rate ज्यादा लेने से IVo कम आएगा

I. Value of Bond

yield (5%)

$IV_0 = (₹10 \times PVAf_{5\%,5}) + (₹110 \times PVf_{5\%,5})$

$= (₹10 \times 4.329) + (₹110 \times 0.783) = ₹129.42$

QUESTION – 04

A company proposes to sell ten-year debentures of ₹ 10,000 each. The company would repay ₹ 1,000 at the end of every year and will pay interest annually at 15 percent on the outstanding amount. Determine the present value of the debenture issue if the capitalization rate is 18 percent.

(Page No. 05)

YEAR InH princ Tote PVF P.V.

present Value of Bond

YEAR	Interest	principal	Total	PVf (18·4)	P.V.
1	1500	1000	2500	0·847	2117
2	1350	1000	2350	0·718	1687
3	1200	1000	2200	0·609	1340
4	1050	1000	2050	0·516	1058
5	900	1000	1900	0·437	830
6	750	1000	1750	0·370	647
7	600	1000	1600	0·314	502
8	450	1000	1450	0·266	386
9	300	1000	1300	0·225	292
10	150	1000	1150	0·191	220
				IVo =	9079

QUESTION – 05

John inherited the following securities on his uncle's death:

Types of Security	Nos.	Annual Coupon %	Maturity Years	Yield %
Bond A (₹ 1,000)	10	9	3	12
Bond B (₹ 1,000)	10	10	5	12
Preference shares C (₹ 100)	100	11	*	13*
Preference shares D (₹ 100)	100	12	*	13*

*Likelihood of being called at a premium over par.

Compute the current value of his uncle's portfolio.

(Practice Manual)

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Value of portfolio

Bond A

$(900 \times PVAf, 3, 12\%) + (10000 \times PVf, 3, 12\%)$

$= (900 \times 2.402) + (10000 \times 0.712) =$ ₹ 9282

Bond B

$(1000 \times PVAf, 12\%, 5) + (10000 \times PVf, 12\%, 5)$

$(1000 \times 3.605) + (10000 \times 0.567) =$ ₹ 9275

pref. share C

$$\frac{₹\,10000 \times 11\%}{13\%} = ₹\,8461$$

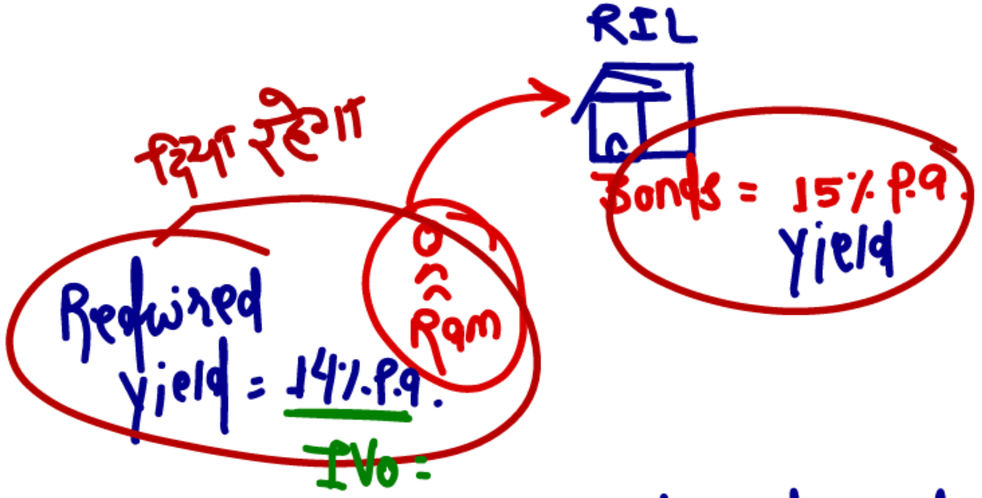
pref. share D

$$\frac{₹\,10000 \times 12\%}{13\%} = ₹\,9231$$

Value = ₹ 36249

2. Bonds Yield

Bond yield means percentage of Return from Bond



- If Bond's yield > required yield - Underpriced - Buy
- If Bond's yield < required yield - Overpriced - Not Buy
- If Bond's yield = required yield - Correctly priced - Do Nothing

Example – 06

	Bond A ZCB	Bond B Conventional Bond	Bond C Perpetual Bond
Face Value	₹ 5,000	₹ 1,000	₹ 100
Coupon	Nil	12%	10%
Maturity Period	5 Years	10 Years	-
CMP	₹ 2,800	₹ 920	₹ 80

Which bond should be purchased?

(Page No. 07)

ZCB Simple Int

$$HPR = \frac{5000 - 2800}{2800} \times 100$$

$$= 78.57\%$$

$$\text{Annual Return} = \frac{78.57}{5} \times 1$$

$$= 15.71\% \text{ P.a.}$$

Yield इस तरह नही निकालते

Yield to Maturity

Alternative 1

$$2800(1+r)^5 = ₹5000$$

$$2800 = \frac{5000}{(1+r)^5}$$

2800 ↑ PVC0 — $\frac{5000}{(1+r)^5}$ ↑ PVC1

$$(1+r)^5 = \frac{5000}{2800}$$

$$r = \left[\left(\frac{5000}{2800}\right)^{1/5} - 1\right] \times 100$$

$$= 12.30\% \text{ P.A.}$$

Alternative 2

Trial & Error Method

YTM is a discounting Rate at which present Value of Cash Inflows is equal to CMP

Let assume YTM is 10%.

$$P.V. = \frac{5000}{(1.10)^5} = ₹3105$$

जैसे जैसे yield Increase होगा, Value of Bond decrease होगा।

Let Assume YTM is 15%

$$\text{Value} = \frac{₹5000}{(1.15)^5} = ₹2486$$

Interpolation

10%	3105	305
15%	2486	2800
5%	619	

$$YTM = 10 + \left(\frac{5}{619} \times 305\right) = 12.46\% \text{ P.A.}$$

* If required yield is 11% P.A. whether Bond should be purchased or not

Basis of on the IV$_0$

$$IV_0 = \frac{₹5000}{(1.11)^5} = ₹2967$$

Rate ↓ IV$_0$ ↑ Rate ↑

IV$_0$ (2967) > CMP (2800)

underpriced → Buy

Bond B

Alternative I [Trial & Error method]

YTM is a disc. Rate at which PVCI is equal to CMP

Let assume ytm is 10%.

$PV = (120 \times PVAf, 10\%, 10) + (1000 \times Pvf, 10\%, 10)$

$= (120 \times 6.145) + (1000 \times 0.386)$

$= ₹1123$

Let assume YTM is 15%.

$P.V. = (120 \times PVAf, 15\%, 10) + (1000 \times PVf, 15\%, 10)$

$= (120 \times 5.019) + (1000 \times 0.247)$

$= ₹849$

Interpolation

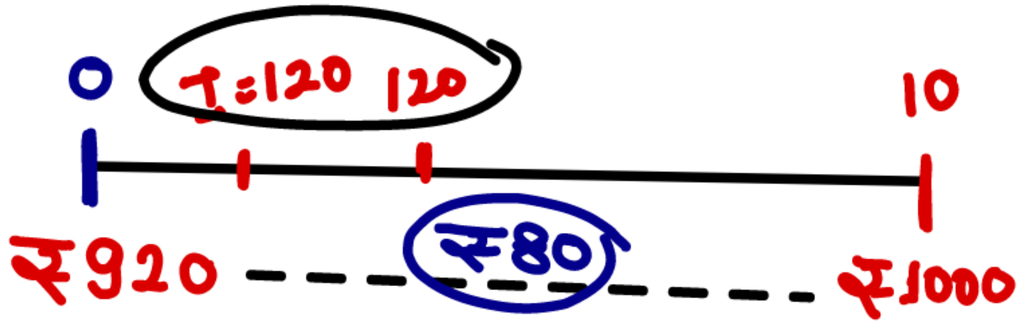
10%	———	₹1123 ┐ 203
		┘ 920
15%	———	₹849
5%		₹274

$$YTM = 10 + \left(\frac{5}{274} \times 203\right)$$

$= 13.70\%$ p.a.

Alternative 2 formula Method [Approximate YTM]

$$YTM = \frac{I + \left(\frac{f-p}{n}\right)}{\frac{f+p}{2}} \times 100$$



$$YTM = \frac{120 + \frac{(1000-920)}{10}}{\frac{1000+920}{2}} \times 100$$

$$= 13.33\% \text{ p.a.}$$

I = Interest Amount

f = Redeemable Value

n = No. of periods

p = price

Bond C

YTM is a disc. Rate at which PVCI is equal to CMP

$$PVCI = \frac{I}{yield}$$

$$CMP = \frac{I}{YTM}$$

$$₹80 = \frac{₹10}{YTM}$$

$$YTM = \frac{10}{80} \times 100 = 12.5\% \text{ P.a.}$$

Current yield

[No use in decision Making]

$$\text{Current yield} = \frac{\text{Int.}}{\text{CMP}} \times 100$$

ZCB (No coupon) it means C.Y. = 0 [Bond A]

Bond B : $\frac{₹120}{₹920} \times 100 = 13.04\%$ P.Q.

If CMP & R.V. are equal then C.Y. = YTM

Bond C = $\frac{10}{80} \times 100 = 12.5\%$ P.Q.

In perpetual Bond, C.Y. = YTM Always

On the Basis of YTM

YTM = 12.30% p.a.

required yield = 11% p.a.

YTM (12.30%) > required yield (11%)

Bond is underpriced → Buy

☞ I. Value निकालने के लिए required yield से disc. करते हैं & CMP के समय YTM से Disc. करते हैं

☞ It means if CMP < I. Value then YTM is more than required yield.

Example – 07

Face value = ₹ 100

Coupon = 11%

CMP = ₹ 90

Life = 5 Years

R.V. = ₹ 110

Income tax = 30%

Capital Gain = 10%

Calculate post tax YTM

(Page No. 07)

Post Tax YTM

$$YTM = \frac{I(1-t) + \frac{F-P}{n}}{\frac{F+P}{2}} \times 100$$

$$= \frac{11(1-0.30) + \left(\frac{108-90}{5}\right)}{\frac{108+90}{2}} \quad \text{W.N.1}$$

$$= \frac{7.70 + 3.60}{99} \times 100 = 11.41\%$$

W.N.1 Calculation of R.V. (Net of Capital Gain Tax)

Redeemble Value =	₹110
(-) Capital Gain Tax	
[110 - 90) x10% =	₹2
	₹108

Example – 08

Face value = ₹ 1,000

CMP = ₹ 980

Life = 5 Years

Redeemable at par

Coupon = 12% p.a. semiannually

Yield of similar bond = 15%

Calculate YTM.

Whether bond should be purchased?

(Page No. 07)

YTM

$$YTM = \frac{I + \left(\frac{F-P}{n}\right)}{\frac{F+P}{2}} \times 100$$

$$= \frac{₹60 + \left(\frac{1000-980}{10}\right)}{\frac{1000+980}{2}}$$

$$= \frac{₹62}{990} \times 100 = 6.26\%$$

$$YTM = 6.26 \times \frac{12}{6} = 12.52\% \text{ P.A.}$$

QUESTION – 11

There is a 9% 5-year bond issue in the market. The issue price is ₹ 90 and the redemption price ₹ 105. For an investor with marginal income tax rate of 30% and capital gains tax rate of 10% (assuming no indexation), what is the post-tax yield to maturity?

(Practice manual)

(Page No. 13)

QUESTION – 06

Based on the credit rating of bonds, Mr. Z has decided to apply the following discount rates for valuing bonds:

Credit Rating	Discount Rate
AAA	364 day T bill rate + 3% spread
AA	AAA + 2% spread
A	AAA + 3% spread

He is considering to invest in AA rated, ₹ 1,000 face value bond currently selling at ₹ 1,025.86. The bond has five years to maturity and the coupon rate on the bond is 15% p.a. payable annually. The next interest payment is due one year from today and the bond is redeemable at par. (Assume the 364 day T-bill rate to be 9%). You are required to calculate the intrinsic value of the bond for Mr. Z. Should he invest in the bond? Also calculate the current yield and the Yield to Maturity (YTM) of the bond.

(Practice manual)

(Page No. 09)

Current yield

$$C.Y. = \frac{\text{Interest}}{\text{Comp}} \times 100 = \frac{₹150}{1025.86} \times 100$$

$$= 14.62\%$$

Yield to maturity

$$YTM = \frac{I + \frac{F-P}{n}}{\frac{F+P}{n}} \times 100$$

$$= \frac{150 + \left(\frac{1000 - 1025.86}{5}\right)}{\frac{1000 + 1025.86}{2}} \times 100$$

$$= \frac{150 - 5.172}{1012.93} \times 100 = 14.30\% \text{ P.A.}$$

Intrinsic Value of Bond

Discounting Rate = 9 + 3 + 2 = 14%.

$IV_0 = (150 \times PVAF_{14\%,5}) + (1000 \times PVF_{14\%,5})$

$= (150 \times 3.433) + (1000 \times 0.519)$

$= ₹ 1034$

Since Bond is underpriced, hence it should be purchased.

QUESTION – 07

Calculate Market Price of:

(i) 10% Government of India security currently quoted at ₹110, but yield is expected to go up by 1%.

(ii) A bond with 7.5% coupon interest, Face Value ₹ 10,000 & term to maturity of 2 years, presently yielding 6% Interest payable half yearly.

(Practice manual & Study Material)

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(ii) Market price of Bond

$$CMP = (375 \times PVAF, 3\%, 4) + (10000 \times PVF, 3\%, 4)$$

$$= (875 \times 3.717) + (10000 \times 0.888)$$

$$= ₹\ 10274$$

(1.) Market price of Bond

- It is assumed that FV of Bond ₹100
- Bond is perpetual Bond

$$YTM = \frac{Int}{CMP} \times 100$$

$$= \frac{₹10}{₹110} \times 100 = 9.09\%$$

If yield increases by 1%. i.e 10.09%

$$CMP = \frac{₹10}{10.09\%} = ₹99.11$$

QUESTION – 08

An investor is considering the purchase of the following Bond:

Face value	₹ 100
Coupon rate	11%
Maturity	3 years

(i) If he wants a yield of 13% what is the maximum price he should be ready to pay for?

(ii) If the Bond is selling for ₹ 97.60, what would be his yield?

(Practice manual & Study Material)

(Page No. 10)

QUESTION – 09

The Nominal value of 10% Bonds issued at par by M/s. SK Ltd. is ₹ 100. The bonds are redeemable at ₹ 110 at the end of year 5.

(I) Determine the value of the bond if required yield is :

(i) 8%

(ii) 9%

(iii) 10%

(iv) 11%

(II) When will the value of the bond be highest ?

Given below are Present Value Factors :

Year	1	2	3	4	5
PV Factor @ 8%	0.926	0.857	0.794	0.735	0.681
PV Factor @ 9%	0.917	0.842	0.772	0.708	0.650
PV Factor @ 10%	0.909	0.826	0.751	0.683	0.621
PV Factor @ 11%	0.901	0.812	0.731	0.659	0.593

(Exam Nov - 2019)

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QUESTION – 10

If the market price of the bond is ₹ 95; years to maturity = 6 yrs: coupon rate = 13% p.a (paid annually) and issue price is ₹ 100. What is the yield to maturity?

(Practice manual)

(Page No. 13)

$$YTM = \frac{I + \left(\frac{F-P}{n}\right)}{\frac{F+P}{2}} \times 100$$

$$= \frac{₹\,13 + \left(\frac{100-95}{6}\right)}{\frac{100+95}{2}} = 14.18\%$$

QUESTION – 11

There is a 9% 5-year bond issue in the market. The issue price is ₹ 90 and the redemption price ₹ 105. For an investor with marginal income tax rate of 30% and capital gains tax rate of 10% (assuming no indexation), what is the post-tax yield to maturity?

(Practice manual)

(Page No. 13)

QUESTION – 12

On 31st March, 2013, the following information about Bonds is available:

Name of Security	Face Value ₹	Maturity Date	Coupon Rate	Coupon Date (s)
Zero coupon	10,000	31st March, 2023	N.A.	N.A.
T-Bill	1,00,000	20th June, 2013	N.A.	N.A.
10.71% GOI 2023	100	31st March, 2023	10.71	31st March
10% GOI 2018	100	31st March, 2018	10.00	31st March & 30th September

Calculate:

(i) If 10 years yield is 7.5% p.a. what price the Zero Coupon Bond would

fetch on 31st March, 2013?

(ii) What will be the annualized yield if the T-Bill is traded @ 98500?

(iii) If 10.71% GOI 2023 Bond having yield to maturity is 8%, what price would it fetch on April 1, 2013 (after coupon payment on 31st March)

(iv) If 10% GOI 2018 Bond having yield to maturity is 8%, what price would it fetch on April 1, 2013 (after coupon payment on 31st March)?

(Practice manual)

(Page No. 14)

① ZCB

$$IV_0 = \frac{₹10000}{(1.075)^{10}} = ₹4852$$

② Annualised yield of T. Bill

$$\text{Annualised yield} = \frac{100000 - 98500}{98500} \times 100 \times \frac{365}{81}$$

$$= 6.86\% \text{ p.a.}$$

③ CMP of Bond

$$CMP = (10.₹1 \times PVAF, 8\%, 10) + (100 \times PVF, 8\%, 10)$$

$$= (10.31 \times 6.₹10) + (100 \times 0.463) = ₹118.26$$

④ CMP of Bond

$$CMP = (5 \times PVAF, 4\%, 10) + (100 \times PVF, 4\%, 10)$$

$$= (5 \times 8.111) + (100 \times 0.6₹6)$$

$$= ₹108.26$$

QUESTION – 13

Today being 1st January 2019, Ram is considering to purchase an outstanding Corporate Bond having a face value of ₹ 1,000 that was issued on 1st January 2017 which has 9.5% Annual Coupon and 20 years of original maturity (i.e. maturing on 31st December 2027). Since the bond was issued, the interest rates have been on downside and it is now selling at a premium of ₹ 125.75 per bond.

Determine the prevailing interest on the similar type of Bonds if it is held till the maturity which shall be at Par.

PV Factors:

	1	2	3	4	5	6	7	8	9
6%	0.943	0.890	0.840	0.792	0.747	0.705	0.665	0.627	0.592
8%	0.926	0.857	0.794	0.735	0.681	0.630	0.583	0.540	0.500

(RTP November - 2020)

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Calculation of YTM of Bond

CMP = ₹1000 + 125.75 = ₹1125.75

Yield (6%)

= (₹95 × PVAF, 6%, 9) + (1000 × PVF, 6%, 9)

= (₹95 × 6.802) + (1000 × 0.592)

= ₹1238

Yield (8%)

= (₹95 × PVAF, 8%, 9) + (1000 × PVF, 8%, 9)

= (₹95 × 6.247) + (1000 × 0.500)

= ₹1093

Interpolation

6%	——	1238	112.25
8%	——	1093	1125-75
2%		145	

$$YTM = 6 + \left(\frac{2}{145} \times 112.25\right)$$

$$= 7.55\%$$

Prevailing Interest Rate of Similar debenture should be 7.55% P.A.

QUESTION – 14

Mr. X wants to invest ₹ 1,00,000 in the 7 years 8% bonds in the market (Face Value ₹ 100) which were issued 2 years ago.

(i) You are requested to advise him what is the maximum price for bonds to be paid in the following scenarios:

(1) If Mr. X is expecting minimum 9% return on the bonds

(2) If Mr. X is expecting minimum 7% return on the bonds

(3) If the present rate of similar bonds issued is 8.25%

(4) If the present rate of similar bonds issued is 7.75%

(ii) If the bonds are available at par and 1% is the transaction cost, what is the effective yield?

(iii) Find the number of days required to breakeven transaction cost if the bonds are available at par and 2% is the transaction cost.

(Exam Nov-2022)

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① 9% = (₹8 × 3.890) + (100 × 0.650)
= ₹96.12

② 7% = (8 × 3.993) + (100 × 0.680)
= ₹99.94

③ 8.25% = (8 × 3.964) + (100 × 0.673)
= ₹99.03

④ 7.75% = (8 × 4.019) + (100 × 0.688)
= ₹101

② YTM

Price of Bond including Transaction Cost = (₹100 × 1.01) = ₹101

$$YTM = \frac{8}{101} \times 100 = 7.92\%$$

③ Break Even days

Transaction Cost = ₹100000 × 2% = ₹2000

Income per day = ₹100000 × 8% × 1/360 = 22.22

No. of days = $\frac{2000}{22.22}$ = 90 days

Example – 09

Face value of bonds = ₹ 1,000

Life = 3 years

CMP = ₹ 970

Coupon Rate = 12% p.a.

Calculate YTM & Calculate Realized YTM if reinvestment rate 9% per annum.

(Page No. 08)

$$970(1+r)^3 = 1410$$

$$r = \left[\left(\frac{1410}{970}\right)^{1/3} - 1\right] \times 100$$

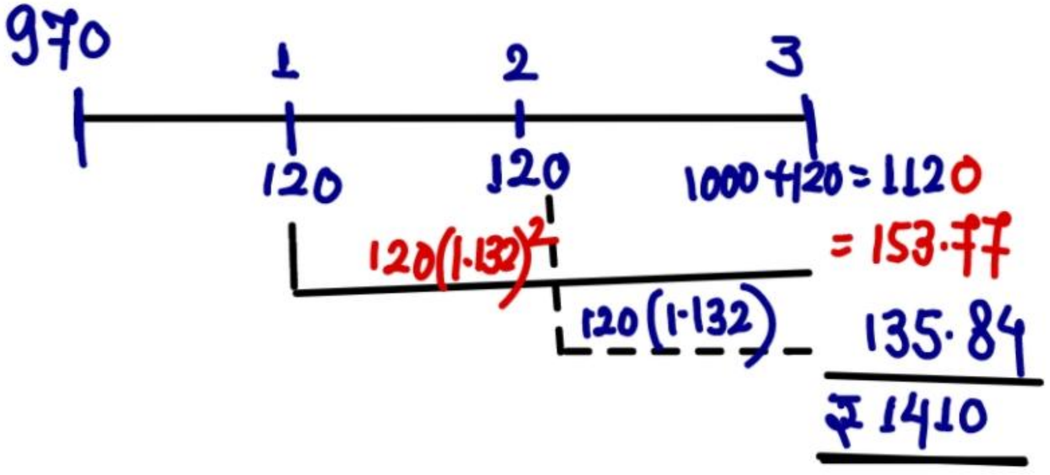
$$= 13.20\%$$

Realised YTM (Modified IRR)

$$YTM = \frac{I + \left(\frac{F-P}{n}\right)}{\frac{F+P}{2}} \times 100$$

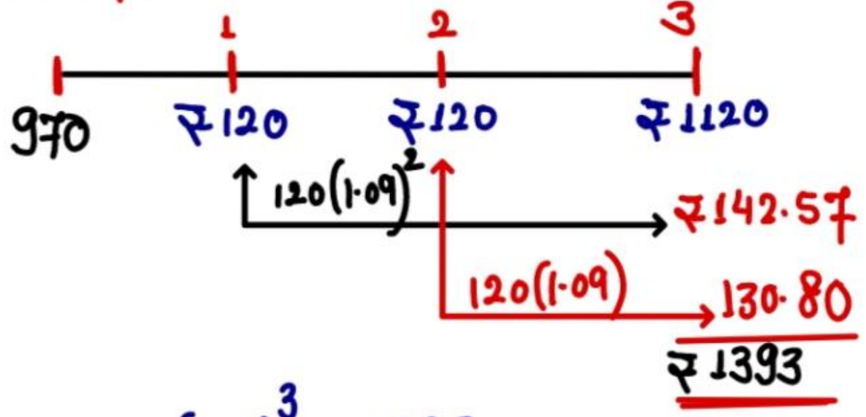
$$= \frac{₹\,120 + \left(\frac{1000-970}{3}\right)}{\frac{1000+970}{2}} \times 100$$

$$= 13.20\%\ \text{P.A.}$$



In YTM, we assume that intermediary cash flows are reinvested as YTM but In reality Intermediary Cash flows are reinvested at Investment rate at that time, hence Introduced Realised YTM

Realised YTM



$$970(1+r)^3 = 1393$$

$$r = \left[\left(\frac{1393}{970}\right)^{1/3} - 1\right] \times 100 = 12.82\% \text{ P.9.}$$

QUESTION – 15

Sushmita acquired at par a bond for ₹ 1,000 that offered a 15% coupon rate. At the time of purchase, the bond had four years to maturity. Assuming annual interest payment, calculate Sushmita's actual yield-to-maturity if all the interest payment were reinvested earning 18% p.a. What would Sushmita's realized yield-to-maturity be if all interest payments were spent immediately upon receipt?

(Page No. 18)

Calculation of CF at the end of 4th year if Reinvestment Rate 18% p.a.

