Duration $= \frac{7.368}{2} = 3.684$ Years

(iii) Realized YTM

Cash outflows = ₹ 90

Cash inflows

(₹ 7 × 10) + 100 = ₹ 170

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

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

Realized YTM $= 6.57 \times \frac{12}{6}$

= 13.14% p.a.

Question – 15

(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?

Solution:

(a) It bonds are selling at par & redeemed at par

Then coupon = Current Yield YTM

5 Years Bond

P.V. of Interest + P.V. of Principal = Market Price

YTM (8%)

Present Value of Interest (80 × 3.993) = ₹ 319

Present Value of Principal (1,000 × 0.681) = ₹ 681

= ₹ 1,000

YTM (6%)

Present Value of Interest (80 × 4.212) = ₹ 337

Present Value of Principal (1,000 × 0.747) = ₹ 747

= ₹ 1084

P.V. of Interest = ₹ 319 – ₹ 337 = ₹ 18

P.V. of Principal = ₹ 681 – 747 = ₹ 66

Market = ₹ 1,000 – 1,084 = ₹ 84

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

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

Change in P.V. of Principal $= \frac{₹\ 66}{84} \times 100 = 78.57\%$

20 Years Bond

	P.V. of Interest	P.V. Principal	Market Price
Yield 8 %	(80 × 9.818) = 786	(1,000 × 0.214) = 214	1,000
Yield 6 %	(80 × 11.470) = 918	(1,000 × 0.312) = 312	1,230
	132	98	230

If yield decreases to 6% then bond price will increase by ₹ 230

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

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

(b) Duration in the average time taken to recollect back the investment

Years (A)	Coupon Payment (₹)	Redemption (₹)	Total (₹) (B)	PVIF (₹) (C)	(A)×(B)×(C) (₹)
1	70	-	70	0.935	65.45
2	70	-	70	0.873	122.22
3	70	-	70	0.816	171.36
4	70	-	70	0.763	213.64
5	70	-	70	0.713	249.55
6	70	1000	1070	0.666	4,275.72
				∑ABC	5,097.94

$$\text{Duration} = \frac{\sum ABC}{\text{Purchase Price}} = \frac{₹\ 5,097.94}{₹\ 1,000} = 5.098 \text{ Years}$$

(c) If YTM goes up to 10%, current price of the bond will decrease to

₹ 70 × PVIFA (10%,6) + ₹ 1000 PVIF (10%,6)

₹ 304.85 + ₹ 564.00 = ₹ 868.85

Years (A)	Inflow (₹) (B)	PVIF (₹) (C)	(A) × (B) × (C) (₹)
1	70	0.909	65.45
2	70	0.826	115.64
3	70	0.751	157.71