1st YEAR Intt ₹150 $(1.18)^3$ = ₹246.43

2nd YEAR 150 $(1.18)^2$ = ₹208.86

3rd YEAR 150 × 1.18 = ₹177

4th YEAR (150+1000) = ₹1150

1782

$$1000(1+r)^4 = 1782$$

$$r = \left[\left(\frac{1782}{1000}\right)^{1/4} - 1\right] \times 100 = 15.54\% \text{ p.a.}$$

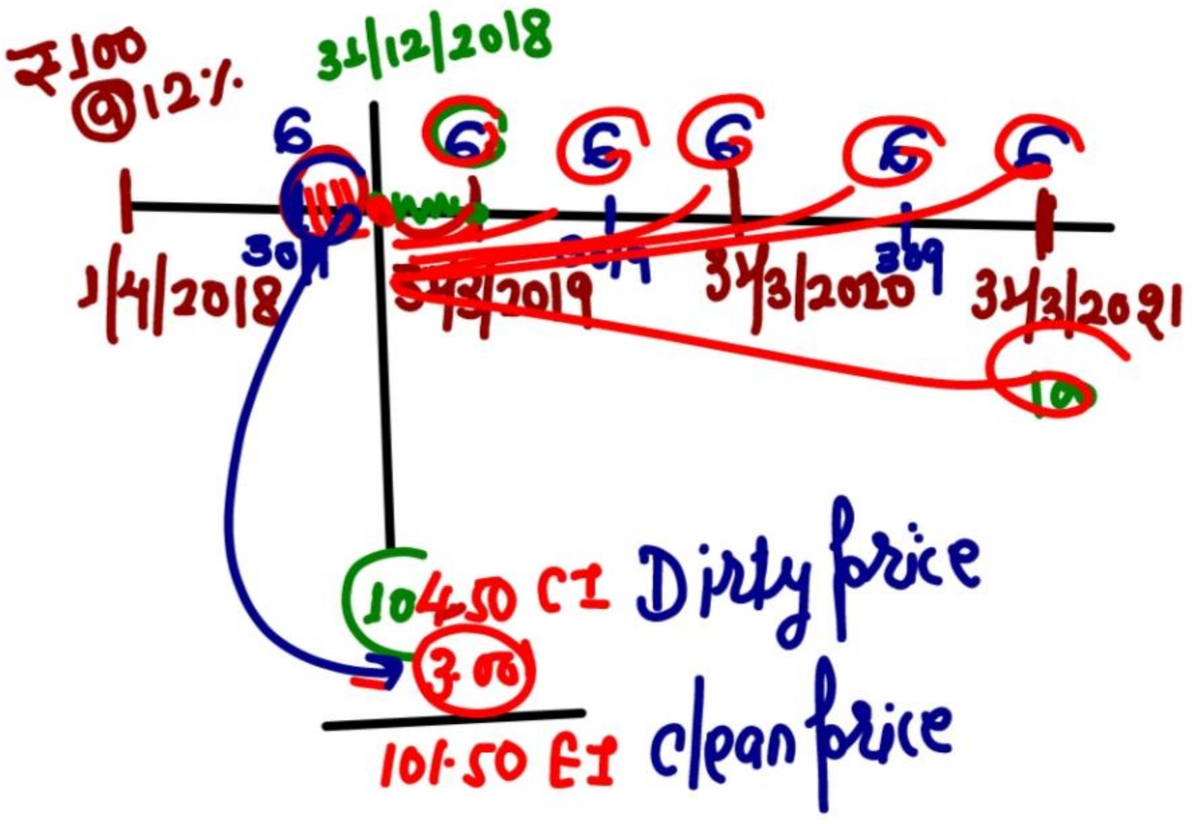
If All intermediary Cash flows are not Reinvested

Total Receipt = 150 + 150 + 150 + 1150 = ₹1600

$$1000(1+r)^4 = 1600$$

$$r = \left[\left(\frac{1600}{1000}\right)^{1/4} - 1\right] \times 100 = 12.47\% \text{ p.a.}$$

Dirty price & clean price



Dirty price

Clean price

Dirty price

= Bond price
Including Intt (full price)

Clean price

Dirty price - Accrued Intt.

Example – 10

Date of purchase = 31/10/2020

Face value = ₹ 1,000

Coupon = 12% p.a. Half yearly due date 30/06 & 31/12

Maturity date = 31/12/2023

Redeemable at par

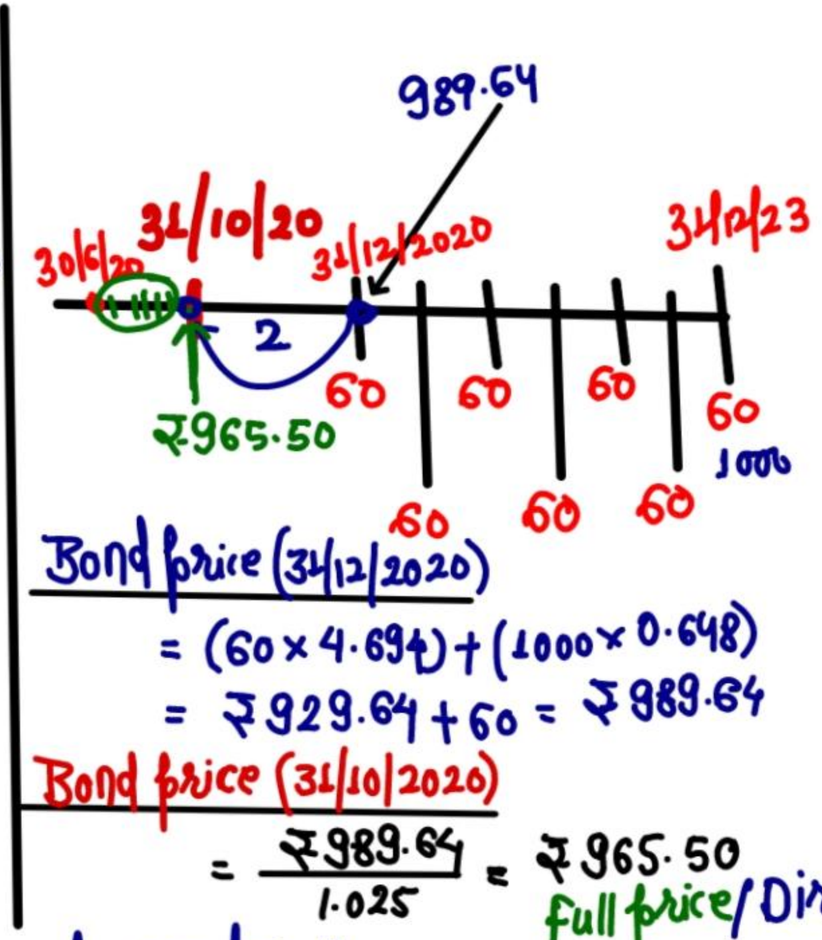
Yield of similar bond = 15% p.a.

Calculate: (i) Clean price

(ii) Dirty price

(ii) Accrued interest.

(Page No. 08)



Bond price (31/12/2020)

$= (60 \times 4.694) + (1000 \times 0.648)$

$= ₹929.64 + 60 = ₹989.64$

Bond price (31/10/2020)

$= \frac{₹989.64}{1.025} = ₹965.50$ Full price / Dirty price

Accrued Int

$1000 \times 12\% \times \frac{4}{12} = ₹40$

Clean price / Bond's Basic value

$₹965.50 - 40 = ₹925.50$

QUESTION – 16

MP Ltd. issued a new series of bonds on January 1, 2010. The bonds were sold at par (₹1,000), having a coupon rate 10% p.a. and mature on 31st December, 2025. Coupon payments are made semiannually on June 30th and December 31st each year. Assume that you purchased an outstanding MP Ltd. bond on 1st March, 2018 when the going interest rate was 12%. Required:

(i) What was the YTM of MP Ltd. bonds as on January 1, 2010?

(ii) What amount you should pay to complete the transaction? Of that

amount how much should be accrued interest and how much would

represent bonds basic value.

(Practice manual)

(Page No. 19)

① YTM as 1/1/2010

$$YTM = \frac{I + \frac{F-P}{n}}{\frac{F+P}{2}} \times 100$$

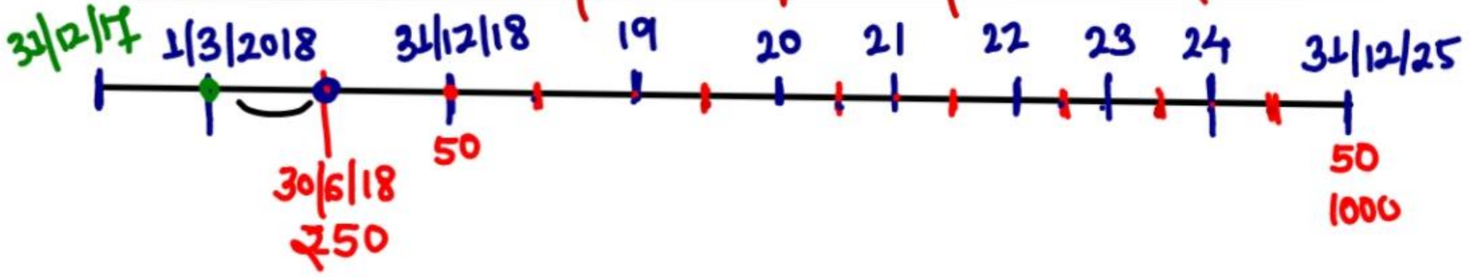
$$= \frac{₹50 + \left(\frac{1000-1000}{16}\right)}{\frac{1000+1000}{2}} \times 100$$

$$= \frac{₹50}{1000} \times 100 = 5\% \times \frac{12}{6} = 10\%$$

$$YTM = \frac{100}{1000} \times 100 = 10\%$$

ICAI

(11) Calculation of Bond full price, Acc. Int & Basic price



Bond price as on 30/6/18

$$(₹50 \times PVAf, 6\%, 15) + (1000 \times PVf, 6\%, 15)$$

$$= (₹50 \times 9.712) + (1000 \times 0.417) = ₹902.60$$

$$= ₹902.60 + 50 = ₹952.60$$

Bond full price as on 1/3/2018

$$\text{full price} = \frac{952.60}{[1 + 0.12 \times 4/12)} = \frac{952.60}{1.04} = ₹915.96$$

Accrued Int = $(₹1000 \times 10\% \times 2/12) = ₹16.67$

Bond's Basic Value = $₹915.96 - 16.67 = ₹899.29$

3. Bond Risk

Relationship between Bond price & yield

- If yield decreases then Bond price increases
- If yield Increases then Bond price decreases.

There are two Methods to Calculate Bond's Sensitivity

① Effective Duration
② Modified duration

Example – 11

Face value of bond = ₹ 1,000

Coupon = 10% p.a.

Yield of the bond = 9%

Life = 5 years

(i) Calculate price of bond.

(ii) If yield changes by 2% calculate new price of bond.

(iii) Calculate effective duration.

(Page No. 21)

1 Effective Duration

Bond price

Yield (9%) = (₹100 × 3.890) + (1000 × 0.650)
= ₹ 1039

Yield (7%) = (₹100 × 4.100) + (1000 × 0.713)
= ₹ 1123

Yield (11%) = (₹100 × 3.696) + (1000 × 0.593)
= ₹963

$$ED = \frac{P_2 - P_1}{2 \times P_0 \Delta y} \quad \frac{1123 - 963}{2 \times 1039 \times 2} = 0.0385$$

3.85%

% Increase in Bond price

$$\frac{1123-1039}{1039} \times 100 = 8.085\%$$

Yield 2%↓ = Bond price ↑ 8.085%

% decrease in Bond price

$$\frac{1039-963}{1039} \times 100 = 7.315\%$$

Yield 2%↑ = Bond price 7.315%↓

$$\frac{(1123-1039)+(1039-963)}{2 \times 1039 \times 2\%}$$

$$\frac{1123-963}{2 \times 1039 \times 2}$$

Yield के गिरने से Bond price ज्यादा speed से बढ़ता है & yield के बढ़ने से Bond price कम speed से गिरता है।

$$\text{Avg} = \frac{8.085+7.315}{2} = 7.70\%$$

$$\text{ED} = \frac{7.70\%}{2\%} = 3.85\%$$

ED = 3.85 means if yield changes by 1%, the Bond price will change by 3.85% in opposite direction.

On the basis of ED
Calculate, Bond price

- If yield decreased by 200 Basis points

$$\text{Effect} = -ED \times \frac{-BP}{100}$$

$$= -3.85 \times \frac{-200}{100} = 7.70\%$$

Expected price = 1039 (1.077) = ₹1119

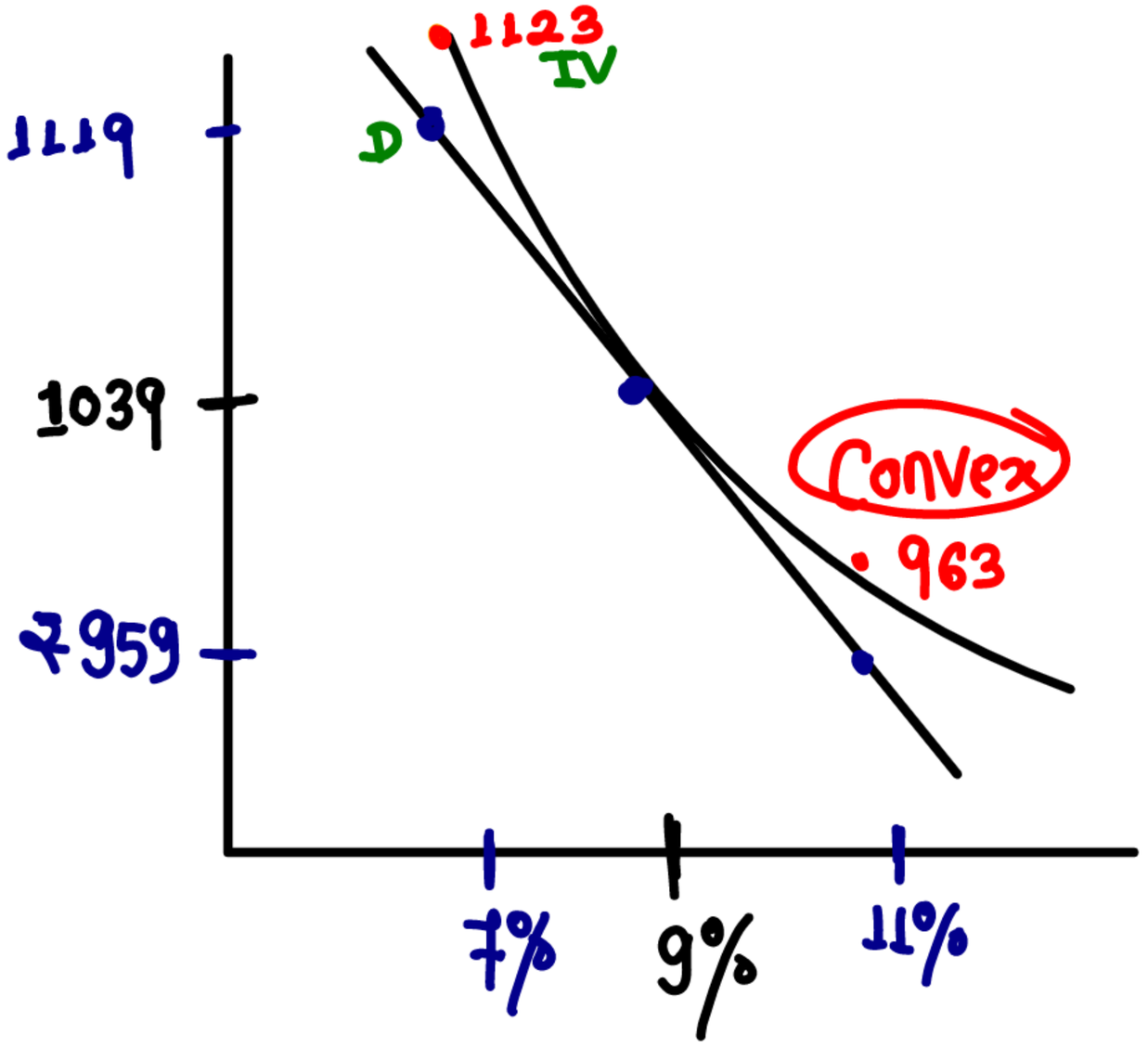
- If yield increase by 200 Basis points

$$\text{Effect} = -ED \times \frac{BP}{100}$$

$$= -3.85 \times \frac{200}{100}$$

$$= -7.70\%$$

₹1039 - 7.70% = ₹959


1123
IV
D
1119
1039
₹959
Convex
963
7%
9%
11%

Example – 12

Face value of bond = ₹ 1,000

Coupon = 10%

Life of bond = 5 years

YTM = 9%

(i) Calculate bond price.

(ii) Calculate Bond duration.

(iii) Calculate modified duration

(iv) If yield increases by 50 basis point calculate new bond price.

(Page No. 21)

(II) Modified Duration

In order to calculate modified duration or volatility, we have to calculate first Duration or Macaulay duration

Duration of Bonds

YEAR	CF	PV(YTM 9%)	YEAR X PVCF	Weight	
1	100	91.74	91.74	0.088	0.088
2	100	84.17	168.34	0.081	0.162
3	100	77.22	231.66	0.074	0.222
4	100	70.84	283.36	0.068	0.272
5	1100	₹1492	3574.60	0.688	3.44
		₹1039	4350		4.184

$$D = \frac{\Sigma \text{ YEAR X PVCF}}{\text{CMP}} = \frac{4350}{1039} = 4.187$$

$$\text{MD or Volatility} = \frac{D}{1+ytm} = \frac{4.184}{1.09} = 3.84$$

$$\text{Effect} = -MD \times \frac{BP}{100} \quad -3.84 \times \frac{50}{100} = -1.92\%$$

Expected price = ₹1039 − 1.92% = ₹1019

FORMUCA

- In ICB, Maturity period = Duration
- **Duration of perpetual Bond**

$$D = \frac{1+YTM}{YTM}$$

- $$D = \frac{1+YTM}{YTM} - \frac{(1+YTM)+(CR-Ytm)n}{CR\left[(1+YTM)^n-1\right]+Ytm}$$

$$= \frac{1.09}{0.09} - \frac{1.09+(0.10-0.09)5}{0.10\left[(1.09)^5-1\right]+0.09}$$

$$= 12.11 - \frac{1.14}{0.144}$$

$$= 4.193 \text{ YEARS}.$$

QUESTION – 17

The following data is available for a bond:

Face Value	₹ 1,000
Coupon Rate	11%
Years to Maturity	6
Redemption Value	₹ 1,000
Yield to Maturity	15%

(Round-off your answers to 3 decimals)

Calculate the following in respect of the bond:

(i) Current Market Price.

(ii) Duration of the Bond.

(iii) Volatility of the Bond.

(iv) Expected market price if increase in required yield is by 100 basis points.

(v) Expected market price if decrease in required yield is by 75 basis points.

(Practice manual)

(Page No. 22)

(1) CMP & Duration

YEAR	CF	YTM (15%)	P.V.	Weights	WXYEAR
1	110	0.870	95.70	0.113	0.113
2	110	0.756	83.16	0.098	0.196
3	110	0.658	72.38	0.085	0.255
4	110	0.572	62.92	0.074	0.296
5	110	0.497	54.67	0.064	0.32
6	1110	0.432	479.52	0.565	3.39
		CMP	848.35	Duration =	4.570

(iii) Volatility of Bond

$$\text{Volatility} = \frac{D}{1+Yrm} = \frac{4.57}{1.15} = 3.974$$

(iv) Yield Increases by 100 BP

$$\text{Effect} = -mD \times \frac{BP}{100} = -3.974 \times \frac{100}{100} = -3.974\%$$

Expected price: $848.35 - 3.974\% = ₹814.64$

(v) Yield decreased by 75 BP

$$\text{Effect} = -3.974 \times \frac{-75}{100} = 2.9805\%$$

$$\text{price} = 848.35 + 2.9805\% = 873.63$$

QUESTION – 18

The following data are available for a bond

Face value	₹ 1,000
Coupon Rate	16%
Years to Maturity	6
Redemption value	₹ 1,000
Yield to maturity	17%

What is the current market price, duration and volatility of this bond?

Calculate the expected market price, if increase in required yield is by 75 basis points.

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(Practice manual & Study Material)

(Page No. 24)

QUESTION – 19

Following is the information for the options free bond:

Face value of the bond	₹ 1,000
Coupon rate	7%
Terms of Maturity	7 years
Yield to Maturity	8%

You are required to calculate:

(i) Market price of the bond and duration.

(ii) If there is an increase in yield by 35 basis points, what would be the price of bond?

Present Value	t_1	t_2	t_3	t_4	t_5	t_6	t_7
$PVIF_{0.07,t}$	0.935	0.874	0.817	0.764	0.714	0.667	0.623
$PVIF_{0.08,t}$	0.926	0.857	0.794	0.735	0.681	0.631	0.584

(Exam Jan-2021, RTP May - 2022)

(Page No. 26)

QUESTION – 20

The following data is available for NNTC bond:

Face value:	₹ 1000
Coupon rate:	7.50%
Years to maturity:	8 years
Redemption Value:	₹ 1000

YTM: 8%

Calculate:

(i) The current market price, duration and volatility of the bond.

(ii) The expected market price if there is a decrease in required yield by 50 bps.

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(RTP November - 2020)

(Page No. 28)

XL Ispat Ltd. has made an issue of 14 per cent non-convertible debentures on January 1, 2007. These debentures have a face value of ₹ 100 and is currently traded in the market at a price of ₹ 90.

Interest on these NCDs will be paid through post-dated cheques dated June 30 and December 31st . Interest payments for the first 3 years will be paid in advance through post-dated cheques while for the last 2 years post-dated cheques will be issued at the third year. The bond is redeemable at par on December 31, 2011 at the end of 5 years.

Required :

(i) Estimate the current yield and YTM of the bond.

(ii) Calculate the duration of the NCD.

(iii) Assuming that intermediate coupon payments are, not available for reinvestment calculate the realized yield on the NCD.

(Practice manual)

(Page No. 31)

① Current yield & YTM

$$C.Y. = \frac{I}{CMP} \times 100 \times \frac{12}{6}$$

$$= \frac{7}{90} \times 100 \times \frac{12}{6} = 15.55\%$$

$$YTM = \frac{I + \left(\frac{F-P}{n}\right)}{\frac{F+P}{2}}$$

$$= \frac{7 + \left(\frac{100-90}{10}\right)^{2}}{\frac{100+90}{2}} = 8.42\%$$

$$= 8.42 \times \frac{12}{6} = 16.84\% \text{ p.a.}$$

(ii) Duration of NCD

YEAR	CF	YTM (8.42%)	PV	Weights	WxYEAR
1	7	0.922	6.454	0.071	0.071
2	7	0.851	5.957	0.066	0.132
3	7	0.785	5.495	0.061	0.183
4	7	0.724	5.068	0.056	0.224
5	7	0.667	4.669	0.051	0.255
6	7	0.616	4.312	0.047	0.282
7	7	0.568	3.976	0.044	0.308
8	7	0.524	3.668	0.040	0.320
9	7	0.483	3.381	0.037	0.333
10	107	0.446	47.722	0.526	5.260
			₹90.7		7.368

$$\text{Duration} = \frac{7.368}{2} = 3.684 \text{ YEARS}$$

(iii) Realised YTM

Cash Outflows = ₹90

Cash Inflows = (₹7 × 10) + 100 = ₹170

$$90(1+r)^{10} = 170$$

$$r = \left[\left(\frac{170}{90}\right)^{1/10} - 1\right] \times 100 = 6.57\%$$

$$\text{Realised YTM} = 6.57 \times \frac{12}{6} = 13.14\% \text{ p.a.}$$

QUESTION – 23

(a) Consider two bonds, one with 5 years to maturity and the other with 20 years to maturity. Both the bonds have a face value of ₹ 1,000 and coupon rate of 8% (with annual interest payments) and both are selling at par. Assume that the yields of both the bonds fall to 6%, whether the price of bond will increase or decrease? What percentage of this increase/decrease comes from a change in the present value of bond's principal amount and what percentage of this increase/decrease comes from a change in the present value of bond's interest payments?

(b) Consider a bond selling at its par value of ₹ 1,000, with 6 years to maturity and a 7% coupon rate (with annual interest payment), what is bond's duration?

(c) If the YTM of the bond in (b) above increases to 10%, how it affects the bond's duration? And why? (Practice Manual)

(Page No. 34)

If Bonds are selling at par & redeemed at par then

Coupon = C.Y. = YTM

5 YEAR BOND

	P.V. of Int +	P.V. of principal =	Market
YTM (8%)	(80 × 3.993) +	(1000 × 0.681) =	
	= ₹319 +	681	= 1000
YTM (6%)	= (80 × 4.212) +	(1000 × 0.747) =	
	= ₹337 +	747	= 1084
	₹18	66	₹84

If yield decreases to 6% then price of Bond will Increase by ₹84 due to

change in P.V. of Int = $\frac{₹18}{84} \times 100 = 21.43\%$

change in P.V. of principal = $\frac{66}{84} \times 100 = 78.57\%$

20 YEARS Bond

	P.V. of InH	P.V. principal	Market price
Yield 8%	(80 × 9.818)	(1000 × 0.214)	
	786	214	1000
Yield 6%	(80 × 11.470)	(1000 × 0.312)	
	918	312	1230
	132	98	230

If yield decreased to 6% then Bond price will Increase by ₹230

Due to P.V. of InH = $\frac{132}{230} \times 100 = 57.39\%$

Due to P.V. of principal = $\frac{98}{230} \times 100 = 42.61\%$

(b) Bond duration

$$D = \frac{1+YTm}{YTm} - \frac{(1+YTm) + (CR-YTm)n}{CR\left[(1+YTm)^n - 1\right] + YTm}$$

$$= \frac{1.07}{0.07} - \frac{(1.07) + (0.07-0.07)6}{0.07\left[(1.07)^6 - 1\right] + 0.07}$$

$$= 15.286 - \frac{1.07}{0.105} = 5.097$$

If yield increased then Bond duration will decrease because proportion of P.V.CI of Last will decrease

(c) If YTm = 10%

$$D = \frac{1.10}{0.10} - \frac{(1.10) + (0.07-0.10)6}{0.07\left[(1.10)^6 - 1\right] + 0.10}$$

$$= 11 - \frac{0.92}{0.154} = 5.025 \text{ YEARS}.$$

Years	Coupon	PVF (7%)	PV	Proportion			Years	Coupon	PVF (10%)	PV	Proportion	
1	70	0.935	65.45	0.065	0.065		1	70	0.909	63.63	0.073	0.073
2	70	0.873	61.11	0.061	0.122		2	70	0.826	57.82	0.067	0.133
3	70	0.816	57.12	0.057	0.171		3	70	0.751	52.57	0.061	0.182
4	70	0.763	53.41	0.053	0.214		4	70	0.683	47.81	0.055	0.220
5	70	0.713	49.91	0.050	0.250		5	70	0.621	43.47	0.050	0.250
6	1070	0.666	712.62	0.713	4.276		6	1070	0.564	603.48	0.695	4.168
			1000		5.098					868.78		5.026

QUESTION – 24

Mr. A is planning for making investment in bonds of one of the two companies X Ltd. and Y Ltd. The detail of these bonds is as follows:

Company	Face Value	Coupon Rate	Maturity Period
X Ltd.	₹ 10,000	6%	5 Years
Y Ltd.	₹ 10,000	4%	5 Years

The current market price of X Ltd.'s bond is ₹10,796.80 and both bonds have same Yield To Maturity (YTM). Since Mr. A considers duration of bonds as the basis of decision making, you are required to calculate the duration of each bond and you decision.

(Practice manual)

(Page No. 36)

Calculation of YTM

$$YTM = \frac{I + \left(\frac{F-P}{n}\right)}{\frac{F+P}{2}} \times 100$$

$$= \frac{₹600 + \left(\frac{10000 - 10796.80}{5}\right)}{\frac{10000 + 10796.80}{2}} \times 100$$

$$= 4.24\% \text{ P.A.}$$

$$Y = 4.24\% \text{ P.A.}$$

Calculation of Duration

$$D = \frac{1+YTM}{YTM} - \frac{(1+YTM) + (CR-YTM)n}{CR\left[(1+YTM)^n - 1\right] + YTM}$$

Bond x

$$D = \frac{1.042}{0.042} - \frac{(1.042) + (0.06-0.042)5}{0.06\left[(1.042)^5 - 1\right] + 0.042}$$

$$= 24.809 - \frac{1.132}{0.056} = 4.59 \text{ YEARS}$$

Bond y

$$D = \frac{1.042}{0.042} - \frac{(1.042) + (0.04-0.042)5}{0.04\left[(1.042)^5 - 1\right] + 0.042}$$

$$= 24.809 - \frac{1.032}{0.0511} = 4.61 \text{ YEARS}.$$

Bond y should be purchased due to Lower duration.

QUESTION – 21

Find the current market price of a bond having face value ₹ 1,00,000 redeemable after 6 year maturity with YTM at 16% payable annually and duration 4.3202 years. Given $1.16^6 = 2.4364$.

(Practice Manual)

(Page No. 30)

Let Assume Intt Amount be x

Calculation of Current Market price

YEAR	CF	YTM (16%)	PV	PVCF x YEAR
1	x	0.862	0.862x	0.862x
2	x	0.743	0.743x	1.486x
3	x	0.641	0.641x	1.923x
4	x	0.552	0.552x	2.208x
5	x	0.476	0.476x	2.380x
6	100000+x	0.410	41000+0.410x	246000+2.46x
			41000+3.684x	246000+11.319x

$$D = \frac{\Sigma \text{ PVCF} \times \text{YEAR}}{\text{CMP}}$$

$$4.3202 = \frac{246000 + 11.319x}{41000 + 3.684x}$$

$$177128 + 15.9156x = 246000 + 11.319x$$

$$68872 = 4.5966x$$

$$x = \frac{68872}{4.5966} = 14983$$

$$\text{Coupon Rate} = \frac{14983}{100000} \times 100$$

$$= 14.98\%$$

Or 15%

$$\text{CMP} = (₹15000 \times \text{PVAf}_{16\%, 6}) + (₹100000 \times \text{PVf}_{16\%, 6})$$

$$= (15000 \times 3.685) + (100000 \times 0.410)$$

$$= ₹96275$$

Example – 11

Face value of bond = ₹ 1,000

Coupon = 10% p.a.

Yield of the bond = 9%

Life = 5 years

(i) Calculate price of bond.

(ii) If yield changes by 2% calculate new price of bond.

(iii) Calculate effective duration.

(Page No. 21)

1 Effective Duration

Bond price

Yield (9%) = (₹100 × 3.890) + (1000 × 0.650)
= ₹1039

Yield (7%) = (₹100 × 4.100) + (1000 × 0.713)
= ₹1123

Yield (11%) = (₹100 × 3.696) + (1000 × 0.593)
= ₹963

$$ED = \frac{P_2 - P_1}{2 \times P_0 \Delta y} \quad \frac{1123 - 963}{2 \times 1039 \times 2} = 0.0385$$

3.85%

On the basis of ED
Calculate, Bond price

- If yield decreased by 200 Basis points

$$\text{Effect} = -ED \times \frac{-BP}{100}$$

$$= -3.85 \times \frac{-200}{100} = 7.70\%$$

Expected price = 1039 (1.077) = ₹1119

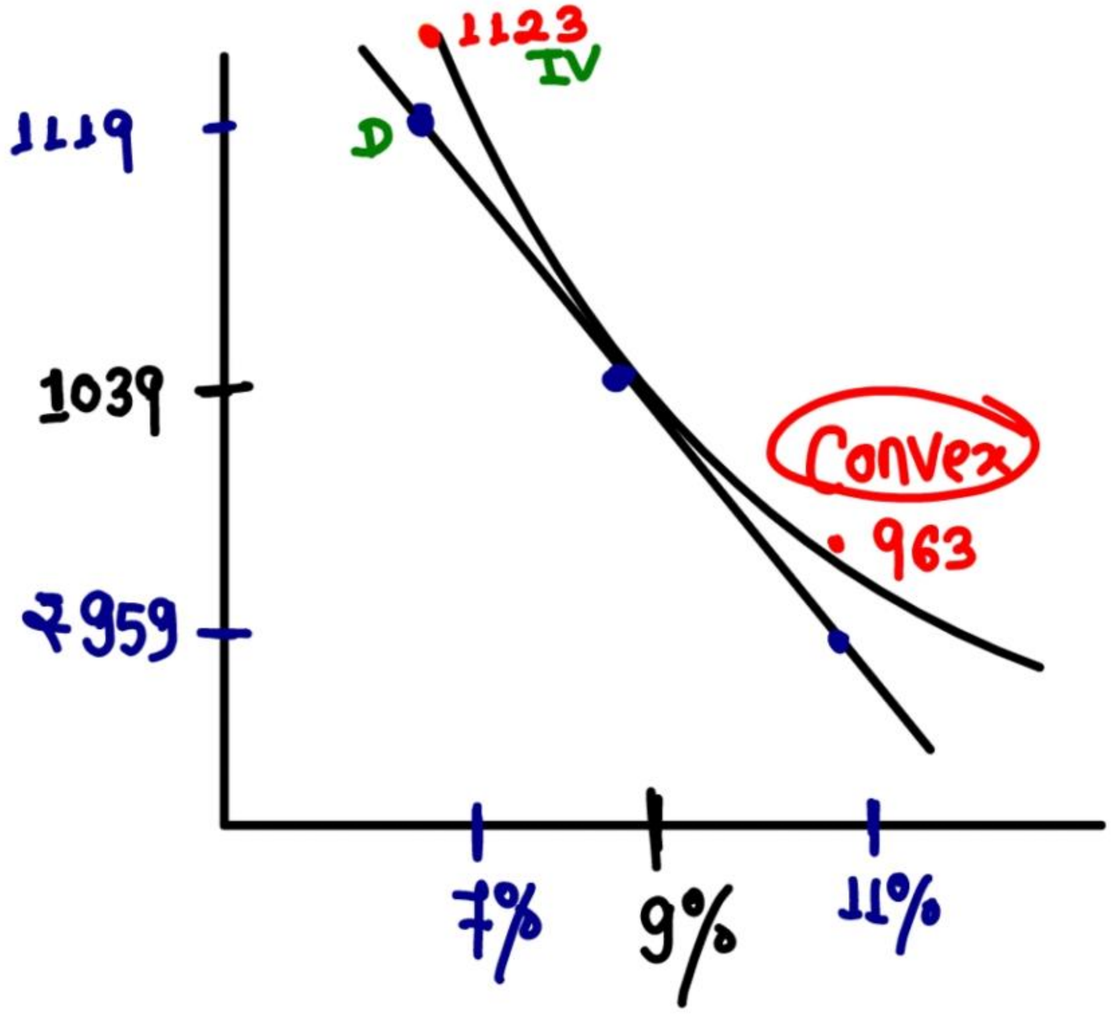
- If yield increase by 200 Basis points

$$\text{Effect} = -ED \times \frac{BP}{100}$$

$$= -3.85 \times \frac{200}{100}$$

$$= -7.70\%$$

₹1039 - 7.70% = ₹959



MD = 3.850

Convexity

Convexity Adjustment

$$C^* = \frac{P_2 + P_1 - 2P_0}{2P_0(\Delta y)^2}$$

$$= \frac{1123 + 963 - 2 \times 1039}{2 \times 1039 \times (0.02)^2}$$

$$= \frac{8}{0.8312} = 9.625$$

$$CA = C^* \times \Delta y^2 \times 100$$

$$= 9.625 \times (0.02)^2 \times 100 = 0.385$$

Calculation of Bond price after Convexity Adjustment

- If yield ↑ 200 BP

$$\text{Effect} = \left(-MD \times \frac{BP}{100}\right) + CA$$

$$= \left(-3.850 \times \frac{200}{100}\right) + 0.385 = -7.315\%$$

Bond price = ₹1039 − 7.315% = ₹963

- If yield ↓ 200 BP

$$\text{Effect} = \left(-3.850 \times \frac{-200}{100}\right) + 0.385 = 8.085$$

Bond price = ₹1039 + 8.085% = ₹1123

QUESTION – 25

The following data are available for a bond:

Face Value ₹ 10,000 to be redeemed at par on maturity

Coupon rate 8.5 per cent per annum

Years to Maturity 5 years

Yield to Maturity (YTM) 10 per cent

You are required to calculate:

(i) Current market price of the Bond,

(ii) Macaulay's Duration,

(iii) Volatility of the Bond,

(iv) Convexity of the Bond,

(v) Expected market price, if there is a decrease in the YTM by 200 basis points

  (a) By Macaulay's Duration based estimate

  (b) By Intrinsic Value Method.

Given

Years	**1**	**2**	**3**	**4**	**5**
PVIF (10%, n)	0.909	0.826	0.751	0.683	0.621
PVIF (8%,n)	0.926	0.857	0.794	0.735	0.681

(Exam November - 2020) (Page No. 38)

CMP & Duration

YEAR	CF	YTM (10%)	P.V.	Weight	YEAR x W
1	850	0.909	772.65	0.082	0.082
2	850	0.826	702.10	0.074	0.148
3	850	0.751	638.35	0.068	0.204
4	850	0.683	580.55	0.062	0.248
5	10850	0.621	6737.85	0.714	3.570
		CMP	9431.50	Duration =	4.252

(iii) Volatility of Bond

$$\text{Volatility of Bond} = \frac{D}{1+ytm} = \frac{4.252}{1.10} = 3.865$$

(iv) Convexity of Bond

If yield Increases by 200 BP (2%) (12%)

$$P_1 = (₹850 \times 3.605) + (10000 \times 0.567)$$
$$= ₹8734.25$$

If yield decreased by 200BP (8%)

$$P_2 = (850 \times 3.993) + (10000 \times 0.681)$$
$$= 10204.05$$

$$C^* = \frac{P_2 + P_1 - 2P_0}{2 \times P_0 \times (\Delta y)^2}$$

$$= \frac{10204.05 + 8734.25 - 2 \times 9431.50}{2 \times 9431.50 \times (0.02)^2}$$

$$= \frac{75.30}{7.5452} = 9.980$$

$$CA = C^* \times (\Delta y)^2 \times 100$$

$$= 9.980 \times (0.02)^2 \times 100$$

$$= 0.399$$

(V) Expected Market price if yield decrease by 200 BP

(i) Using Macaulay Duration

$$\text{Effect} = -MD \times \frac{-BP}{100}$$

$$= -3.865 \times \frac{-200}{100} = 7.73\%$$

Expected price = 9431.50 + 7.73% = ₹ 10160

(ii) Intrinsic Value Method

Expected price = ₹ 10204.05

AFTER CA

$$\text{Effect} = \left(-3.865 \times \frac{-200}{100}\right) + 0.399$$

$$= 8.129$$

Expected price

$$= 9431.50 + 8.129\%$$

$$= 10198$$

QUESTION – 26

The following data are available for a bond:

Face Value	₹ 10,000 to be redeemed at par on maturity
Coupon rate	8.5%
Years to Maturity	5 years
Yield to Maturity (YTM)	10%

EVALUATE the change in the expected market price of the Bond, if there is a decrease in the YTM by 200 basis points based on

(i) By Macaulay's Duration after making Convexity Adjustment.

(ii) By Intrinsic Value Method.

Given

Years	1	2	3	4	5
PVIF (10%, n)	0.909	0.826	0.751	0.683	0.621
PVIF (8%, n)	0.926	0.857	0.794	0.735	0.681

(MTP April - 2022)

(Page No. 41)

H.W.

C.W

Bond portfolio Management

1. Active Bond portfolio Management
   → Manage Bond portfolio on the basis of Expectation.
2. passive Bond portfolio Management
   → Immunization Theory

1 Active Bond portfolio Management

Step 1 Calculate Duration of Bond portfolio [Weighted Avg]

Step 2 Change the investment Amt on the Basis of Int Rate Expectation

- If Int Rate is Expected to Increase
  - Buy Lower Duration & Sell Higher Duration Bond
- If Int. Rate is Expected to fall
  - Buy higher duration Bond & Sell Lower duration Bond

Example – 13

BONDS	AMT	DURATION
A	8,00,000	11 years
B	3,00,000	1 years
C	2,00,000	2 years
D	4,00,000	8 years

(i) Calculate duration of Bond Portfolio.

(ii) Advise if:

(a) Yield will increase.

(b) Yield will decrease.

(Page No. 43)

(i) Duration of Bonds portfolio

$$D = \frac{(8 \times 11) + (3 \times 1) + (2 \times 2) + (4 \times 8)}{17}$$

$$= 7.47 \text{ YEARS}$$

(ii) (a) If yield will increase, then duration of portfolio should be decreased [Sell Bond A & Buy Bond B]

(b) If yield will decrease then duration of portfolio should be increased [Buy Bond A & Sell Bond B]

2. Passive Bond Portfolio Management

[Immunization Theory]

Example – 14

Face Value = ₹ 1,000

Coupon = 12%

Maturity = 5 years

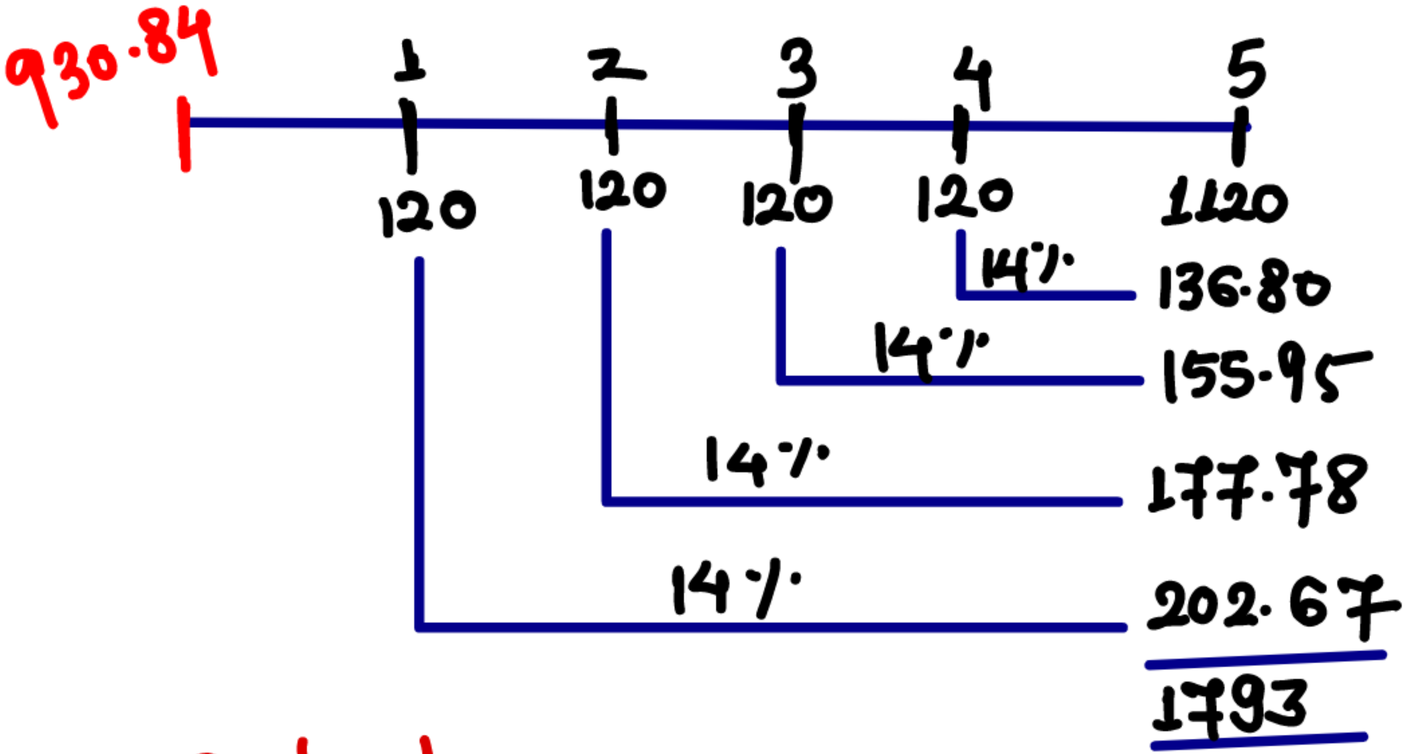
YTM = 14%

Calculate Bond Duration.

(Page No. 44)

Bond duration

YEAR	CF	YTM (14%)	PV	weight	PVxW
1	120	0.877	105.24	0.113	0.113
2	120	0.769	92.28	0.099	0.198
3	120	0.675	81.00	0.087	0.261
4	120	0.592	71.04	0.076	0.304
5	1120	0.519	581.28	0.624	3.12
			930.84	D	4 YEARS



Assumption of YTM

① Reinvestment Rate Assumption

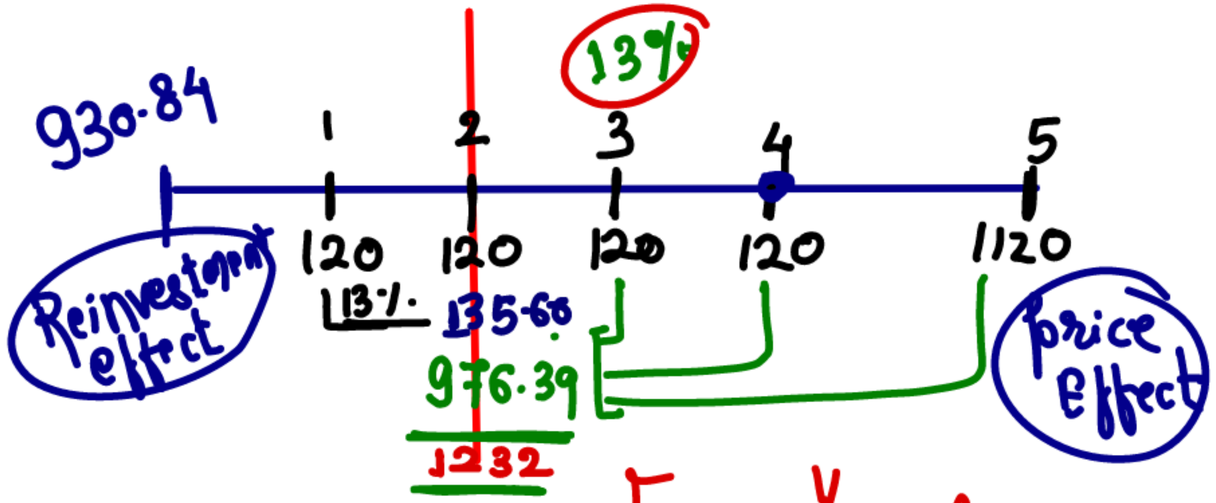
② Held till Maturity

Realised YTM

$$930.84(1+r)^5 = 1793$$

$$r = \left[\left(\frac{1793}{930.84}\right)^{1/5} - 1\right] \times 100 = 14\%$$

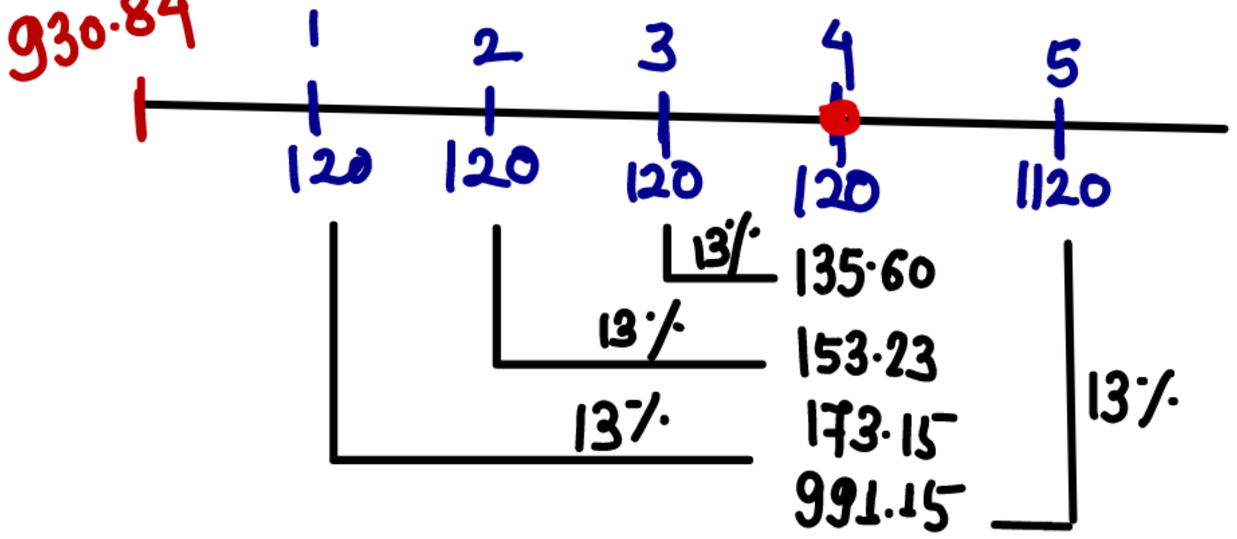
Suppose Reinvestment Rate After purchase of Bond is 13% & Hold Bond upto 2 YEAR only.



$$\text{Realised yield} = \left[\left(\frac{1232}{930.84}\right)^{1/2} - 1\right] \times 100 = 15.04\%$$

आखिर Bond कितने period तक Hold किया जाए So that मेरी कमाई Reinvestment Rate change होने के बाद भी 14% ही हो ना कम, ना ज्यादा।

Suppose Reinvestment Rate = 13%
& Duration = 4 YEARS.



$$r = \left[\left(\frac{1573.13}{930.84}\right)^{1/4} - 1\right] \times 100 = 14\%$$

There are three types of Bond Risk

1. Credit Risk
   — Not deal in this chapter
2. Reinvestment Rate Risk
3. Price Risk

" Duration is an immunization period at which Reinvestment Rate Risk & price Risk Nullifies each other Or at which Realised yield = YTM

QUESTION – 29

Mr. A will need ₹ 1,00,000 after two years for which he wants to make one time necessary investment now. He has a choice of two types of bonds. Their details are as below:

	Bond X	**Bond Y**
Face value	₹ 1,000	₹ 1,000
Coupon	7% payable annually	8% payable annually
Years to maturity	1	4
Current price	₹ 972.73	₹ 936.52
Current yield	10%	10%

Advice Mr. A whether he should invest all his money in one type of bond or he should buy both the bonds and, if so, in which quantity? Assume that there will not be any call risk or default risk.

(PM, SM, MTP March – 2021 & RTP November - 2021)

(Page No. 48)

Bond duration

Bond x

YEAR	CF	YTM 10%	PV	Weight	YEAR x Weight
1	1070	0.909	972.36	1	1
			972.63		

D = 1 YEAR

BOND Y

		10%			
1	80	0.909	72.72	0.078	0.078
2	80	0.826	66.08	0.070	0.14
3	80	0.751	60.08	0.064	0.192
4	1080	0.683	737.64	0.788	3.152
			936.52		3.562

D = 3.562

We can not invest in Individual Bond because duration of liability is 2 YEARS, hence duration of Asset should be 2 YEARS. We should Invest in Both Bonds in such proportion so that Duration of Bond portfolio should be 2 YEARS

$$D_L = D_A$$

$$2 = (1 \times w_x) + 3.562(1 - w_x)$$

$$2 = w_x + 3.562 - 3.562 w_x$$

$$1.562 = 2.562 w_x$$

$$w_x = \frac{1.562}{2.562} = 0.61$$

$$w_y = 1 - 0.61 = 0.39$$

Amt of Investment

$$= ₹100000 \times 0.826$$

$$₹82600$$

Bond x $= 82600 \times 0.61$

$$= ₹50386$$

Quantity $= \frac{50386}{972.73} = 51.79$

$$= 52 \text{ Bonds}$$

Bond y $= 82600 \times 0.39$

$$= 32214$$

Quantity $= \frac{32214}{936.52} = 34.39$

$$= 34 \text{ Bonds}$$

QUESTION – 28

The following data are available for three bonds A, B and C. These bonds are used by a bond portfolio manager to fund an outflow scheduled in 6 years. Current yield is 9%. All bonds have face value of ₹ 100 each and will be redeemed at par. Interest is payable annually.

Bond	Maturity (Years)	Coupon rate
A	10	10%
B	8	11%
C	5	9%

(i) Calculate the duration of each bond.

(ii) The bond portfolio manager has been asked to keep 45% of the portfolio money in Bond A. Calculate the percentage amount to be invested in bonds B and C that need to be purchased to immunize the portfolio.

(iii) After the portfolio has been formulated, an interest rate change occurs, increasing the yield to 11%. The new duration of these

(i) Bond duration

$$D = \frac{1+YTM}{YTM} - \frac{(1+YTM)+(CR-YTM)n}{CR\left[(1+YTM)^n-1\right]+YTM}$$

Bond A

$$D = \frac{1.09}{0.09} - \frac{(1.09)+(0.10-0.09)10}{0.10\left[(1.09)^{10}-1\right]+0.09}$$

$$= 12.11 - \frac{1.19}{0.2267} = 6.861$$

Bond B

$$D = \frac{1.09}{0.09} - \frac{(1.09)+(0.11-0.09)8}{0.11\left[(1.09)^{8}-1\right]+0.09}$$

$$= 12.11 - \frac{1.25}{0.1992} = 5.835$$

Bond C

$$D = \frac{1.09}{0.09} - \frac{(1.09)-(0.09-0.09)5}{0.09\left[(1.09)^{5}-1\right]+0.09}$$

$$= 12.11 - \frac{1.09}{0.1385} = 4.240$$

bonds are: Bond A = 7.15 years, Bond B = 6.03 years and Bond C = 4.27 years.

Is the portfolio still immunized? Why or why not?

(iv) Determine the new percentage of B and Ca bonds that are needed to immunize the portfolio. Bond A remaining at 45% of the portfolio.

Present values be used as follows:

Present Values	t_1	t_2	t_3	t_4	t_5
$PVIF_{0.09,t}$	0.917	0.842	0.772	0.708	0.650

Present Values	t_6	t_7	t_8	t_9	t_{10}
$PVIF_{0.09,t}$	0.596	0.547	0.502	0.460	0.4224

(MTP March - 2021)

(Page No. 45)

(ii) Calculation of percentage Investment in Bond B & Bond C

$$D_L = D_A \qquad (0.55)$$

$$6 = (6.861 \times 0.45) + (5.835 \times w_B) + 4.240 \times (0.55 - w_B)$$

$$6 = 3.087 + 5.835 w_B + 2.332 - 4.240 w_B$$

$$0.581 = 1.595 w_B$$

$$w_B = \frac{0.581}{1.595} = 0.364$$

$$w_C = (0.55 - 0.364) = 0.186$$

$W_A = 45\%$

$W_B = 36.4\%$

$W_C = 18.6\%$

(iii) If yield increases to 11% & duration of each Bond will change, then calculation of DA of the basis of Weighted Calculated as point (ii)

$$(7.15 \times 0.45) + (6.03 \times 0.364) + (4.27 \times 0.186)$$

$$= 6.20 \text{ YEARS}.$$

Since $D_L = 6$ YEARS but duration of assets is 6.20 years
Hence portfolio will not immunize

(iv) Calculation of Weights of Bond B & C

$$6 = (7.14 \times 0.45) + (6.03 \times \omega_B) + 4.27 (0.55 - \omega_B)$$

$$6 = 3.213 + 6.03\omega_B + 2.348 - 4.27\omega_B$$

$$0.439 = 1.76\,\omega_B$$

$$\omega_B = \frac{0.439}{1.76} = 0.249$$

$$\omega_C = 0.55 - 0.249 = 0.301$$

Investment

A = 45%

B = 24.90%

C = 30.10%

QUESTION – 27

The following corporate bonds are considered for investment by the portfolio manager. His aim is to immunize the liability due in 6 years All bonds have face value of ₹ 1000.

Bonds	**Maturity (years)**	**Coupon rate**	**Duration (years)**
Arvind Mills	10	8	7.35
BILT	8	9	6.15
Cipla	7	7	4.30

If the portfolio manager wishes to invest 50% in Arvind Mills, what is the proportion of total amount that can be invested in other two bonds to immunize the portfolio?

(Page No. 44)

4. Optionally Convertible Bonds (OCD)

In OCD, there are two options

1. Convert this Bond in Shares
2. Treated as NCD & held till Maturity.

We have to calculate Issue price of OCD

Example – 15

Face Value = ₹ 1,000

Coupon Rate = 8% p.a.

Years = 5 years

Conversion Ratio = 4 shares

Current share price = ₹ 245

Yield on similar NCD = 11%

Calculate price of convertible bond if price is more than 10% of floor value.

(Page No. 49)

Suppose Bond is treated as NCD

- Intrinsic Value or
- Investment Value or
- Straight Value

$IV_0 = (80 \times PVAf_{11\%,5}) + (1000 \times PVf_{11\%,5})$

$= (80 \times 3.696) + (1000 \times 0.593)$

$= ₹ 889$

Suppose Bonds are Converted into Shares Now

- Conversion Value of Bond

or

- Stock Value of Bond

Conversion Value = Conversion Ratio × MPS

= 4 × 245 = ₹980

Floor Value means IVo or Conversion Value whichever is higher

In this question Floor Value is ₹980

Price of Bond = Floor Value + Conv.

= ₹980 × 1.10 = ₹1078

Example – 16

Consider a convertible bond

Face Value = ₹ 1,000

Coupon = 10% p.a.

Life = 10 years

Conversion Ratio = 20 shares

Market price per share = ₹ 45

Current market price of bond = ₹ 970

Expected dividend per share = ₹ 2

Yield of similar NCD = 14%

Calculate:

(i) Straight value of bond.

(ii) Stock value of bond.

(iii) Percentage of downside risk.

(iv) Premium over conversion value.

(v) Premium over investment value.

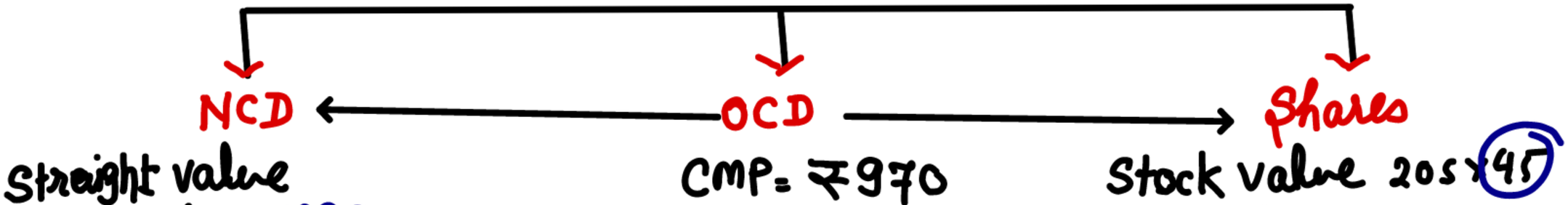
(vi) Conversion parity price per share.

(vii) Conversion premium per share.

(viii) Favorable income differential per share.

(ix) Premium pay back period.

(Page No. 50)



- premium over Conversion Value = 7.78%
- premium over Investment Value = 22.47%
- parity price per share = ₹48.50
- Conversion premium per share = 3.50
- favorable Income per share = ₹3

1. Straight Value of Bond

$= (₹100 \times PVAf, 14\%, 10) + (1000 \times PVf, 14\%, 10)$

$= (₹100 \times 5.216) + (1000 \times 0.270) = ₹792$

2. Stock Value of Bond

Conversion Ratio × mps

20 shares × 45 = ₹900

(3.) Premium over Conversion Value or Conversion premium

$$\text{premium} = \frac{\text{CMP} - \text{Conversion Value}}{\text{Conversion Value}} \times 100$$

$$= \frac{970 - 900}{900} \times 100 = 7.78\%$$

4. Premium over Investment Value

$$\text{premium} = \frac{\text{CMP} - \text{IVo}}{\text{IVo}} \times 100$$

$$= \frac{970 - 792}{792} \times 100 = 22.47\%$$

5 Conversion parity price per share

अगर आज OCD Buy करके (₹970), आज ही shares में convert कर लें (20 shares) तो per share price कितना होगा

$$\text{parity price per share} = \frac{\text{CMP}}{\text{Conversion Ratio}} = \frac{970}{20} = ₹48.50$$

6. Conversion premium per share

= parity price − mps

= ₹48.50 − 45 = ₹3.50

- Ratio of Conversion premium

$= \frac{₹3.50}{45} \times 100 = 7.78\%$

7. favorable Income differential per share

Income from OCD = ₹100

Equivalent Income per share = $\frac{₹100}{20}$ = ₹5

Expected dividend per share = ₹2

favorable Income differential per share = ₹5 − 2

= ₹3 p.a.

8 premium pay Back period

$\text{Payback period} = \frac{\text{Conversion premium}}{\text{fav. Income}}$

$= \frac{₹3.50}{3}$

= 1.17 YEARS.

9. percentage of downside Risk

$= \frac{CMP - IVo}{CMP} \times 100$

$= \frac{970 - 792}{970} \times 100 = 18.35\%$

$\text{or} = \frac{970 - 792}{792} \times 100 = 22.47\%$

285

QUESTION – 37

The following data is related to 8.5% Fully Convertible (into Equity shares) Debentures issued by JAC Ltd. at ₹ 1000.

Market Price of Debenture	₹ 900
Conversion Ratio	30
Straight Value of Debenture	₹ 700
Market Price of Equity share on the date of Conversion	₹ 25
Expected Dividend Per Share	₹ 1

H.W
Class Work

You are required to calculate:

(a) Conversion Value of Debenture 750

(b) Market Conversion Price ₹30

(c) Conversion Premium per share 5

(d) Ratio of Conversion Premium 20%

(e) Premium over Straight Value of Debenture 28.57%

2.833 - 1 = 1.833 →

(f) Favorable income differential per share

(g) Premium pay back period 6/1.833 = 2.727

(Practice Manual & RTP November - 2021)

QUESTION – 31

A convertible bond with a face value of ₹ 1,000 is issued at ₹ 1,350 with a coupon rate of 10.5%. The conversion rate is 14 shares per bond. The current market price of bond and share is ₹ 1,475 and ₹ 80 respectively. What is the premium over conversion value?

(Practice manual & SM)

(Page No. 52)

QUESTION – 33

The data given below relates to a convertible bond :

Face Value	₹ 250
Coupon rate	12%
No. of shares per bond	20
Market price of share	₹12
Straight value of bond	₹ 235
Market price of convertible bond	₹ 265

H.W

C.W

Calculate:

(i) Stock value of bond.

(ii) The percentage of downside risk.

(iii) The conversion premium.

(iv) The conversion parity price of the stock.

(SM, PM & RTP May - 2019)

(Page No. 53)

QUESTION – 34

Pineapple Ltd has issued fully convertible 12 percent debentures of ₹ 5,000 face value, convertible into 10 equity shares. The current market price of the debentures is ₹ 5,400. The present market price of equity shares is ₹ 430.

Calculate:

(i) the conversion percentage premium, and

(ii) the conversion value

(Practice Manual)

(Page No. 54)

QUESTION – 35

GHI Ltd., AAA rated company has issued, fully convertible bonds on the following terms, a year ago:

Face value of bond	₹ 1000
Coupon (interest rate)	8.5%
Time to Maturity (remaining)	3 Years
Interest Payment	Annual, at the end of year
Principal Repayment	At the end of bond maturity
Conversion ratio (Number of shares per bond)	25
Current market price per share	₹ 45
Market price of convertible bond	₹ 1175

AAA rated company can issue plain vanilla bonds without conversion option at an interest rate of 9.5%.

H-20

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Required: Calculate as of today:

(i) Straight Value of bond.

(ii) Conversion Value of the bond.

(iii) Conversion Premium.

(iv) Percentage of downside risk.

(v) Conversion Parity Price.

t	1	2	3
$PVIF_{0.095,\ t}$	0.9132	0.8340	0.7617

(Practice Manual)

(Page No. 55)

QUESTION – 36

The following information was extracted from the books of M/s Murugan Ltd.:

Face Value of Bond	₹ 1,000
Coupon Interest Rate	8.5%
Time Period of Maturity Remaining	4 Years
Interest Payment	Annual, at the end of the year
Principal Repayment	At the end of the Bond maturity
Conversion Ratio (Number of shares per Bond)	30
Current Market Price per Share	₹ 55
Market Price of Convertible Bond	₹ 1,725

It can issue plain bonds without conversion option at an Interest rate of 10.5%.

H.W
HW COPY

Year	t_1	t_2	t_3	t_4
PVIF @ 10.5%	0.905	0.819	0.741	0.671

Based on the above data, you are requested to calculate:

(i) Straight value of bonds

(ii) Conversion Value of Bond

(iii) Conversion Premium

(iv) Percentage of Down Turn Risk

(v) Conversion Parity Price

(Exam Nov-2022)

(Page No. 57)

QUESTION – 39

The following is the data related to 9% Fully convertible (into Equity Shares) debentures issued by Delta Ltd. at ₹ 1000.

Market Price of 9% Debenture	₹ 1,000
Conversion Ratio (No. of shares)	25
Straight Value of 9% Debentures	₹ 800
Market price of equity share on the date of conversion	₹ 30
Expected Dividend per share	₹ 1

HW
HWCOPY

Calculate:

(a) Conversion value of Debenture;

(b) Market Conversion Price;

(c) Conversion Premium per share;

(d) Ratio of Conversion Premium;

(e) Premium over straight Value of Debenture;

(f) Favorable Income Differential per share; and

(g) Premium pay back period

(Exam May – 2018 & MTP April - 2022)

(Page No. 61)

QUESTION – 42

The data given below relates to convertible bond of Hi-Fi Ltd.:

Face value	₹ 2,500
No. of shares per bond	20
Coupon rate	12%
Market price per share	₹ 120
Market price of convertible bond	₹ 2,650
Straight value of bond	₹ 2,350

H.W
HW COPY

You are required to calculate the following:

(i) Conversion value of bond.

(ii) The percentage of downside risk.

(iii) The conversion premium

(iv) Conversion parity price of the stock and also interpret the results.

(Exam July – 2021)

(Page No. 65)

QUESTION – 32

Saranam Ltd. has issued convertible debentures with coupon rate 12%. Each debenture has an option to convert to 20 equity shares at any time until the date of maturity. Debentures will be redeemed at ₹ 100 on maturity of 5 years. An investor generally required a rate of return of 8% p.a. on a 5-year security. As an investor when will you exercise conversion for given market prices of the equity share of (i) ₹ 4, (ii) ₹ 5 and (iii) ₹ 6.

Cumulative PV factor for 8% for 5 years : 3.993

PV factor for 8% for year 5 : 0.681

(Practice manual, SM)

(Page No. 52)

Calculation of IV0

$IV_0 = (₹12 \times PVAf, 8\%, 5) + (100 \times PVf, 8\%, 5)$

$= (12 \times 3.993) + (100 \times 0.681)$

$= ₹116$

Conversion Value

(i) $4 \times 20 = 80$

(ii) $5 \times 20 = 100$

(iii) $6 \times 20 = 120$

Investor will convert Bond into share if price per share is ₹6 per share

QUESTION – 40

Sabanam Ltd. has issued convertible debentures with coupon rate 11%. Each debenture has an option to convert to 16 equity shares at any time until the date of maturity. Debenture will be redeemed at ₹ 100 on maturity of 5 years. An investor generally requires a rate of return of 8% p.a. on a 5-year security. As an advisor, when will you advise the investor to exercise conversion for given market prices of the equity share of (i) ₹ 5, (ii) ₹ 6 and (iii) ₹ 7.10.

Cumulative PV factor for 8% for 5 years: 3.993

P.V. factor for 8% for year 5 : 0.681

(Exam May - 2018)

(Page No. 63)

QUESTION – 30

XYZ company has current earnings of ₹ 3 per share with 5,00,000 shares outstanding. The company plans to issue 40,000, 7% convertible preference shares of ₹ 50 each at par. The preference shares are convertible into 2 shares for each preference shares held. The equity share has a current market price of ₹ 21 per share.

(i) What is preference share's conversion value?

(ii) What is conversion premium?

(iii) Assuming that total earnings remain the same, calculate the effect of the issue on the basic earning per share (a) before conversion (b) after conversion.

(iv) If profits after tax increases by ₹ 1 million what will be the basic EPS (a) before conversion and (b) on a fully diluted basis?

(Practice Manual)

(Page No. 50)

① Conversion value

= Conversion Ratio × MPS

= 2 × 21 = 42

② Conversion premium

$$\frac{CMP - \text{Conversion value}}{\text{Conversion Value}} \times 100$$

$$= \frac{50 - 42}{42} \times 100 = 19.05\%$$

(iii) Change in EPS

(iv) H.W.

	Before Conversion	After Conversion
Earning	1500000	1500000
(-) PD	(40000 × 50 × 7%) 140000	-
E for ESH	1360000	1500000
÷ N	500000	580000 (500000 + (40000 × 2))
	2.72	2.59

QUESTION – 38

A Ltd. has issued convertible bonds, which carries a coupon rate of 14%. Each bond is convertible into 20 equity shares of the company A Ltd. The prevailing interest rate for similar credit rating bond is 8%. The convertible bond has 5 years maturity. It is redeemable at par at ₹ 100. The relevant present value table is as follows.

Present Values	t_1	t_2	t_3	t_4	t_5
$PVIF_{0.14,t}$	0.877	0.769	0.675	0.592	0.519
$PVIF_{0.08,t}$	0.926	0.857	0.794	0.735	0.681

You are required to estimate:

(Calculations be made upto 3 decimal places)

(i) current market price of the bond, assuming it being equal to its fundamental value,

(ii) minimum market price of equity share at which bond holder should exercise conversion option; and

(iii) duration of the bond.

(Practice Manual)

(Page No. 60)

QUESTION – 41

A hypothetical company ABC Ltd. issued a 10% Debenture (Face Value of ₹ 1000) of the duration of 10 years, currently trading at ₹ 850 per debenture. The bond is convertible into 50 equity shares being currently quoted at ₹ 17 per share.

If yield on equivalent comparable bond is 11.80%, then calculate the spread of yield of the above bond from this comparable bond.

The relevant present value table is as follows.

Present Values	t_1	t_2	t_3	t_4	t_5
$PVIF_{0.11,t}$	0.901	0.812	0.731	0.659	0.593
$PVIF_{0.13,t}$	0.885	0.783	0.693	0.613	0.543

Present Values	t_6	t_7	t_8	t_9	t_{10}
$PVIF_{0.11,t}$	0.535	0.482	0.434	0.391	0.352
$PVIF_{0.13,t}$	0.480	0.425	0.376	0.333	0.295

(RTP November - 2019)

(Page No. 64)

YTM is a rate at which IV = CMP

11%
= (₹100 × 5.889) + (1000 × 0.352)
= ₹941

13%
= (100 × 5.426) + (1000 × 0.295)
= 838

11% ——— 941 ↑ 91 / 850
13% ——— 838 ↓ 103
3%

YTM = $11 + \left(\frac{3}{103} \times 91\right) = 13.65\%$

Spread = 13.65 − 11.80 = 1.85%

5. Option Embedded Bond

(1) Puttable Bonds

(2) Callable Bonds

(3) Extendable Bonds

1 Puttable Bonds

In puttable Bonds, Bondholders has an option to sell such Bonds to the company after specific period before maturity at predetermine price. Be

This option will Exercised only when Market Rate of Intt will rise

2 Callable Bonds

In Callable Bonds, Company has an option to buy such Bonds at predetermine price after specified period & such option will be Exercised when Market Rate of Intt will fall.

Example – 17

Face value of bond = ₹1000

Coupon = 12% p.a.

Life = 15 year

Feature = Callable Bond

1st call after 5 year at ₹1200

2nd call after 10 year at ₹ 1150

Redeemable Value = ₹ 1000

(i) Calculate yield to call (YTC)

(ii) Yield to Maturity (YTC)

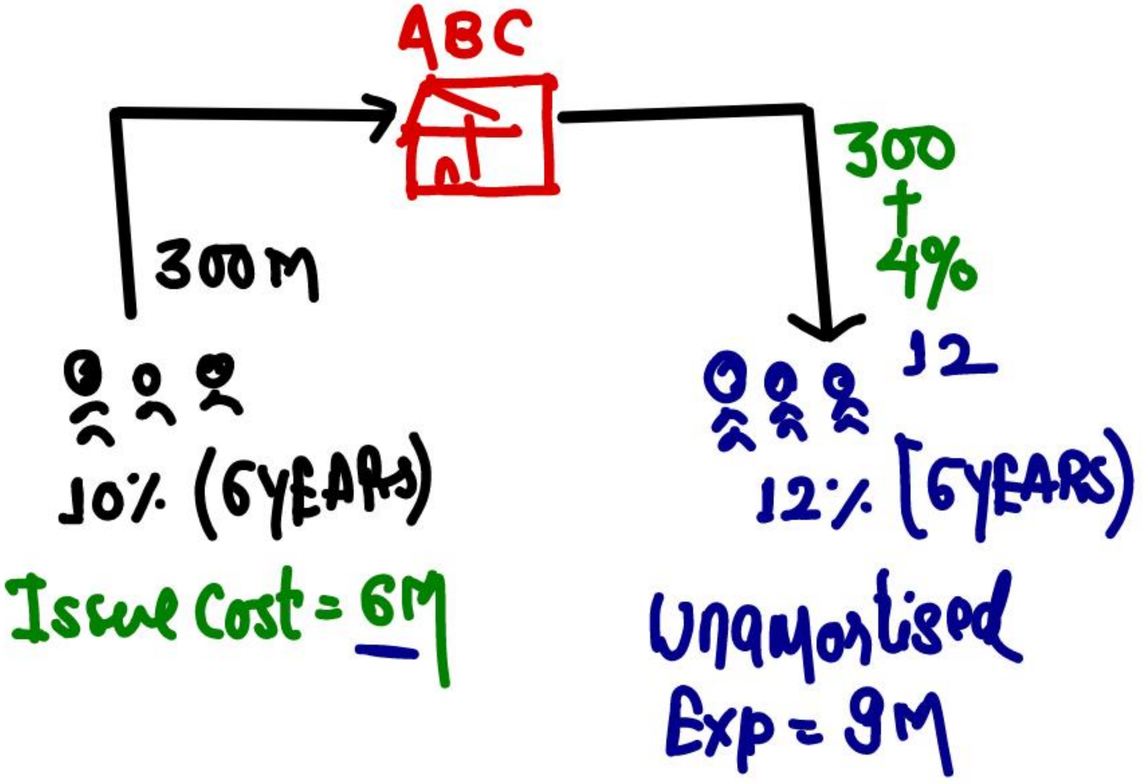
(Page No. 16)

QUESTION – 43

ABC Ltd. has ₹ 300 million, 12 per cent bonds outstanding with six years remaining to maturity. Since interest rates are falling, ABC Ltd. is contemplating of refunding these bonds with a ₹ 300 million issue of 6 year bonds carrying a coupon rate of 10 per cent. Issue cost of the new bond will be ₹ 6 million and the call premium is 4 per cent. ₹ 9 million being the unamortized portion of issue cost of old bonds can be written off no sooner the old bonds are called off. Marginal tax rate of ABC Ltd. is 30 per cent. You are required to analyze the bond refunding decision.

(SM, PM & RTP May - 2020)

(Page No. 67)



1 Incremental Cash Outflows (Millions)

Repayment of old Bonds including premium 300 (1.04)	= (312)
Tax Savings on call premium (12 × 30%)	= 3.60
Tax Savings on Unamortised Exp of old Bond (9 × 30%)	= 2.70
Issue of New Bonds	= 300
Issue cost of New Bonds	= (6)
Incremental Cash outflows =	11.70

present Value of Cash Inflows

	old Bonds	New Bonds
Interest (Net of Tax)	300 x 12%. 36(1-0.30) 25.20	300 x 10%. 30 (1-0.30) 21
Tax Savings on Exp.	$\frac{9}{6}$ x 30%. = (0.45)	$\frac{6}{6}$ x 30%. (0.30)
Cost	24.75	20.70

If disc. Rate is not given, then Kd is used

Kd = I(1-t)
= 10(1-0.30)
= 7%

Incremental Savings (P.a) = 24.75 - 20.70 = 4.05 M

PVCI = 4.05 x (PVAf, 6, 7%)
= 4.05 x 4.766 = 19.30 M

NPV = PVCI - PVCO
= 19.30 - 11.70 = 7.60 M

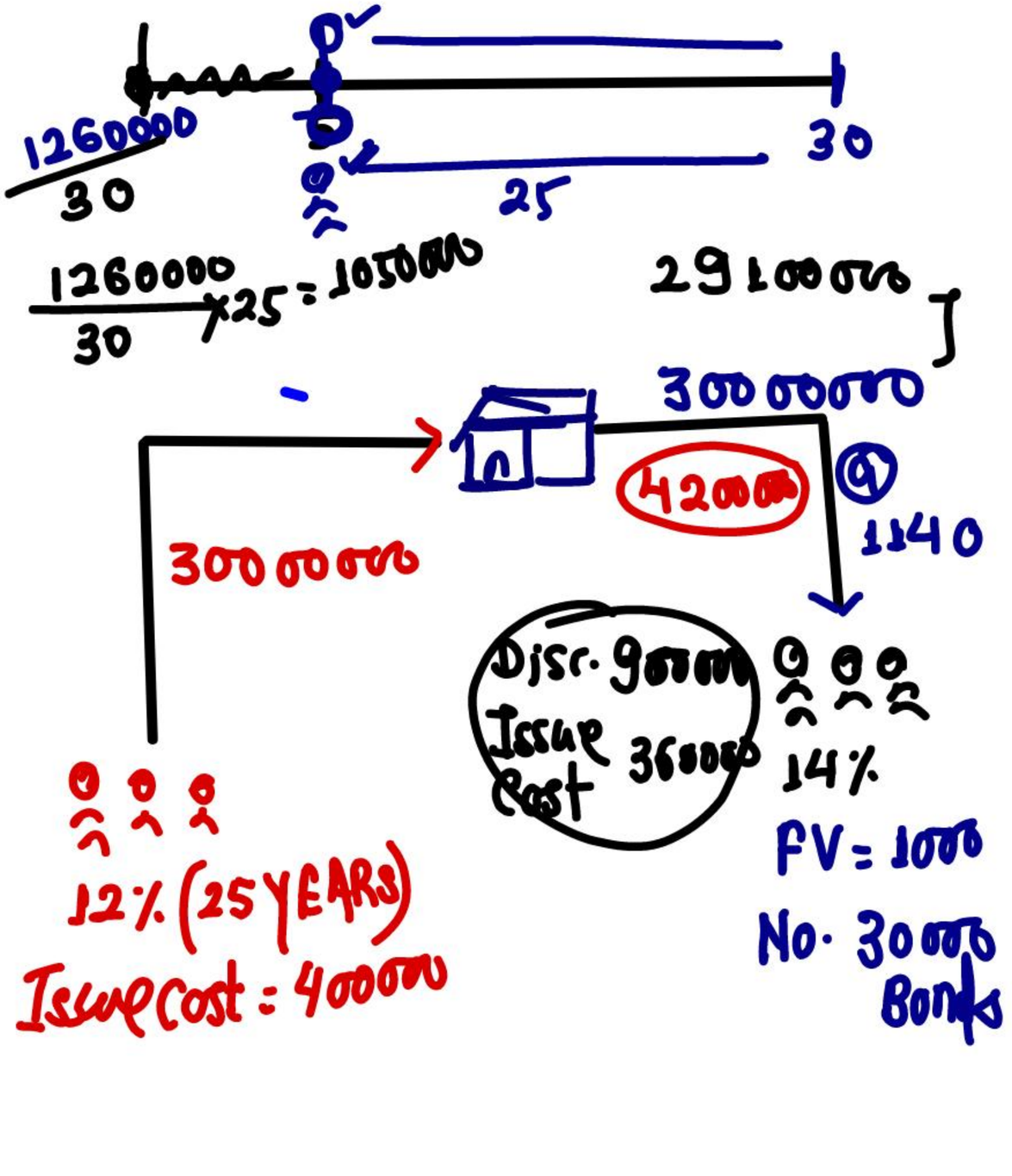
Since NPV is positive, hence Bonds should be refunded.

QUESTION – 44

M/s Trans India Ltd. is contemplating calling ₹ 3 crores of 30 years, ₹ 1,000 bond issued 5 years ago with a coupon interest rate of 14 per cent. The bonds have a call price of ₹ 1,140 and had initially collected proceeds of ₹ 2.91 crores due to a discount of ₹ 30 per bond. The initial floating cost was ₹ 3,60,000. The Company intends to sell ₹ 3 crores of 12 per cent coupon rate, 25 years bonds to raise funds for retiring the old bonds. It proposes to sell the new bonds at their par value of ₹ 1,000. The estimated floatation cost is ₹ 4,00,000. The company is paying 40% tax and its after tax cost of debt is 8 per cent. As the new bonds must first be sold and their proceeds, then used to retire old bonds, the company expects a two months period of overlapping interest during which interest must be paid on both the old and new bonds. What is the feasibility of refunding bonds?

(Practice Manual)

(Page No. 68)



1. Incremental Cash Outflows

Repayment of old Bonds (30000 × 1140)	(₹ 34200000)
Tax Savings on Call premium (420000 × 40%)	1680000
Tax Savings on Unamortised Exp of old Bonds $\left[\frac{900000 + 360000}{30}\right] \times 25 = 1050000$ × 40%	420000
Issue of New Bond	30000000
Issue Cost of New Bonds	(400000)
Int paid on Overlapping period $30000000 \times 14\% \times \frac{2}{12} = 700000\,(1 - 0.40)$	(420000)
Incremental C.O. =	₹ 2920000

2. Incremental Cash Inflows

	Old	New
Intt (Net of Tax)	(3000000 × 14%)(1-0.40)	(3000000 × 12%)(1-0.40)
	2520000	2160000
Tax Savings on Exp	$\left(\frac{1050000}{25}\right)$ × 40%	$\left(\frac{400000}{25}\right)$ × 40%
	(16800)	(6400)
Cost	2503200	2153600

Annual Incremental Savings

(2503200 - 2153600) = ₹ 349600

NPV = PVCI - PVCO

PVCI = 349600 × PVAf 25, 8%

PVCI = 349600 × 10.675

= ₹ 3731980

NPV = 3731980 - 2920000

= ₹ 811980

Since NPV is positive, Hence Bonds should be refunded.

QUESTION – 45

M/s. Earth Limited has 11% bond worth of ₹ 2 crores outstanding with 10 years remaining to maturity.

The company is contemplating the issue of a ₹ 2 crores 10 year bond carring the coupon rate of 9% and use the proceeds to liquidate the old bonds.

H.W

H.W Copy

The unamortized portion of issue cost on the old bonds is ₹ 3 lakhs which can be written off no sooner the old bonds are called. The company is paying 30% tax and it's after tax cost of debt is 7%. Should Earth Limited liquidate the old bonds?

You may assume that the issue cost of the new bonds will be ₹ 2.5 lakhs and the call premium is 5%.

(Page No. 70)

3. Extendable Bonds

In Extendable Bonds, company has an option to Extend the maturity period.

Such option will be Exercised when Rate of Intt in market will rise.

QUESTION – 46

Pet feed plc has outstanding, a high yield Bond with following features:

Face Value	£ 10,000
Coupon	10%
Maturity Period	6 Years
Special Feature	Company can extend the life of Bond to 12 years.

Presently the interest rate on equivalent Bond is 8%.

(a) If an investor expects that interest will be 8%, six years from now then how much he should pay for this bond now.

(b) Now suppose, on the basis of that expectation, he invests in the Bond, but interest rate turns out to be 12%, six years from now, then what will be his potential loss/ gain if the company extents the life of Bond for another 6 years.

(Practice Manual)

(Page No. 71)

(a) If Rate of Intt in Market after 6 year is expected to be 8% p.a. which is less than 10%..

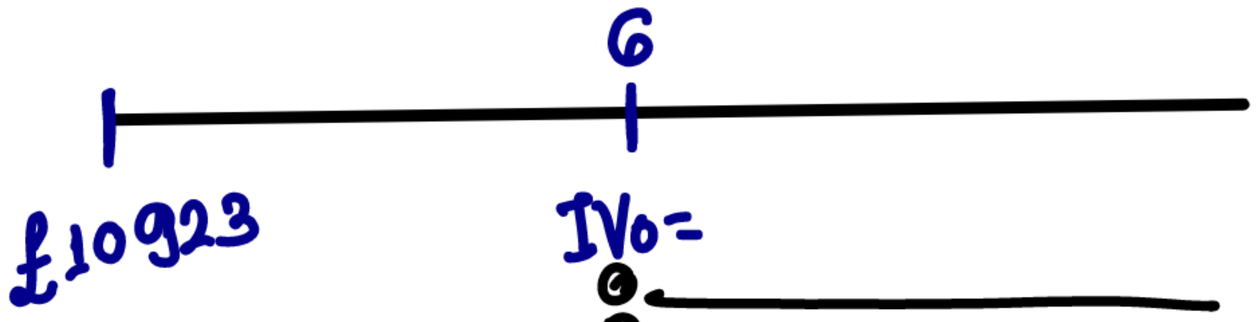
In this Situation, Company will not Extend the the life Hence price of Bond

$IV_0 = (1000 \times PVAf, 8\%, 6) + (10000 \times 8\%, 6)$

$= (1000 \times 4.623) + (10000 \times 0.630)$

$= £10923$

(b)



If Company Extend the bond then

$$IVo = £1000 \times PVAf_{1,12\%,6} + £10000 \times PVf_{1,12\%,6}$$

$$= (£1000 \times 4.111) + (£10000 \times 0.507)$$

$$= £9181$$

Potential Loss = £10923 - £9181 = £1742

Security Valuation

1. Valuation of Equity
2. Buy Back decision
3. Right Valuation

Valuation of Equity

1 Dividend discount Model (DDM)

- one year Holding period

$$P_0 = \frac{P_1 + D_1}{(1+ke)}$$

Suppose → Expected price at the end of YEAR = 420
Expected dividend per share = ₹30
Required Rate of Return = 15%
Current Market price = ₹375
whether stock should be bought ?

Theoretical price

$$P_0 = \frac{P_1 + D_1}{(1+ke)} = \frac{420+30}{1.15} = ₹391$$

Since share is underpriced, hence it should be purchased.

- **perpetual Holding period [forever]**

  - **No Growth Model**

$$P_0 = \frac{D}{K_e} \text{ or } \left[\frac{E}{K_e}\right]$$

$D = E$

  - **perpetual Growth Model** [Gordon's Model]

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

D_1 = Expected dividend per share

If D_1 is not given

$D_1 = D_0(1+g)$

D_0 = Dividend paid per share

Ke = required Rate of Return

Suppose

$D_0 = ₹4$

$g = 5\%$

$K_e = 12\%$

$P_0 = ?$

$$P_0 = \frac{D_0(1+g)}{K_e - g}$$

$$= \frac{4(1.05)}{0.12 - 0.05}$$

$$= ₹60$$

$D_0 = 4$

$g = 5\%$

$P_0 = ₹60$

$K_e = ?$

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

$$= \frac{4(1.05)}{60} + 0.05$$

$$= 12\%$$

$D_0 = 4$

$P_0 = 60$

$K_e = 12\%$

$g = ?$

$$60 = \frac{4(1+g)}{0.12 - g}$$

$$7.20 - 60g = 4 + 4g$$

$$3.20 = 64g$$

$$g = \frac{3.20}{64} \times 100 = 5\%$$

Imp Eg

$D_0 = ₹5$

$g = 6\%$

$K_e = 15\%$

$P_0 = ?$

$$P_0 = \frac{5(1.06)}{0.15-0.06} = ₹58.89$$

Suppose Growth Rate changes to 8%

$$P_0 = \frac{5(1.08)}{0.15-0.08} = ₹77.14$$

Eg

$D_1 = 5.30$

$g = 6\%$

$K_e = 15\%$

$P_0 = ?$

$$P_0 = \frac{5.30}{0.15-0.06} = ₹58.89$$

If Growth Rate changes to 8% p.a.

$$P_0 = \frac{5.30}{0.15-0.08} = 75.71$$

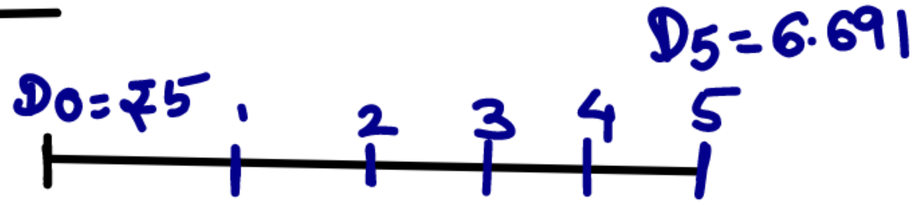
Calculation of Growth Rate

1. Compounding Growth Rate

D_0 = ₹5

D_5 = ₹6.691

g = ?



$$D_0(1+g)^5 = D_5$$

$$5(1+g)^5 = 6.691$$

$$(1+g)^5 = \frac{6.691}{5}$$

$$g = \left[(1.338)^{1/5} - 1\right] \times 100 = 6\%$$

2. Sustainable Growth Rate (SGR)

SGR = $b \times r$

b = Retention Ratio

r : ROE

Suppose = EPS = ₹ 20

DPR = 60% (12)

Retention Ratio = 40% (8)

ROE = 13%

$g = b \times r$

$= 0.40 \times 0.13 = 0.052$

$= 5.2\%$

After 1 YEAR

EPS = 20 + (8 × 13%) = 21.04

DPR = 60% (₹ 12.624)

$g = \frac{12.624 - 12}{12} \times 100$

$= 5.2\%$

Calculation of RoE

Suppose

ESC (10000 shares x 100) = ₹1000000

Res = ₹300000

Net Worth, ES fund = ₹1300000

Net Income = ₹143000

$$RoE = \frac{NI}{Equity} \times 100 \quad \frac{143000}{1300000} \times 100 = 11\%$$

- Book Value per share (BVPS)

$$BVPS = \frac{1300000}{10000} = ₹130$$

$$EPS = \frac{143000}{10000} = 14.30$$

$$RoE = \frac{EPS}{BVPS} \times 100$$

$$= \frac{14.30}{130} \times 100 = 11\%$$

Example – 20

Expected EPS = ₹ 10

Dividend Payout Ratio = 60%

Return on Equity = 20%

Cost of Equity (ke) = 15%

Calculate value per share.

(Page No. 78)

$D_1 = 10 \times 60\% = ₹6$

$g = b \times r$

$0.40 \times 0.20 = 0.08$

$$P_0 = \frac{D_1}{k_e - g} \quad \frac{6}{0.15 - 0.08} = ₹85.71$$

Concept of P/E Ratio

	RIL	TATA
MPS	₹2000	₹500
EPS	₹100	₹100
P/E Ratio	20 times	5 times

$$P/E = \frac{MPS}{EPS}$$

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

CAPM Equation

$$Ke = Rf + \beta(Rm - Rf)$$

Walter's Model

$$P_0 = \frac{D + (E - D)\frac{r}{Ke}}{Ke}$$

QUESTION – 52

A company has a book value per share of ₹ 137.80. Its return on equity is 15% and it follows a policy of retaining 60% of its earnings. If the Opportunity Cost of Capital is 18%, compute is the price of the share today using both Dividend Growth Model and Walter's Model.

(Study Material & Practice Manual)
(Page No. 79)

EPS = BVPS × RoE
= 137.80 × 15% = 20.67

D_1 = 20.67 × 40% = 8.268

$g = b \times r$
= 0.60 × 0.15 = 0.09 or 9%

• Dividend Growth Model

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

$$= \frac{8.268}{0.18 - 0.09} = ₹ 91.87$$

• Walter's Model

$$P_0 = \frac{D + (E - D)\frac{r}{K_e}}{K_e}$$

$$= \frac{8.268 + (20.67 - 8.268)\frac{0.15}{0.18}}{0.18}$$

$$= ₹ 103.35$$

* In walter model, we want to keep Market price ₹ 103.35 then what should be D/P Ratio

$$103.35 = \frac{x + (20.67 - x)\frac{0.15}{0.18}}{0.18}$$

$$18.603 = x + 17.225 - 0.833x$$

$$1.378 = 0.167x$$

$$x = \frac{1.378}{0.167} = 8.25$$

$$DPR = \frac{8.25}{20.67} \times 100 = 39.92\%$$

QUESTION – 53

On the basis of the following information:

Current dividend (Do)	= ₹ 2.50
Discount rate (k)	= 10.5%
Growth rate (g)	= 2%

(i) Calculate the present value of stock of ABC Ltd.

(ii) Is its stock overvalued if stock price is ₹ 35, ROE = 9% and EPS = ₹ 2.25? Show detailed calculation.

(Practice Manual, MTP – 2022)

Earning Growth model (Page No. 80)

$$P_0 = \frac{E(1+g)}{k_e - g} \quad \frac{2.25(1.02)}{0.09 - 0.02}$$

$$= ₹32.79$$

Stock is overvalued.

① Value of Stock

$$P_0 = \frac{D_1}{k_e - g} = \frac{2.50(1.02)}{0.105 - 0.02} = ₹30$$

②

P/E Model

$$P/E = \frac{1}{k_e} = \frac{1}{0.09} = 11.11$$

MPS = EPS × P/E

= 2.25 × 11.11 = ₹25

Since Actual price is more than IVo hence stock is overvalued.

QUESTION – 54

Given the following information:

Current Dividend	₹ 5.00
Discount Rate	10%
Growth rate	2%

(i) Calculate the present value of the stock.

(ii) Is the stock over valued if the price is ₹ 40, ROE = 8% and EPS = ₹ 3.00. Show your calculations under the PE Multiple approach and Earnings Growth model.

(Practice Manual)

(Page No. 81)

QUESTION – 55

ABC Ltd. has been maintaining a growth rate of 10 percent in dividends. The company has paid dividend @ ₹3 per share. The rate of return on market portfolio is 12 percent and the risk free rate of return in the market has been observed as 8 percent. The Beta co-efficient of company's share is 1.5.

You are required to calculate the expected rate of return on company's shares as per CAPM model and equilibrium price per share by dividend growth model.

(Study Material & PM)

(Page No. 82)

$g = 10\%$ $D_0 = ₹3$

$R_m = 12\%$ $R_f = 8\%$

$\beta = 1.5$

- **Required Rate of Return**

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

$$= 8 + 1.5(12 - 8) = 14\%$$

- **Equilibrium price**

$$P_0 = \frac{D_1}{K_e - g} = \frac{3(1.10)}{0.14 - 0.10}$$

$$= ₹82.50$$

QUESTION – 56

A Company pays a dividend of ₹ 2.00 per share with a growth rate of 7%. The risk-free rate is 9% and the market rate of return is 13%. The Company has a beta factor of 1.50. However, due to a decision of the Finance Manager, beta is likely to increase to 1.75. Find out the present as well as the likely value of the share after the decision.

(Study Material & PM)

(Page No. 83)

QUESTION – 57

Shares of Voyage Ltd. are being quoted at a price-earning ratio of 8 times. The company retains 45% of its earnings which are ₹ 5 per share.

You are required to compute

(1) The cost of equity to the company if the market expects a growth rate of 15% p.a.

(2) If the anticipated growth rate is 16% per annum, calculate the indicative market price with the same cost of capital.

(3) If the company's cost of capital is 20% p.a. & the anticipated growth

rate is 19% p.a., calculate the market price per share.

(Study Material & PM)

(Page No. 85)

QUESTION – 58

A share of Tension-free Economy Ltd. is currently quoted at, a price earnings ratio of 7.5 times. The retained earnings per share being 37.5% is ₹ 3 per share. Compute:

(1) The company's cost of equity, if investors expect annual growth rate of 12%.

(2) If anticipated growth rate is 13% p.a., calculate the indicated market price, with same cost of capital.

(3) If the company's cost of capital is 18% and anticipated growth rate is 15% p.a., calculate the market price per share, assuming other conditions remain the same.

(Page No. 87)

$EPS = \frac{₹3}{37.5\%} = ₹8$

$DPS = ₹5$

① Cost of Equity

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

- It is Assumed that given DPS = ₹5 is Expected dividend
- P_0 = EPS × P/E Ratio
  = ₹8 × 7.5 = ₹60

$$Ke = \frac{5}{60} + 0.12 = 20.33\%$$

② Market price

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

$$= \frac{₹5}{0.2033 - 0.13}$$

$$= ₹68.21$$

③ Market price

$$P_0 = \frac{5}{0.18 - 0.15}$$

$$= ₹166.67$$

QUESTION – 59

M/s X Ltd. has paid a dividend of ₹ 2.5 per share on a face value of ₹ 10 in the financial year ending on 31st March, 2009. The details are as follows:

Current market price of share	₹ 60
Growth rate of earnings and dividends	10%
Beta of share	0.75
Average market return	15%
Risk free rate of return	9%

Calculate the intrinsic value of the share.

(Study Material & PM)

(Page No. 88)

QUESTION – 60

The risk free rate of return R_f is 9 percent. The expected rate of return on the market portfolio R_m is 13 percent. The expected rate of growth for the dividend of Platinum Ltd. is 7 percent. The last dividend paid on the equity stock of firm A was ₹ 2.00. The beta of Platinum Ltd. equity stock is 1.2.

(i) What is the equilibrium price of the equity stock of Platinum Ltd.?

(ii) How would the equilibrium price change when

- The inflation premium increases by 2 percent?
- The expected growth rate increases by 3 percent?
- The beta of Platinum Ltd. equity rises to 1.3?

(Study Material & PM)

(Page No. 88)

$R_f = 9\%$

$R_m = 13\%$

$g = 7\%$

$D_0 = ₹ 2$

$\beta = 1.20$

(i) Equilibrium price

CAPM

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

$$= 9 + 1.20(13 - 9) = 13.80\%$$

$$P_0 = \frac{D_1}{k_e - g} = \frac{₹ 2(1.07)}{0.138 - 0.07} = ₹ 31.47$$

Alternative 1 Assume each factor changes seperately

- **Inflation premium increases by 2%**

$$Ke = 11\% + (15-11)1.20 = 15.8\%$$

$$P_0 = \frac{2(1.07)}{0.158-0.07} = ₹24.32$$

- **Growth Rate increases by 3%**

$$P_0 = \frac{2(1.10)}{0.138-0.10} = ₹57.89$$

- **Beta increases to 1.30**

$$Ke = 9 + (13-9)1.30 = 14.2\%$$

$$P_0 = \frac{2(1.07)}{0.142-0.07} = ₹29.72$$

Alternative 2 Assume that All factors are changed Simultaneously.

$$Ke = 11 + (15-11)1.30$$

$$= 16.2\%$$

$$P_0 = \frac{2(1.10)}{0.162-0.10} =$$

$$= ₹35.48$$

QUESTION – 61

Multiple Growth

XYZ Ltd. paid a dividend of ₹ 2 for the current year. The dividend is expected to grow at 40% for the next 5 years and at 15% per annum thereafter. The return on 182 days T-bills is 11% per annum and the market return is expected to be around 18% with a variance of 24%.

The co-variance of XYZ's return with that of the market is 30%. You are required to calculate the required rate of return and intrinsic value of the stock.

(Study Material & PM)

(Page No. 90)

QUESTION – 62

Sahu & Co. earns ₹ 6 per share having capitalization rate of 10 per cent and has a return on investment at the rate of 20 per cent. According to Walter's modal, what should be the price per share at 30 per cent dividend payout ratio ? Is this the optimum payout ratio as per Walter ?

(Page No. 91)

QUESTION – 63

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 Company.

	Amount ₹
Net Profit	50 lakhs
Outstanding 10% Preference Shares	80 lakhs
Number Equity Shares	5 lakhs
Return on Investment	15%
Cost of Capital (after Tax) (K_e)	12%

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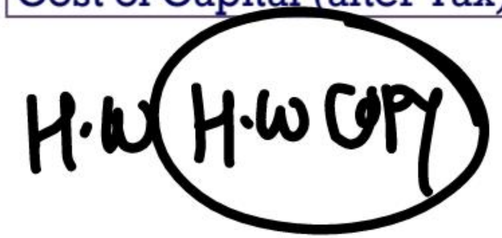

QUESTION – 64

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 capitalization rate	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?

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PAT 1.50 cr.

Div 0.90 cr

0.50 cr

1.80

PBT

RoE

$K_e = 12\%$

$$\frac{1.80}{0.12 - 0.06}$$

$g = 0.40 \times 0.15$

$= 0.06$

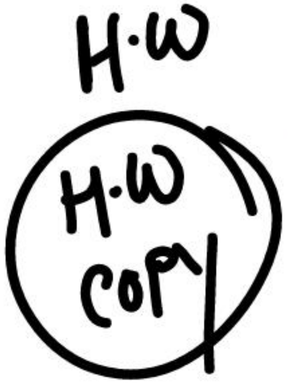
QUESTION – 66

Shares of Volga Ltd. are being quoted at a price-earning ratio of 8 times. The company retains 50% of its Earnings Per share. The Company's EPS is ₹ 10.

i. the cost of equity to the company if the market expects a growth rate or 15% p.a.

ii. the indicative market price with the same cost of capital and if the anticipated growth rate 16% p.a.

iii. the marked price per share if the company's cost of capital is 20% p.a. and the anticipated growth rate is 18% p.a.



(Exam November - 2018)

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QUESTION – 68

The risk free rate of return is 5%. The expected rate of return on the market portfolio is 11%. The expected rate of growth in dividend of X Ltd. is 8%. The last dividend paid was ₹ 2.00 per share. The beta of X Ltd. equity stock is 1.5.

(i) What is the present price of the equity stock of X Ltd.?

(ii) How would the price change when:

- The inflation premium increases by 3%.
- The expected growth rate decreases by 3% and
- The beta decreases to 1.3.

H·W

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(Exam May – 2018)

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QUESTION – 69

A company has an EPS of ₹ 2.5 for the last year and the DPS of ₹ 1. The earnings is expected to grow at 2% a year in long run. Currently it is trading at 7 times its earnings. If the required rate of return is 14%, compute the following:

(i) An estimate of the P/E ratio using Gordon growth model.

(ii) The Long-term growth rate implied by the current P/E ratio.

(MTP March - 2021)

(Page No. 100)

① P/E Ratio (GGM)

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

$$= \frac{1\,(1.02)}{0.14 - 0.02} = ₹ 8.50$$

$$P/E = \frac{MPS}{EPS} \quad \frac{8.50}{2.50} = 3.40 \text{ times}$$

② Growth Rate

$$MPS = EPS \times P/E$$

$$= 2.5 \times 7 \text{ times} = ₹ 17.50$$

$$17.50 = \frac{1(1+g)}{0.14 - g}$$

$$2.45 - 17.50g = 1 + 1g$$

$$1.45 = 18.50g$$

$$g = \frac{1.45}{18.50} = 0.0784 \text{ or } 7.84\% \text{ p.a.}$$

QUESTION – 70

Following are the details of X Ltd. and Y Ltd.:

Particulars	X Ltd.	Y Ltd.
Dividend per Share	₹ 4	₹ 4
Growth Rate	10%	10%
Beta	0.9	1.2
Current Market Price per Share	₹ 150	₹ 70

Other Information:

Risk Free Rate of Return	7%
Market Rate of Return	14%

(i) Calculate the price of shares of both the companies.

(ii) Write the comment on the valuation on the basis of price calculated and current market price.

(iii) As an investor what course of action should be followed?

(Exam December - 2021)

(Page No. 101)

gt is assumed that given dividend is d_1

X Y

① CAPM

$$Ke = Rf + \beta(Rm - Rf)$$

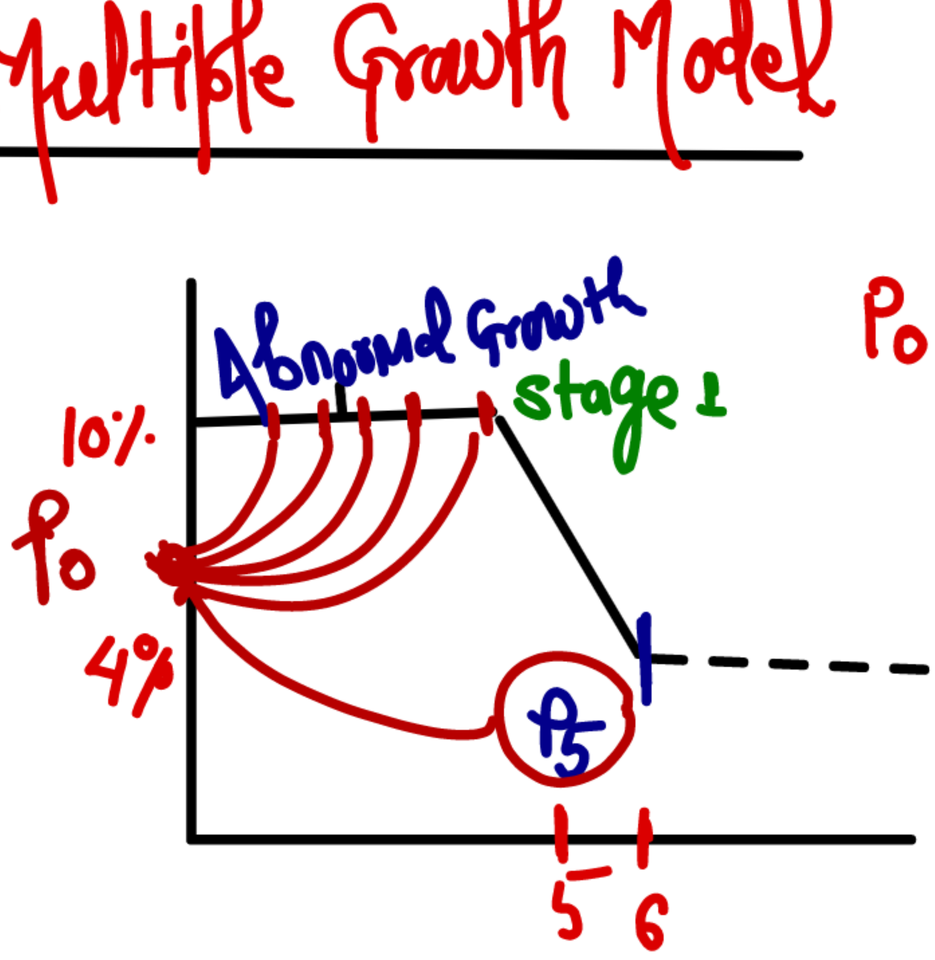
$$= 7 + 0.90(14-7) = 13.3\%$$

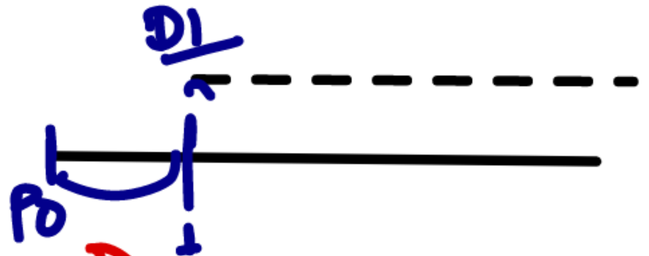
$$P_0 = \frac{D_1}{Ke - g} = \frac{4}{0.133 - 0.10} = ₹121.21$$

② Since CMP > P_0, hence share is oversvalued.

③ Should not Invest or if already hold then sell

Two Stages dividend discount Model
or
Multiple Growth Model





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

Example – 21

D_0 = ₹ 5

Growth Rate

First 2 years = 12% p.a.

Next 2 years = 10% p.a.

And there after = 6% p.a. perpetual

Required rate of return = 15% p.a.

Calculate value per share.

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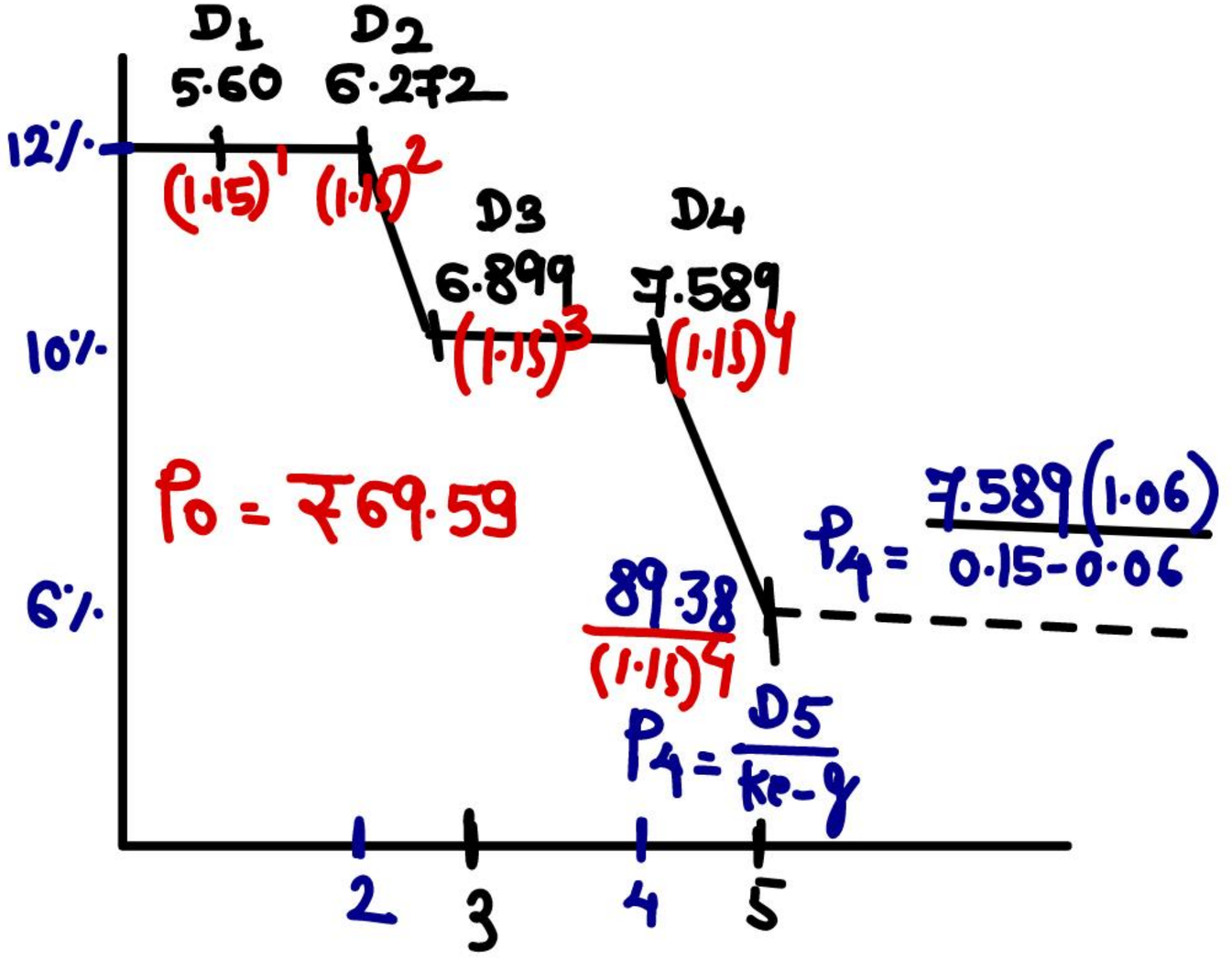

Calculation of IV_0

YEAR	CF	PVf(15%)	P.V.
1	$D_1 = 5(1.12) = 5.60$	0.870	4.872
2	$D_2 = 5.60(1.12) = 6.272$	0.756	4.742
3	$6.272(1.12) = 6.899$	0.658	4.539
4	$6.899(1.10) = 7.589$	0.572	4.341
4	W.N.1 = 89.38	0.572	51.13
		P_0	₹69.62

$$W.N.1 = P_4 = \frac{D_5}{K_e - g} = \frac{7.589(1.06)}{0.15 - 0.06} = ₹89.38$$

QUESTION – 72

MNP Ltd. has declared and paid annual dividend of ₹ 4 per share. It is expected to grow @ 20% for the next two years and 10% thereafter. The required rate of return of equity investors is 15%. Compute the current price at which equity shares should sell.

Note: Present Value Interest Factor (PVIF) @ 15%:

For year 1 = 0.8696;

For year 2 = 0.7561

(Practice Manual)

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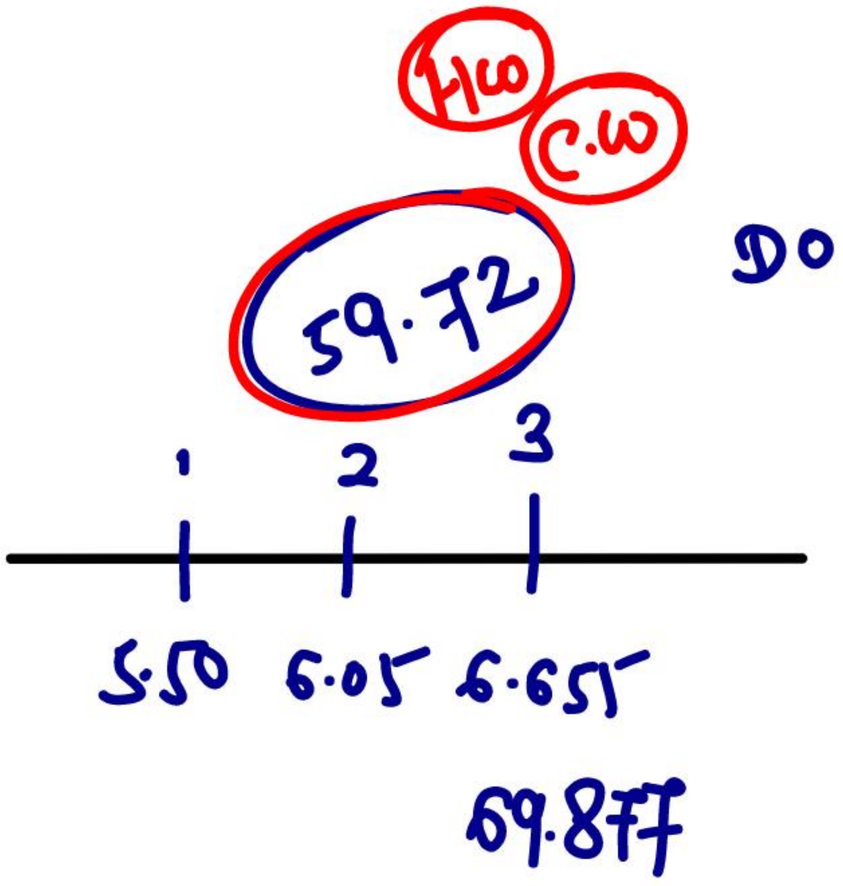

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QUESTION – 73

The shares of G Ltd. we currently being traded at ₹ 46. The company published its results for the year ended 31st March, 2019 and declared a dividend of ₹ 5. The company made a return of 15% on its capital and expects that to be the norm in which it operates. G Ltd. Also expects the dividends to grow at 10% for the first three years and thereafter at 5%.

You are required to advise whether the share of the company is being traded at a premium or discount.

PVIF @ 15% for the next 3 years is 0.870, 0.756 and 0.658 respectively.

(Exam May-2019)

(Page No. 105)

$$P_3 = \frac{6.655(1.05)}{0.15 - 0.05}$$

QUESTION – 74

M/s. B Ltd. has declared dividend of ₹ 2.50 per share on the EPS of ₹ 7. Earnings of the company are expected to grow at the rate of 10% for the next 3 years and to be stabilized at 3% thereafter.

The pay-out ratio is expected to remain at the same level during 3 years and then will increase to 60%. If required rate of return is 16% calculate:

(i) The current price of the share.

(ii) The expected price of share of B Ltd. At the end of 3rd year.

Following table may be used for calculations.

Present Value	t_1	t_2	t_3	t_4	t_5
$PVIF_{0.16,t}$	0.862	0.743	0.641	0.553	0.477

(Exam Jan-2021)

(Page No. 107)

W.N. 1 Calculation of dividend

$$DPR = \frac{2.50}{7} \times 100 = 35.72\%$$

	1	2	3	4
EPS (7)	7.70	8.47	9.317	9.597
DPS (2.50)	2.75	3.025	3.327	5.758 (D_4)

$$P_3 = \frac{D_4}{k_e - g} = \frac{5.758}{0.16 - 0.03} = 44.29$$

Stage I

P.V. = (2.75 × 0.862) + (3.025 × 0.743) + (3.327 × 0.641)

= ₹ 6.75

Stage II

P.V. = (44.29 × 0.641) = 28.39

P_0 = Stage I + Stage II

= 6.75 + 28.39 = ₹ 35.14

② Expected price at the end of 3rd YEAR = ₹ 44.29

QUESTION – 75

X Limited, just declared a dividend of ₹14.00 per share Mr. B is planning to purchase the share of X Limited, anticipating increase in growth rate from 8% to 9%, which will continue for three years. He also expects the market price of this share to be ₹ 360.00 after three years.

You are required to determine:

(i) the maximum amount Mr. B should pay for shares, if he requires a rate of return of 13% per annum.

(ii) the maximum price Mr. B will be willing to pay for share, if he is of the opinion that the 9% growth can be maintained indefinitely and require 13% rate of return per annum.

(iii) the price of share at the end of three years, if 9% growth rate is achieved and assuming other conditions remaining same as in (ii) above.

(i) IV_0

$$IV_0 = \frac{14(1.09)}{(1.13)^1} + \frac{14(1.09)^2}{(1.13)^2} + \frac{14(1.09)^3}{(1.13)^3} + \frac{360}{(1.13)^3}$$

$$= \frac{15.26}{(1.13)^1} + \frac{16.632}{1.277} + \frac{18.13}{1.443} + \frac{360}{1.443} = 288.57$$

(ii) If 9% Growth Rate perpetual

$$P_0 = \frac{D_1}{k_e - g} = \frac{14(1.09)}{0.13 - 0.09} = ₹381.50$$

Calculate rupee amount up to two decimal points.

	Year-1	**Year-2**	**Year-3**
FVIF @ 9%	1.090	1.188	1.295
FVIF @ 13%	1.130	1.277	1.443
PVIF @ 13%	0.885	0.783	0.693

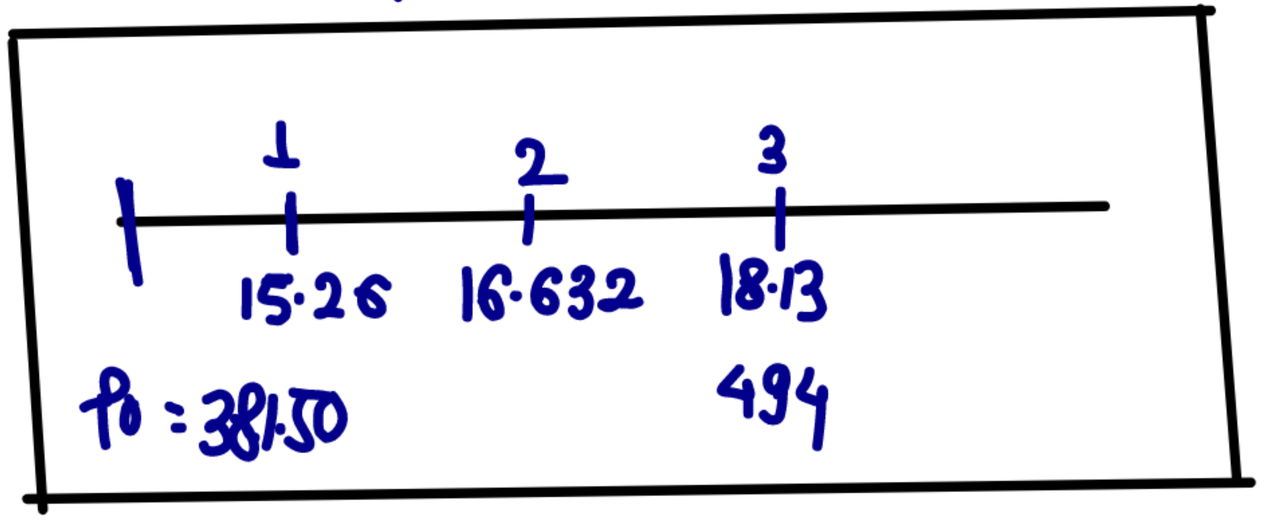
(Practice Manual)

(Page No. 108)

(iii) Price of share at the end of 3rd year

$$P_3 = \frac{D_4}{Ke - g}$$

$$= \frac{18.13(1.09)}{0.18 - 0.09} = ₹ 494$$



QUESTION – 79

Seawell Corporation, a manufacturer of do-it-yourself hardware and house wares, reported earnings per share of € 2.10 in 2003, on which it paid dividends per share of €0.69. Earnings are expected to grow 15% a year from 2004 to 2008, during this period the dividend payout ratio is expected to remain unchanged. After 2008, the earnings growth rate is expected to drop to a stable rate of 6%, and the payout ratio is expected to increase to 65% of earnings. The firm has a beta of 1.40 currently, and is expected to have a beta of 1.10 after 2008. The market risk premium is 5.5%. The Treasury bond rate is 6.25%.

(a) What is the expected price of the stock at the end of 2008?

(b) What is the value of the stock, using the two-stage dividend discount model?

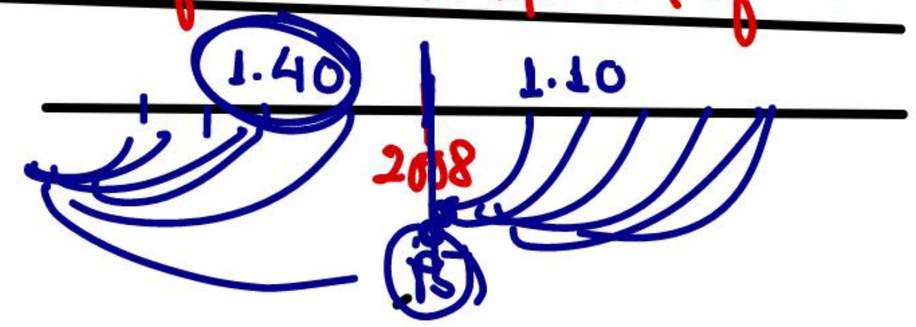
(Practice Manual & RTP May - 2019)

(Page No. 114)

W.N.1 Dividend Amount (€)

	2004	2005	2006	2007	2008	2009
EPS (2.10)	2.415	2.777	3.194	3.673	4.224	4.477
DPS (0.69)	0.793	0.912	1.049	1.207	1.388	2.910 (4.477 × 65%)

(a) Price of Stock at the end of 2008



Disc. Rate after 2008

$$Ke = Rf + (Rm - Rf)\beta$$

$$= 6.25 + (5.50)1.10$$

$$= 12.30\%$$

$$P_5 = \frac{D_6}{ke - g}$$

$$= \frac{2.910}{0.123 - 0.06}$$

$$= €46.19$$

(b) Value of Stock (Today)

Disc. Rate before 2008

$$Ke = 6.25 + 5.5 \times 1.40 = 13.95\%$$

Stage I

$$P.V. = \frac{0.793}{(1.1395)^1} + \frac{0.912}{(1.1395)^2} + \frac{1.049}{(1.1395)^3} + \frac{1.209}{(1.1395)^4} + \frac{1.388}{(1.1395)^5} = €3.547$$

Stage II

$$PV = \frac{€46.19}{(1.1395)^5} = €24.438$$

Value of Stock = €3.547 + €24.438 = €27.985

QUESTION – 81

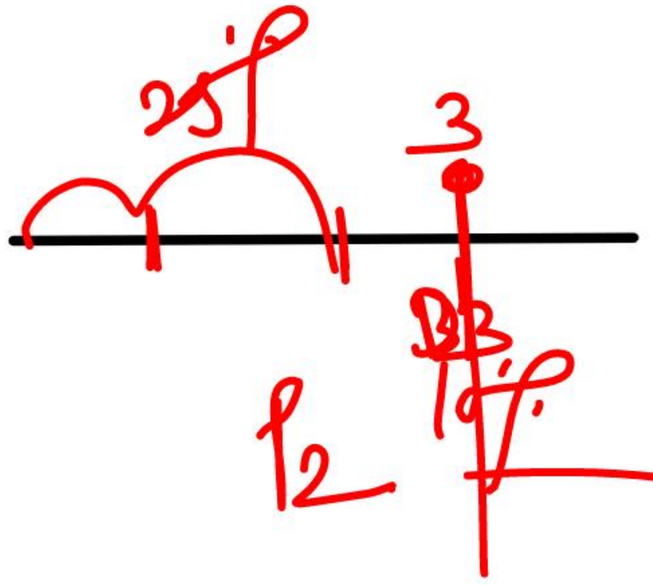
X Ltd. is a shoes manufacturing company. It is all equity financed and has paid-up Capital of ₹ 10,00,000 (₹ 10 per share)

X Ltd. has hired Swastika consultants to analyses the future earnings. The report of Swastika consultants states as follows:

a. The earnings and dividend will grow at 25% for the next two year.

b. Earnings are likely to grow at the rate of 10% from 3rd year and onwards.

c. Further, if there is reduction in earnings growth, dividend payout ratio will increase to 50%



The other data related to the company are follows:

Year	EPS (₹)	Net Dividend per share (₹)	Share Price (₹)
2010	6.30	2.52	63.00
2011	7.00	2.80	46.00
2012	7.70	3.08	63.75
2013	8.40	3.36	68.75
2014	9.60	3.84	93.00

You may assume that the tax rate is 30% (not expected to change is future) and post tax cost of capital is 15%.

By using the Dividend Valuation Model, calculate

i. Expected Market Price per share

ii. P/E Ratio.

(Page No. 117)

QUESTION – 82

Y Ltd., a manufacturer of house wares, reported earnings per share of 4.5 in 2005, on which it paid dividends per share 1.65. Earnings are expected to grow 50% a year from 2005 to 2010, during which period the dividend payout ratio is expected to remain unchanged. After 2010, the earnings growth rate is expected to drop to a stable 8% and the payout ratio is expected to increase to 85% of earnings. The firm has a beta of 2 currently, and is expected to have a beta of 1.50 after 2010. The Treasure bond rate is 5.75%.

i. What is the expected price of the stock at the end of 2010.

ii. What is the value of stock using the two-stage dividend discount model?

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Q73

QUESTION – 85

The shares of G Ltd. are currently being traded at ₹ 46. The company published its results for the year ended 31st March 2019 and declared a dividend of ₹ 5. The company made a return of 15% on its capital and expects that to be the norm in which it operates. G Ltd. also expects the dividends to grow at 10% for the first three years and thereafter at 5%.

You are required to advise whether the share of the company is being traded at a premium or discount.

PVIF @ 15% for the next 3 years is 0.870, 0.756 and 0.658 respectively.

(Exam May - 2019)

(Page No. 123)

QUESTION – 77

Mr. A is thinking of buying shares at ₹ 500 each having face value of ₹ 100. He is expecting a bonus at the ratio of 1:5 during the fourth year. Annual expected dividend is 20% and the same rate is expected to be maintained on the expanded capital base. He intends to sell the shares at the end of seventh year at an expected price of ₹ 900 each. Incidental expenses for purchase and sale of shares are estimated to be 5% of the market price. He expects a minimum return of 12% per annum.

Should Mr. A buy the share? If so, what maximum price should he pay for each share? Assume no tax on dividend income and capital gain.

(SM, PM & RTP November - 2019)

(Page No. 112)

Calculation of IVo

YEAR	Cash flows		PVf (12%)	P.V.
1	₹100 × 20%	= 20	0.893	17.86
2		20	0.797	15.94
3		20	0.712	14.24
4	₹100 × 1.2 × 20%	= 24	0.636	15.26
5		24	0.567	13.61
6		24	0.507	12.17
7		24	0.452	10.85
7	(900 × 1.20) × 95%	1026	0.452	463.75
			IVo =	₹563.68

Share should be purchased due to Net Gain ₹38.68

Gain = 563.68 - (500 × 1.05) = ₹38.68

Maximum price

Assume maximum price be x

$$x\,(1.05) = ₹563.68$$

$$x = \frac{563.68}{1.05} = ₹536.84$$

QUESTION – 78

Mr. X wants to buy shares of A Ltd. (having a Beta of 2) at current market price of ₹ 500 each having face value of ₹ 100. He is expecting a bonus at the ratio of 1: 4 during the fifth year. Annual expected dividend is 20% and the same rate is expected to be maintained throughout the holding period. He intends to sell the shares at the end of 7th year and expect that the market price shall be doubled during this holding period. Incidental expenses for purchase of shares are estimated to be 5% of the market price. The risk-free rate of return and market rate of return are 5% and 7.50% respectively.

ADVISE Mr. X should buy this share or not. If so, then recommend the maximum price should he pay for each share.

Note: Assume no tax on dividend income and capital gain.

(MTP: Sep – 2022)

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QUESTION – 76

Piyush Loonker and Associates presently pay a dividend of Re. 1.00 per share and has a share price of ₹ 20.00.

(i) If this dividend were expected to grow at a rate of 12% per annum forever, what is the firm's expected or required return on equity using a dividend-discount model approach?

(ii) Instead of this situation in part (i), suppose that the dividends were expected to grow at a rate of 20% per annum for 5 years and 10% per year thereafter. Now what is the firm's expected, or required, return on equity?

(Practice Manual)

(Page No. 109)

(i) Required Return on Equity

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

$$= \frac{₹1\,(1.12)}{20} + 0.12$$

$$= 0.176 \text{ or } 17.6\%$$

(ii) Required Rate of Return

Assume $IV_0 = P_0 = ₹20$

Calculation of dividend

1	2	3	4	5	6
1.20	1.44	1.73	2.07	2.49	2.74

Let assume $K_e = 18\%$

$$P_5 = \frac{D_6}{k_e - g} = \frac{2.74}{0.18 - 0.10} = ₹ 34.25$$

$$P_0 = \frac{1.20}{(1.18)^1} + \frac{1.44}{(1.18)^2} + \frac{1.73}{(1.18)^3} + \frac{2.07}{(1.18)^4} + \frac{2.49}{(1.18)^5} + \frac{34.25}{(1.18)^5}$$

$$= ₹ 20.23$$

Let Assume $K_e = 19\%$

$$P_5 = \frac{2.74}{1.19 - 0.10} = ₹ 30.44$$

$$P_0 = \frac{1.20}{(1.19)^1} + \frac{1.44}{(1.19)^2} + \frac{1.73}{(1.19)^3} + \frac{2.07}{(1.19)^4} + \frac{2.49}{(1.19)^5} + \frac{30.44}{(1.19)^5}$$

$$= 17.88$$

Interpolation

18%	20.23
19%	17.88
1%	2.35

0.23 | 20

$$K_e = 18 + \left(\frac{1}{2.35} \times 0.23\right)$$

$$= 18.10\%$$

QUESTION – 80

SAM Ltd. has just paid a dividend of ₹ 2 per share and it is expected to grow @ 6% p.a. After paying dividend, the Board declared to take up a project by retaining the next three annual dividends. It is expected that this project is of same risk as the existing projects. The results of this project will start coming from the 4th year onward from now. The dividends will then be ₹ 2.50 per share and will grow @ 7% p.a.

An investor has 1,000 shares in SAM Ltd. and wants a receipt of at least ₹ 2,000 p.a. from this investment.

Show that the market value of the share is affected by the decision of the Board. Also show as to how the investor can maintain his target receipt from the investment for first 3 years and improved income thereafter, given that the cost of capital of the firm is 8%.

(Study Material & PM)

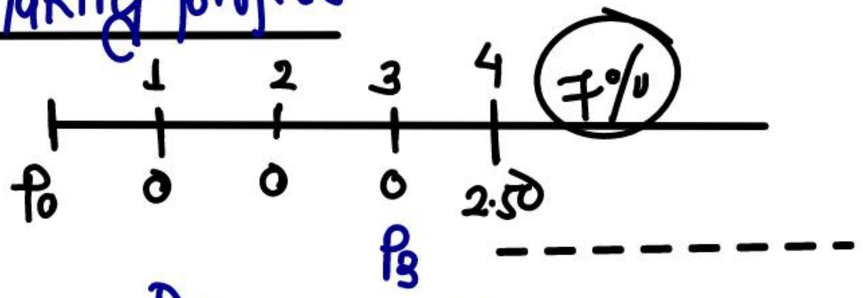
(Page No. 115)

Calculation of price of share

Existing (without taking project)

$$P_0 = \frac{D_1}{k_e - g} \quad \frac{2(1.06)}{0.08 - 0.06} = ₹106$$

Taking project



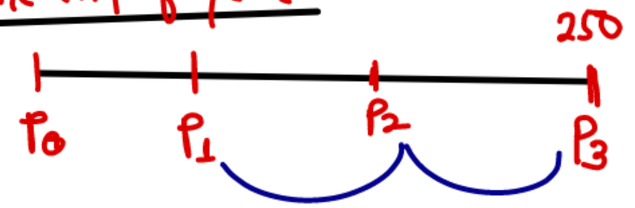
$$P_3 = \frac{D_4}{k_e - g} = \frac{2.50}{0.08 - 0.07} = ₹250$$

$$P_0 = \frac{250}{(1.08)^3} = ₹198.46$$

If Take project Share price will increase to ₹198.46

Investor wants Receipt ₹2000 p.a., he can maintain such Income to sell shares

At the end of year 1



$$P_1 = \frac{250}{(1.08)^2} = ₹214.33$$

No. of shares $= \frac{₹2000}{₹214.33} = 9.33$ shares

Sell 10 shares

2nd YEAR end

$$P_2 = \frac{250}{(1.08)^1}$$

$= ₹231.48$

No. $\frac{2000}{231.48} = 8.64$ shares

Sell 9 shares

3rd YEAR

$P_3 = 250$

No. $= \frac{2000}{250}$

$= 8$ shares

Total No. of shares at the end of 3rd YEAR $= 1000 - 10 - 9 - 8$

$= 973$ shares

Income in 4th YEAR $= 973$ shares $\times 2.50 = ₹2432.50$

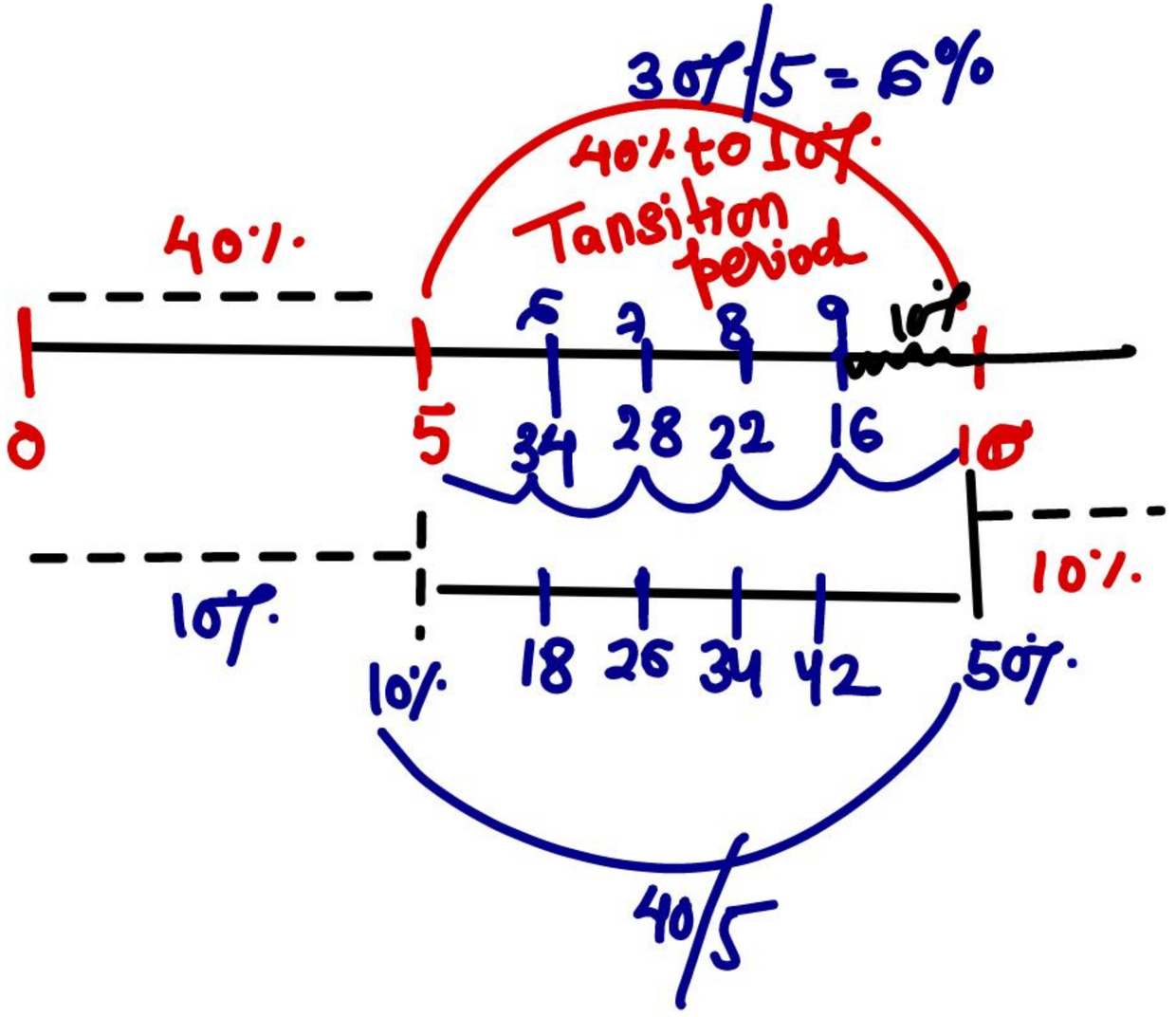
Increase Income to ₹2432.50

QUESTION – 86

The current EPS of M/s VEE Ltd. is ₹ 4. The company has shown an extraordinary growth of 40% in its earnings in the last few years this high growth rate is likely to continue for the next 5 years after which growth rate in earnings will decline from 40% to 10% during the next 5 years and remain stable at 10% thereafter. The decline in the growth rate during the 5 years transition period will be equal and linear. Currently, the company's pay-out ratio is 10%. It is likely to remain the same for the next five years and from the beginning of the sixth year till the end of the 10th year, the pay-out will linearly increase and stabilize at 50% at the end of the 10th year. The post tax cost of capital is 17% and the PV factors are given below:

Years	1	2	3	4	5
PVIF @17%	0.855	0.731	0.625	0.534	0.456

Years	6	7	8	9	10
PVIF @17%	0.390	0.333	0.285	0.244	0.209



W.N. 1 Calculation of dividend

YEAR	1	2	3	4	5	6	7	8	9	10
Earning Growth	40%	40%	40%	40%	40%	34%	28%	22%	16%	10%
EPS	5.60	7.84	10.98	15.37	21.51	28.83	36.90	45.02	52.22	57.44
DPR	10%	10%	10%	10%	10%	18%	26%	34%	42%	50%
DPS	0.56	0.78	1.10	1.54	2.15	5.19	9.59	15.31	21.93	28.72

$$P_{10} = \frac{D_{11}}{K_e - g} = \frac{28.72(1.10)}{0.17 - 0.10}$$

$$= ₹451.31$$

Calculation of IV0

YEAR	CF	PVF (17%)	PV.
1	0.56	0.855	0.48
2	0.78	0.731	0.57
3	1.10	0.625	0.69
4	1.54	0.534	0.82
5	2.15	0.456	0.98
6	5.19	0.390	2.02
7	9.59	0.333	3.19
8	15.30	0.285	4.36
9	21.92	0.244	5.35
16	28.71	0.209	6.00
10	451.31	0.209	94.32
		IV0 =	₹118.79

You are required to Calculate the intrinsic value of the company's stock based on expected dividend. if the current market price of the stock is ₹ 125, suggest if it is advisable for the investor to invest in the company's stock or not.

(Exam November - 2019)

(Page No. 124)

Since share is overpriced, Hence Investor should not Invest.

QUESTION – 83

An investor is considering to purchase the equity shares of LX Ltd., whose current market price (CMP) is ₹ 112. The company is proposing a dividend of ₹ 4 for the next year. LX Ltd. is expected to grow @ 20 per cent per annum for the next four years. The growth will decline linearly to 16 per cent per annum after first four years. Thereafter, it will stabilize at 16 per cent per annum infinitely. The investor requires a return of 20 per cent per annum. You are required

(i) To calculate the intrinsic value of the share of LX Ltd.

(ii) Whether it is worth to purchase the share at this price.

Period	1	2	3	4	5	6	7
PVIF (20%,n)	0.833	0.694	0.579	0.482	0.402	0.335	0.279

(Exam November - 2020)

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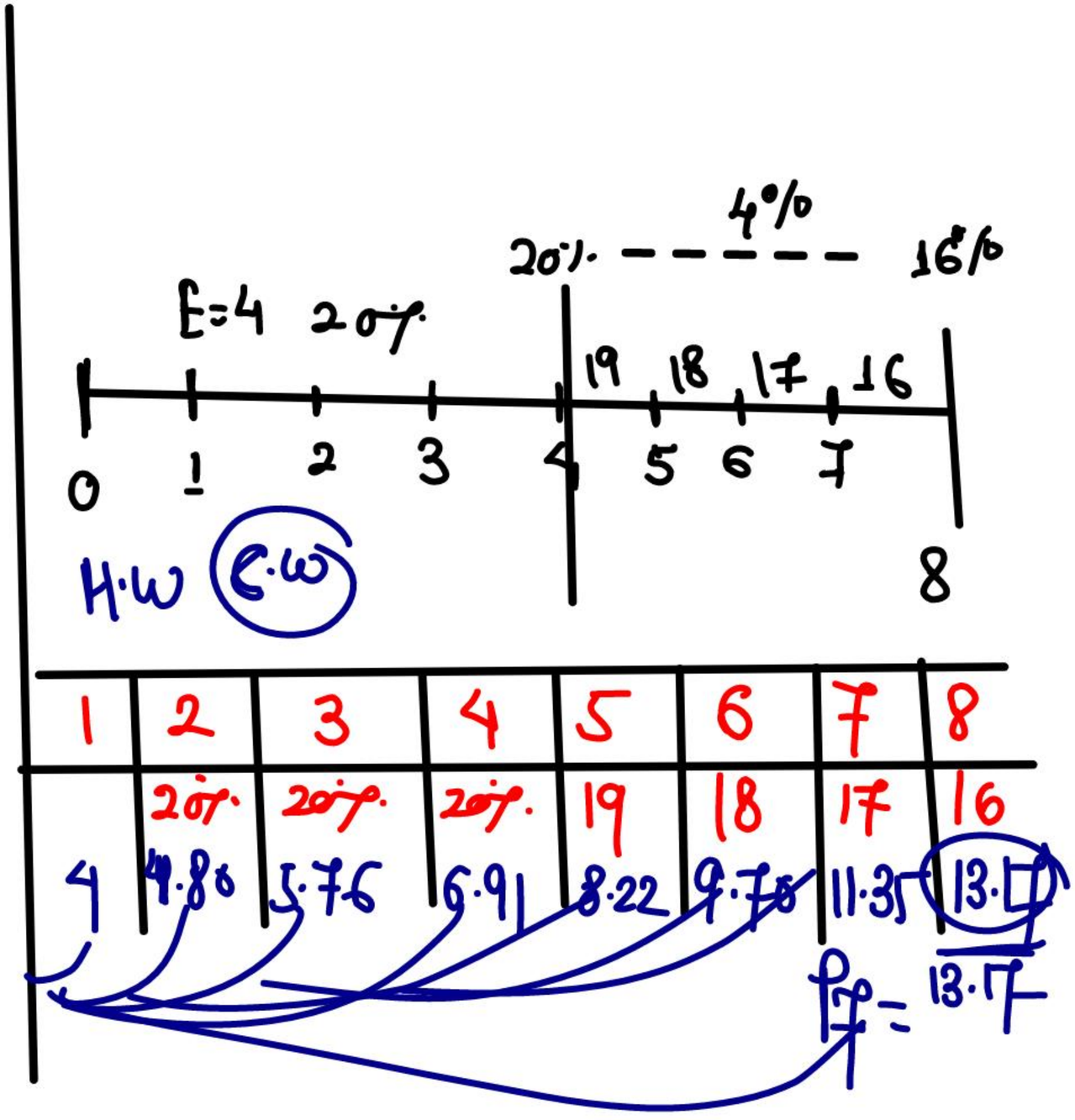

QUESTION – 84

An investor is considering purchasing the equity shares of LX Ltd., whose current market price (CMP) is 150. The company is proposing a dividend of ₹ 6 for the next year. LX is expected to grow @ 18 per cent per annum for the next four years. The growth will decline linearly to 14 per cent per annum after first four years. Thereafter, it will stabilize at 14 per cent per annum infinitely. The required rate of return is 18 per cent per annum.

You are required to determine:

(i) The intrinsic value of one share.

(ii) Whether it is worth to purchase the share at this price.

Period	**1**	**2**	**3**	**4**	**5***	**6***	**7***	**8***
PVIF (18,t)	0.847	0.718	0.609	0.516	0.437	0.370	0.314	0.266

* Wrongly got printed as 4, 5, 6 and 7 respectively.

(Exam May - 2019)

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Calculation of IV_0

YEAR	1	2	3	4	5	6	7	8
growth	18%	18%	18%	18%	17%	16%	15%	14%
DPS	₹6	7.08	8.35	9.86	11.53	13.38	15.39	17.54
PVF	0.847	0.718	0.609	0.516	0.437	0.370	0.314	X

P_7

$IV_0 = 35.16 + (438.50 \times 0.314)$

$= ₹ 172.85$

$P_7 = \frac{D_8}{k_e - g} \quad \frac{17.54}{0.18 - 0.14} = ₹ 438.50$

QUESTION – 65

In December, 2011 AB Co.'s share was 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 ?

(Page No. 94)

(i)

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

$$= \frac{3.36}{146} + 0.075 = 9.80\%$$

(ii) $g = b \times r$

$= 0.60 \times 0.10 = 0.06$ or 6%

$$K_e = \frac{3.36}{146} + 0.06$$

$= 8.30\%$

QUESTION – 71

(i) What is sustainable growth rate?

(ii) Mr. X has submitted the following data:

Particulars	(₹) in Lakhs
Total Assets	250
Total Liabilities	220
Net Income	12
Dividend Paid	4.5
Sales	100

Mr. X wants to know to what extent sales can be increased without going for additional borrowings by using Sustainable Growth Rate (SGR) Concept?

(Exam Nov - 2022)

(Page No. 103)

Sales increased to
$100 \times 1.25 = 125$

$SGR = b \times r$

b = Retention Ratio

Income	12
(-) Dividend	4.50
R.E	7.50

$b = \frac{7.50}{12} \times 100 = 62.5\%$

ROE

$ROE = \frac{NI}{NW} \quad \frac{12}{250-220} \times 100 = 40\%$

$g = 0.625 \times 0.40$
$= 0.25$ or 25%

Buy Back

- Market Capitalization

Market Cap = No. of Shares x MPS

- Buy back price is more than Current MPS

Buy Back V/S dividend

QUESTION – 87

Rahul Ltd. has surplus cash of ₹ 100 lakhs and wants to distribute 27% of it to the shareholders. The company decides to buy back shares. The Finance Manager of the company estimates that its share price after re-purchase is likely to be 10% above the buyback price-if the buyback route is taken. The number of shares outstanding at present is 10 lakhs and the current EPS is ₹ 3.

You are required to determine:

(i) The price at which the shares can be re-purchased, if the market capitalization of the company should be ₹ 210 lakhs after buyback,

(ii) The number of shares that can be re-purchased, and

(iii) The impact of share re-purchase on the EPS, assuming that net income is the same.

(Practice manual, SM)

(Page No. 126)

1 Buy Back price

Let assume buy back price be x

No. of share after Buy Back × MPS after Buy Back = Market Cap after Buy Back

$$\left(10 - \frac{27}{x}\right) \times 1.10x = 210$$

$$11x - 29.70 = 210$$

$$x = \frac{210 + 29.70}{11} = ₹ 21.79$$

(ii) No. of shares to be bought back

$$\text{No.} = \frac{27 \text{ Lacs}}{21.79} = 1.2391 \text{ Lacs shares}$$

(iii) Impact on EPS

EPS before Buy Back = ₹ 3

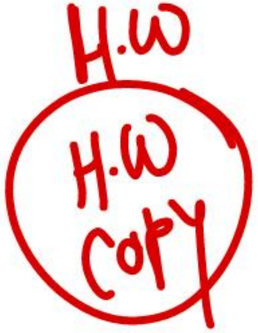
EPS after Buy Back = $\frac{10 \times 3 = ₹30}{10 - 1.2391}$

= ₹ 3.424

EPS will increase by ₹ 0.424

QUESTION – 88

Abhishek Ltd. has a surplus cash of ₹ 90 lakhs and wants to distribute 30% of it to the shareholders. The Company decides to buyback shares. The Finance Manager of the Company estimates that its share price after re-purchase is likely to be 10% above the buyback price; if the buyback route is taken. The number of shares outstanding at present is 10 lakhs and the current EPS is ₹ 3.



You are required to determine:

i. The price at which the shares can be repurchased, if the market capitalization of the company should be ₹ 200 lakh after buyback.

ii. The number of shares that can be re-purchased.

iii. The impact of share re-purchased on the EPS, assuming the net income is same.

(Page No. 127)

QUESTION – 91

SK Ltd., has a surplus cash of ₹ 150 lakhs and wants to distribute 30% of it to the shareholders. The company decided to buy-back shares.

The company estimates that its share price after the buy-back is likely to be 15% above the buy-back price. The number of shares outstanding at present is 15 lakhs and the current EPS is ₹ 4.

You are required to determine:

(i) The price at which the shares can be bought-back, if the market capitalization of the company should be ₹ 400 lakhs after buy back.

(ii) The number of shares that can be bought-back, and

(iii) The impact of this buy-back on the EPS, assuming that the net income remains the same.

(Exam July – 2021)

(Page No. 130)

QUESTION – 89

ABB Ltd. has a surplus cash balance of ₹ 180 lakhs and wants to distribute 50% of it to the equity share holders. The company decides to buyback equity shares. The company estimates that its equity share price after re-purchase is likely to be 15% above the buyback price, if the buyback route is taken.

Other information is as under:

(1) Number of equity shares outstanding at present (Face value ₹ 10 each) is 20 lakhs.

(2) The current EPS is ₹ 5.

You are required to calculate the following:

(i) The price at which the equity shares can be re-purchased, if market capitalization of the company should be ₹ 400 lakhs after buyback.

(ii) Number of equity shares that can be re-purchased.

(iii) The impact of equity shares re-purchase on the EPS, assuming that the net income remains unchanged.

(Exam May - 2019)

(Page No. 128)

QUESTION – 90

Eager Ltd. has a market capitalization of ₹ 1,500 crores and the current market price of its share is ₹ 1,500. It made a PAT of 200 crores and the Board is considering a proposal to buy back 20% of the shares at a premium of 10% to the current market price. It plans to fund this through a 16% bank loan. You are required to calculate the post buy back Earnings Per Share (EPS). The company's corporate tax rate is 30%.

(MTP March - 2021)

(Page No. 130)

Post buy Back EPS

$$= \frac{200 \text{ Cr.} - 36.96 \text{ Cr.}}{1 \text{ Cr.} - 0.2 \text{ Cr.}}$$

$$= ₹ 203.80$$

- No. of Shares before Buy Back

$$= \frac{₹ 1500 \text{ Cr.}}{₹ 1500} = 1 \text{ Cr.}$$

- No. of Shares buy back

$$= 1 \text{ Cr.} \times 20\% = 0.2 \text{ Cr.}$$

- Buy Back price

$$= ₹ 1500 \times 1.20 = ₹ 1650$$

- Buy Back Amt = $0.2 \text{ Cr.} \times 1650$

$$= 330 \text{ Cr.}$$

- Int = $330 \times 16\% = ₹ 52.80 \text{ Cr.}$
- Int after Tax = $52.80(1 - 0.30)$

$$= 36.96 \text{ Cr.}$$

QUESTION – 91

SK Ltd., has a surplus cash of ₹ 150 lakhs and wants to distribute 30% of it to the shareholders. The company decided to buy-back shares.

The company estimates that its share price after the buy-back is likely to be 15% above the buy-back price. The number of shares outstanding at present is 15 lakhs and the current EPS is ₹ 4.

You are required to determine:

(i) The price at which the shares can be bought-back, if the market capitalization of the company should be ₹ 400 lakhs after buy back.

(ii) The number of shares that can be bought-back, and

(iii) The impact of this buy-back on the EPS, assuming that the net income remains the same.

(Exam July – 2021)

(Page No. 130)

Valuation of Right

Example – 22

Existing shares of A Ltd. = 1,00,000 shares

Current market price per share = ₹ 40

Right Issue 1 share for every 5 shares hold

Offer price = ₹ 30

(i) Calculate Ex-Right price.

(ii) Value of Right

(iii) Assuming Ram hold 100 shares, calculate his wealth if he

(a) Buy right shares.

(b) Sell right.

(c) Ignore right.

(Page No. 132)

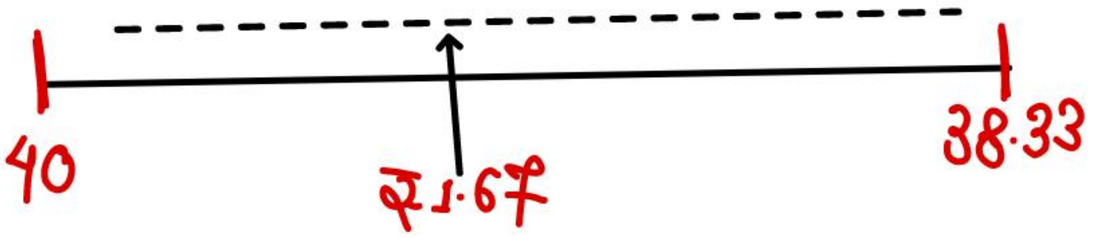
1. Calculation of Theoretical Ex. Right price

$$\text{Ex-Right price} = \frac{(\text{No. of shares before Right} \times \text{mps before Right}) + (\text{Right shares} \times \text{OFFER price})}{\text{Total No. of shares after Right}}$$

$$= \frac{(100000 \times 40) + (20000 \times 30)}{120000} = ₹ 38.33$$

Or

$$= \frac{(5 \times 40) + (1 \times 30)}{6} = ₹ 38.33$$



(ii) Value of Right

Value of Right per share = MPS Before Right − Ex-Right price

= ₹40 − ₹38.33 = ₹1.667

[1 Right share, Buy करने के लिए 5 share का Loss सहना होगा]

Hence Value of Right = ₹1.667 × 5 shares = ₹8.333

Or

[जो Right buy करेगा और share खरीदेगा OFFER price पर तो उसे ₹30 में मिलेगा, फिर वो share market में ₹38.33 में बिकेगा]

Value of Right = Ex-Right price − OFFER price

= ₹38.33 − 30 = ₹8.333

(iii) Calculation of Wealth

Wealth before Right Issue = 100 Shares × ₹40 = ₹4000

Wealth after Right

(a) Buy Right shares

Value of shares (120 shares × ₹38·333)	=	₹4600
(-) Buy Right shares (20 shares × ₹30)	=	₹600
		₹4000

No change

(b) Sell Right

Value of shares (100 shares × 38·33)	=	₹3833
(+) Sell of Rights (20 × 8·333) or (100 × 1·67)	=	₹167
		₹4000

No change

(c) Ignore Rights

Value of shares (100 shares × 38·33) = ₹3833 Wealth decrease

QUESTION – 92

ABC Limited's shares are currently selling at ₹ 13 per share. There are 10,00,000 shares outstanding. The firm is planning to raise ₹ 20 lakhs to Finance a new project.

Required:

What are the ex-right price of shares and the value of a right, if

(i) The firm offers one right share for every two shares held.

(ii) The firm offers one right share for every four shares held.

(iii) How does the shareholders' wealth change from (i) to (ii)? How does right issue increases shareholders' wealth?

(Practice Manual)

(Page No. 132)

(i) One Right share for every Two

No. of Right shares = $1000000 \times \frac{1}{2}$

= 500000 shares

Offer price = $\frac{₹2000000}{500000}$ = ₹4

- Ex Right price = $\frac{(2 \times 13) + (1 \times 4)}{3}$ = ₹10
- Value of Right per share = ₹13 − 10

= ₹3 per share

Value of Right = ₹3 × 2 shares

= ₹6

(ii) One share for every 4 shares

Right shares = 1000000 × $\frac{1}{4}$ = 250000 shares

Offer price = $\frac{₹\,2000000}{250000}$ = ₹ 8

- Ex-Right price = $\frac{(4 \times 13) + (1 \times 8)}{5}$ = ₹ 12
- Value of Right

per share = ₹ 13 - ₹ 12 = ₹ 1

Value of Right = ₹ 1 × 4 shares = ₹ 4

(iii) It is assumed that shareholder hold 100 shares before Right & Buy Right shares

Wealth Before Right = 100 shares × ₹13 = ₹1300

Wealth after Right

	1 for Every 2 shares	1 for Every 4 shares
Value of shares	150 shares × 10 = 1500	125 shares × 12 = 1500
(-) Buy Right shares	(50 × 4) = 200	(25 × 8) = 200
	₹1300	₹1300

There will be No change in wealth

QUESTION – 93

The share Galaxy Ltd. of a face ₹ 10 in being quoted at ₹ 24. The Company has a plan to make a right issue of one equity share for every four shares currently held at a premium of 40% per share.

You are required to:

i. Determine the minimum price that can be expected of share after the issue.

ii. Calculate the theoretical value of the rights alone.

iii. Show the effect of the right issue on the wealth of a shareholder who has 1500 shares, if

   a. he sells the entire rights, and

   b. he ignores the rights.

(Page No. 134)

QUESTION – 94

KLM Limited has issued 90,000 equity shares of ₹ 10 each. KLM Limited's shares are currently selling at ₹ 72. The company has a plan to make a rights issue of one new equity share at a price of ₹ 48 for every four shares held.

You are required to:

(a) Calculate the theoretical post-rights price per share and analyze the change

(b) Calculate the theoretical value of the right alone.

(c) Suppose Mr. A who is holding 100 shares in KLM Ltd. is not interested in subscribing to the right issue, then advice what should he do.

(RTP May - 2021)

(Page No. 135)

QUESTION – 95

AMKO Limited has issued 75,000 equity shares of ₹ 10 each. The current market price per share is ₹ 36. The company has a plan to make a rights issue of one new equity share at a price of ₹ 24 for every four shares held.

You are required to:

(i) Calculate the theoretical post-rights price per share.

(ii) Calculate the theoretical value of the right alone.

(Exam November - 2018)

(Page No. 136)

QUESTION – 96

Pragya Limited has issued 75,000 equity shares of ₹ 10 each. The current market price per share is ₹ 24. The company has a plan to make a rights issue of one new equity share at a price of ₹ 16 for every four share held.

You are required to:

(i) Calculate the theoretical post-rights price per share;

(ii) Calculate the theoretical value of the right alone;

(iii) Show the effect of the rights issue on the wealth of a shareholder, who has 1,000 shares assuming he sells the entire rights; and

(iv) Show the effect, if the same shareholder does not take any action and ignores the issue.

(PM & RTP November - 2018)

(Page No. 137)

QUESTION – 97

Aggressive Ltd. is proposing to fund its expansion plan of ₹ 12 crore by making a rights issue. The current market price (CMP) is ₹ 40. The Board is willing to offer a discount of 20% on the CMP for the rights issue. The Board is also desirous that the fall in Ex-right price of the shares be restricted to 10% of CMP.

CALCULATE:

(1)The number of new equity shares to be offered for each rights held,

(2) Theoretical value of right and

(3) The total number of equity shares to be issued.

(MTP: Oct – 2022)

(Page No. 139)

① No. of Right shares

Current MPS = ₹40

Offer price = ₹40 - 20% = ₹32

Ex Right price = ₹40 - 10% = ₹36

Assume we hold 1 share & Right share be x

$$\frac{(1 \times 40) + (x \times 32)}{1 + x} = 36$$

$$40 + 32x = 36 + 36x$$

$$4 = 4x$$

$$x = 4/4 = 1$$

① OFFER = 1 share for every 1 share held

③ No. of New shares = $\frac{120000000}{32}$ = 3750000

② Value of Right

per share = ₹40 − ₹36 = ₹4

Value of Right = ₹4 × 1 = ₹4

1 T. Bills

- T. Bills are issued by Govt
- T. Bills are Issued at discount & redeemable at par

$$\text{Investment yield / BEY} = \frac{F - P}{P} \times 100 \times \frac{360}{n}$$

[BEY = Bond Equivalend yield]

$$\text{Discound yield} = \frac{F - P}{F} \times 100 \times \frac{360}{n}$$

QUESTION – 100

Suppose Mr. X purchase Treasury bill for Rs. 9,940 maturing in 91 days for 10,000. Then what would be annualized investment rate for Mr. X and Annualized discount rate for the Govt. Investment.

(Page No. 142)

Assume 1 YEAR = 360 days

$$\text{Investment Rate} = \frac{10000 - 9940}{9940} \times 100 \times \frac{360}{91} = 2.39\%$$

$$\text{Discount yield} = \frac{10000 - 9940}{10000} \times 100 \times \frac{360}{91} = 2.37\%$$

QUESTION – 99

Suppose Govt. Pays ₹ 5,000 at maturity for 91 days Treasury bill. If Mr. Y is desirous to earn an annualized discount rate of 3.5%, then how he can pay for it.

(Page No. 141)

$$\text{Disc. Rate} = \frac{F-P}{F} \times 100 \times \frac{360}{91}$$

$$3.5 = \frac{5000-P}{5000} \times 100 \times \frac{360}{91}$$

$$\frac{3.5 \times 5000}{100 \times 360} \times 91 = 5000 - P$$

$$44.24 = 5000 - P$$

$$P = ₹4955.76$$

QUESTION – 114

RBI sold a 91-day T-bill of face value of ₹ 100 at an yield of 6%. What was the issue price?

(Study Material)

(Page No. 162)

$$BEY = \frac{F-P}{P} \times 100 \times \frac{360}{91}$$

$$6 = \frac{100-P}{P} \times 100 \times \frac{360}{91}$$

$$\frac{6P}{100 \times 360} \times 91 = 100 - P$$

$$0.01517P = 100 - P$$

$$1.01517P = 100$$

$$P = \frac{100}{1.01517} = ₹ 98.506$$

QUESTION – 115

Wonderland Limited has excess cash of ₹ 20 lakhs, which it wants to invest in short term marketable securities. Expenses relating to investment will be ₹ 50,000.

The securities invested will have an annual yield of 9%

The company seeks your advice

(i) as to the period of investment so as to earn a pre-tax income of 5%. (discuss)

(ii) the minimum period for the company to breakeven its investment expenditure overtime value of money.

(Study Material)

(Page No. 163)

(1)

Required Return

(2000000 × 5%) = ₹ 100000

(+) Exp = ₹ 50000

Total Earnings = ₹ 150000

Let Assume period of Holding be x

$2000000 \times 9\% \times \frac{x}{12} = 150000$

$\frac{180000x}{12} = 150000$

$15000x = 150000$

$x = 10$ months

QUESTION – 98

A bond is held for period of 45 days. The current discount yield is 6 per cent per annum. It is expected that current yield will increase by 200 basis points and current market price will come down by ₹ 2.50.

Calculate :

i Face value of the Bond and

ii. Bond Equivalent yield

(Exam May - 2019)

(Page No. 140)

1. Calculation of F.V of Bond

Yield (P.a)	periodical yield
6%	$(6 \times \frac{45}{360}) = 0.75\%$
8%	$(8 \times \frac{45}{360}) = 1\%$
	0.25%

$$\text{F.V. of Bond} = \frac{\text{change in CMP}}{\text{Change in Disc-Yield}}$$

$$= \frac{2.5}{0.25\%} = ₹\,1000$$

(ii) BEY

Disc. yield 6%.

$F = ₹1000$

$P = 1000 - \left(1000 \times 6\% \times \frac{45}{360}\right) \; 7.50 = ₹992.50$

$$BEY = \frac{1000 - 992.50}{992.50} \times 100 \times \frac{360}{45} = 6.05\%$$

Disc. yield 8%.

H.W.

2. Commercial papers (CP)

- CP's are issued by company for short Term funding
- Issued at disc. & Redeemed at F.V
- Extra Expenses
  - Brokerage
  - stamp duty
  - Rating charges

QUESTION – 103

From the following particulars, calculate the effective rate of interest p.a. as well as the total cost of funds to Bhaskar Ltd., which is planning a CP issue:

• Issue Price of CP	₹ 97,550
Face Value	₹ 1,00,000
Maturity Period	3 Months
Issue Expenses:	
Brokerage	0.15% for 3 months
Rating Charges	0.50% p.a.
Stamp Duty	0.175% for 3 months

(MTP October - 2020)

(Page No. 144)

Effective Rate of Interest

$$EAR = \frac{100000 - 97550}{97550} \times 100 \times \frac{12}{3} = 10.05\%$$

Total Cost of fund

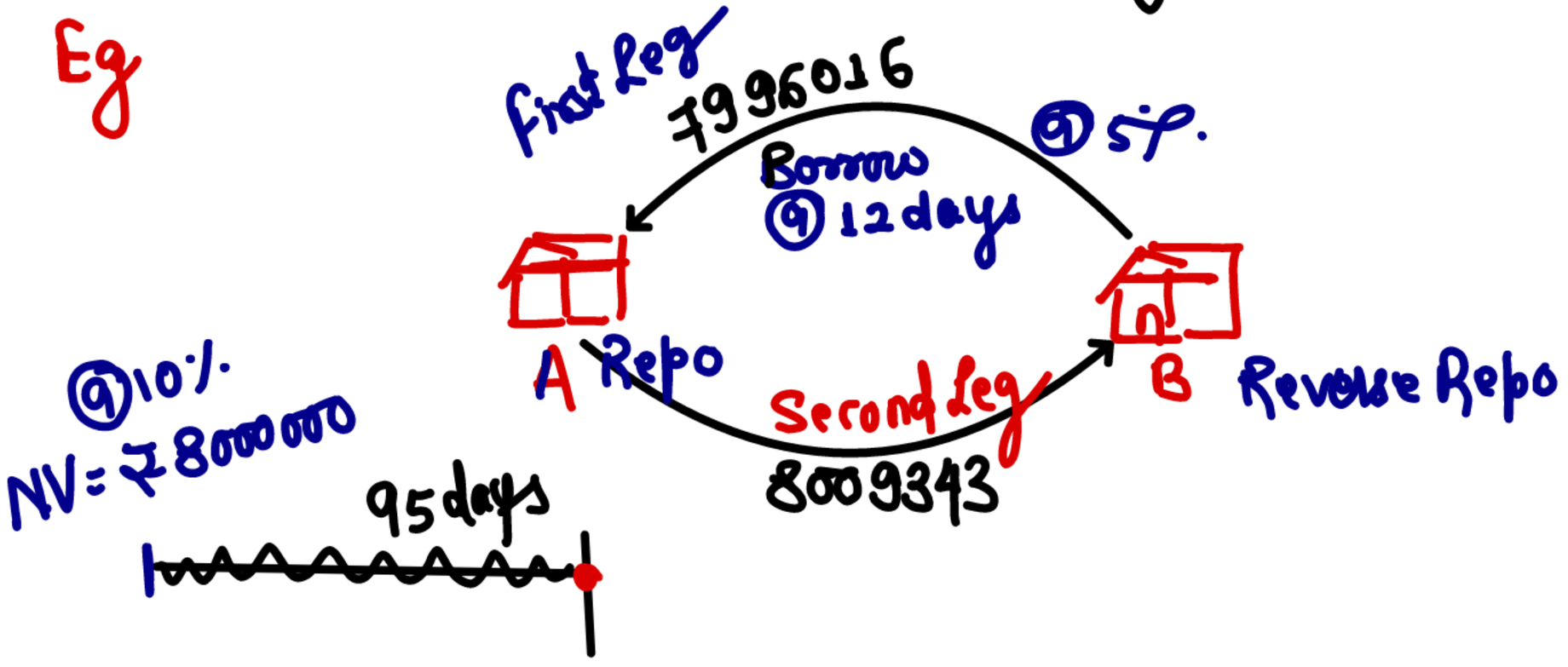
Rate of Intt	10.05 %
Brokerage $(0.15 \times \frac{12}{3})$	0.60%
Rating charges	0.50%
Stamp duty $(0.175 \times \frac{12}{3})$	0.70%
Total cost	= 11.85% P.a.

Q16 H.W

C.W copy

(3) Repo (Repurchase obligation)

Eg



Clean price = ₹ 99.35

$$\text{Dirty price} = 99.35 + \left(100 \times 10\% \times \frac{95}{360}\right)$$

$$= 101.99$$

① Dirty price

$$DP = \text{Clean price} + \text{Accrued Int}$$

$$= ₹99.35 + \left(100 \times 10\% \times \frac{95}{360}\right) = ₹101.99$$

② Borrowing Amt

$$\text{Borrowing Amt} = NV \times \frac{DP}{100} \times \frac{100 - \text{Initial margin}}{100}$$

$$= ₹8000000 \times \frac{101.99}{100} \times \frac{100-2}{100}$$

$$= ₹7996016$$

(iii) Repayment on Maturity

$$\text{Repayment} = ₹\,7996016 \times \left[1 + \left(0.05 \times \frac{12}{360}\right)\right]$$

$$: ₹\,8009343$$

QUESTION – 101

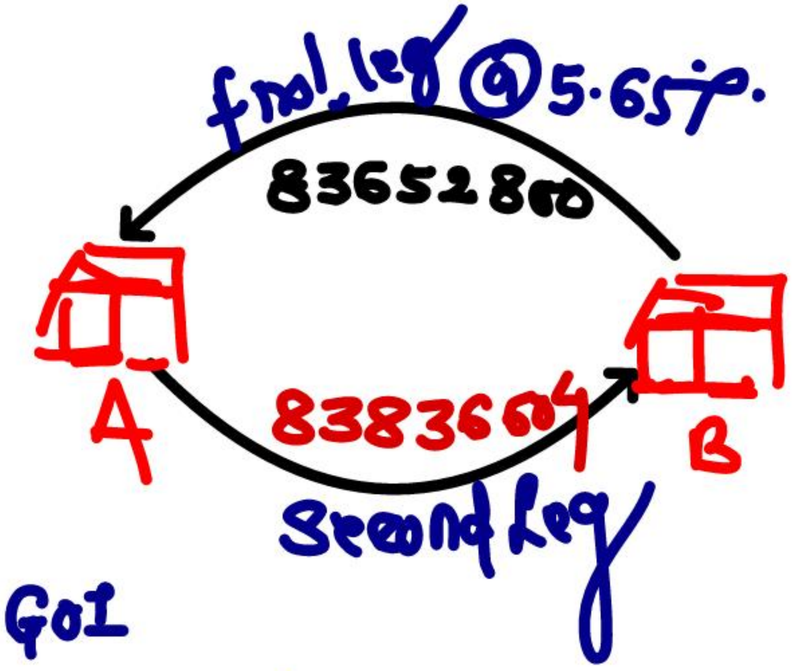
Bank A enter into a Repo for 14 days with Bank B in 10% Government of India Bonds 2018 @ 5.65% for ₹ 8 crore. Assuming that clean price be ₹ 99.42 and initial margin be 2% and days of accrued interest be 262 days. You are required to determine.

(i) Dirty Price

(ii) Repayment at maturity. (Consider 360 days in a year)

(MTP March & April - 2021)

(Page No. 142)



10% GoI

NV = 8000000

① Dirty price

DP = Clean price + Acc. Int

$= ₹ 99.42 + \left(100 \times 10\% \times \frac{262}{360}\right)$

$= ₹ 106.70$

⑪ Repayment on Maturity

First Leg

$\text{Borrowing Amt} = NV \times \frac{DP}{100} \times \frac{100 - \text{Initial margin}}{100}$

$= ₹ 80000000 \times \frac{106.70}{100} \times \frac{100-2}{100}$

$= ₹ 8,36,52800$

Second Leg

Repayment

$= ₹ 83652800 \left[1 + \left(0.0565 \times \frac{47}{360}\right)\right.$

$= ₹ 83836604$

QUESTION – 104

Bank A enters into a Repo for 21 days with Bank B in 8% Government of India Bonds 2020 @ 6.10% for ₹ 5 crore. Assuming that clean price is ₹ 97.30 and initial margin is 1.50% and days of accrued interest are 240 days (assume 360 days in a year).

Compute:

(i) The dirty price.

(ii) The repayment at maturity.

(Exam January – 2021)

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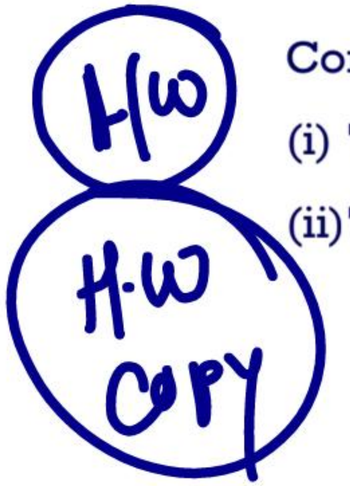

QUESTION – 102

The Bank BK enters into a Repo for 9 days with Bank NE in 6% Government bonds 2022 for an amount of ₹ 2 crore. The other relevant details are as follows:

First Leg Payment (Start Proceed)	₹ 2,00,06,750
Second Leg Payment (Repayment Proceed)	₹ 2,00,31,759
Initial Margin	1.25%
Days of accrued interest	240

Assume 360 days in a year.

CALCULATE:

(1) Repo Rate

(2) Dirty Price and

(3) Clean Price

(MTP: Oct – 2022)

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(i) Repo Rate

$$20031759 = 20006750 \times \left[1 + \left(x \times \frac{9}{360}\right)\right]$$

$$\frac{20031759}{20006750} = 1 + 0.025x$$

$$1.00125 = 1 + 0.025x$$

$$0.00125 = 0.025x$$

$$x = \frac{0.00125}{0.025} = 0.05 \text{ or } 5\% \text{ p.a.}$$

(ii) DP

$$\text{Borrowing Amt} = NV \times \frac{DP}{100} \times \frac{100 - \text{Initial margin}}{100}$$

$$2000\,6750 = 2000000 \times \frac{x}{100} \times \frac{100 - 1.25}{100}$$

$$\frac{2000\,6750}{2000000} = \frac{x}{100} \times 0.9875$$

$$1.000\,3375 = \frac{0.9875x}{100}$$

$$x = \frac{1.000\,3375 \times 100}{0.9875} = ₹\,101.30$$

(iii) clean price

Dirty price = clean price + Acc. Int

$$101.30 = x + \left(100 \times 6\% \times \frac{240}{360}\right)$$

$$101.30 = x + 4$$

$$x = 101.30 - 4 = ₹ 97.30$$

QUESTION – 109

Following Financial data are available for PQR Ltd. for the year 2008:

	(₹ in lakh)
8% debentures	125
10% bonds (2007)	50
Equity shares (₹ 10 each)	100
Reserves and Surplus	300
Total Assets	600
Assets Turnovers ratio	1.1
Effective interest rate	8%
Effective tax rate	40%
Operating margin	10%
Dividend payout ratio	16.67
Current market Price of Share	14
Required rate of return of investors	15%

You are required to:

(i) Draw income statement for the year

(ii) Calculate its sustainable growth rate of earnings

1 Income Statement

• Turnover

Asset Turnover Ratio = $\frac{\text{Sales}}{\text{TA}}$

$1.1 = \frac{\text{Sales}}{600}$

Sales = $600 \times 1.10 = ₹660$

operating Exp = ₹660 × 90% = ₹594

(iii) Calculate the fair price of the Company's share using dividend discount model, and

(iv) What is your opinion on investment in the company's share at current price?

(SM, PM & RTP May - 2020)

(Page No. 152)

	(₹ in Lakh)
Sales :	₹660
(-) operating Exp =	₹594
EBIT	₹66
(-) Interest (125+50) × 8%	₹14
EBT	₹52
(-) Tax @ 40%	₹20.80
EAT	₹31.20
Dividend @ 16.67%	5.20
Retain Earnings	26.00

(i) Calculation of growth Rate

$g = b \times r$

$b = 100 - 16.67 = 83.33\%$

$ROE = \frac{EAT}{ESC + R\&S} = \frac{31.20}{100+300} \times 100 = 7.8\%$

$g = 0.8333 \times 0.078 = 0.065$ or 6.5%

(ii) fair price

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

Dividend $= \frac{5.20}{10}$

$D_0 = 0.52$

$P_0 = \frac{0.52(1.065)}{0.15 - 0.065} = ₹6.51$

(iv) Since share is overpriced, hence it should not be purchased.

QUESTION – 110

Following financial information are available of XP Ltd. for the year 2018:

Equity share capital (₹ 10 each)	₹ 200 Lakh
Reserves and Surlus	₹ 600 Lakh
10% Debentures (₹ 100 each)	₹ 350 Lakh
Total Assets	₹ 1200 Lakh
Assets Turnover Ratio	2 times
Tax Rate	30%
Operating Margin	10%
Dividend Payout Ratio	20%
Current Market Price per Equity Share	₹ 28
Required Rate of Return of Investors	18%

You are required to:

(i) Prepare income statement for the year 2018.

(ii) Determine its sustainable growth rate.

(iii) Determine the fair price of the company's share using dividend discount model.

(iv) Give your opinion on investment in the company's share at current price.

(Exam May - 2019)

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QUESTION – 112

Following Financial Data for Platinum Ltd.

For The year 2011	(₹ in lakhs)
Equity Shares (10 each)	100
8% Debentures	125
10% Bonds	50
Reserve and Surplus	200
Total Assets	500
Assets Turnover Ratio	1.1
Effective Tax Rate	30%
Operation Margin	10%
Required rate of return of investors	15%
Dividend payout 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

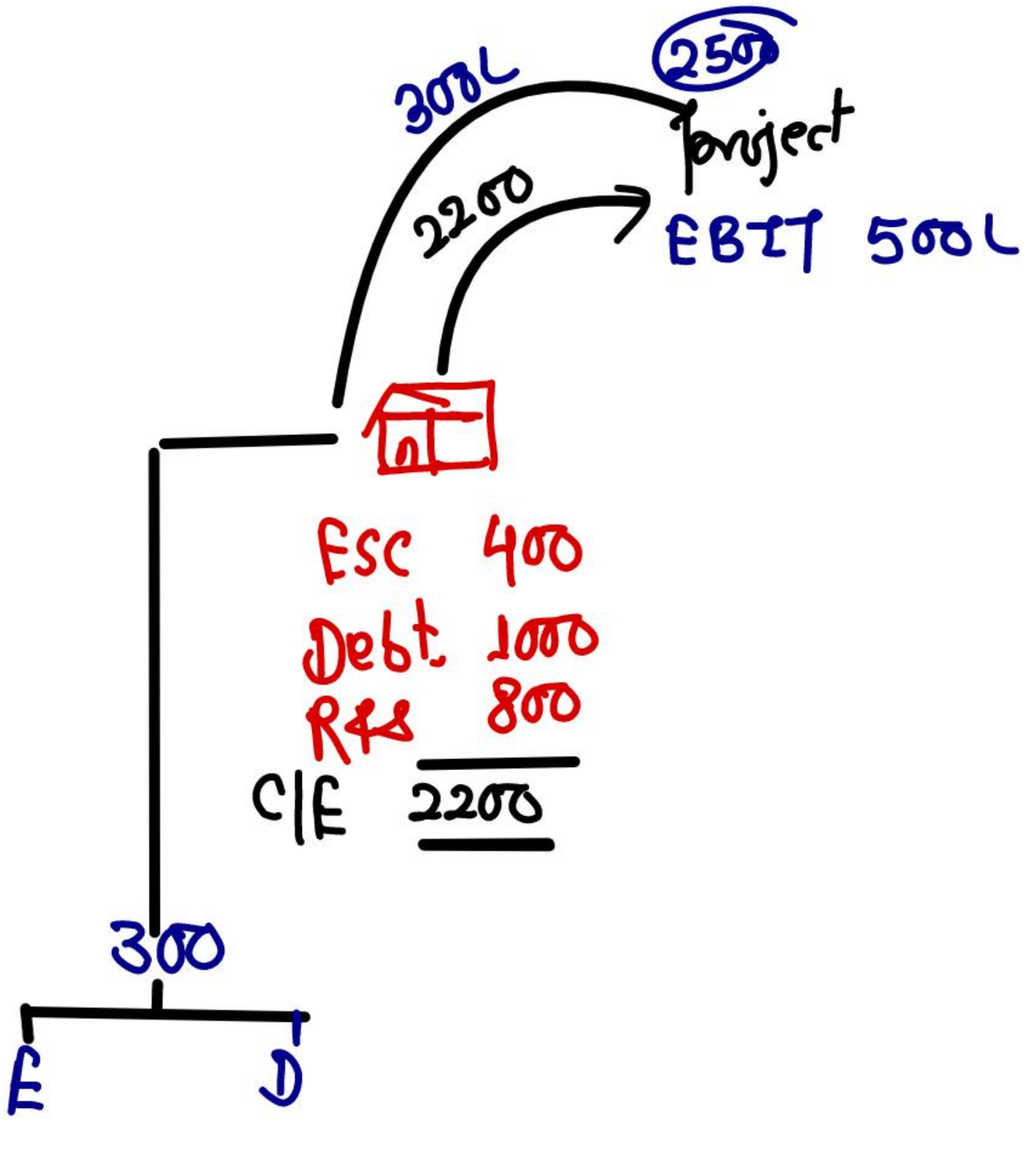
(Page No. 159)

QUESTION – 111

Following information is available of M/s. TS Ltd.

	(₹ in crores)
PBIT	5.00
Less: Interest on debt (10%)	1.00
PBT	4.00
Less: Tax @ 25%	1.00
PAT	3.00
No. of outstanding shares of ₹ 10 each	40 lakh
EPS (₹)	7.5
Market price of share (₹)	75
P/E ratio	10 Times

TS Ltd. has an undistributed reserves of ₹ 8 crores. The company requires ₹ 3 crores for the purpose of expansion which is expected to earn the same rate of return on capital employed as present however, if the debt to capital employed ratio is higher than 35%, then P/E ratio is expected to decline to 8 Times and rise in the cost of additional debt to 14%.



Given this data which of the following options the company would prefer, and why?

Option (i): If the required amount is raised through debt, and

Option (ii): If the required amount is raised through equity and the new shares will be issued at a price of ₹ 25 each.

(Exam November - 2019)

(Page No. 156)

Calculation of Estimated Market price

(Lacs)

	Equity	Debt
Estimated EBIT	568.25	568.25
(-) Int old (1000 × 10%)	100.00	100.00
New (300 × 14%)	—	42.00
EBT	468.25	426.25
(-) Tax @ 25%	117.0625	106.5625
EAT	351.1875	319.6875
÷ No. of Equity shares	40 + 12 $\left(\frac{300}{25}\right)$ = 52	40
EPS	6.7536	7.9922
(x) P/E	8	8
MPS	54.03	63.94

Debt option is better due to Higher MPS

W.N.1 Estimated EBIT

$$ROCE = \frac{EBIT}{C|E} \times 100 = \frac{500}{2200} \times 100 = 22.73\%$$

$$\text{Estimated EBIT} = (2200 + 300) \times 22.73\%$$

$$= ₹568.25 \text{ Lacs.}$$

W.N.2 Debt to C|E Ratio

	Debt	Equity
C|E	2500	2500
Debt	(1000+300) 1300	1000
Debt/C|E x100	52%	40%
	More than 30%	More than 30%
P|E	8	8
Rate on Additional Debt	14%	NA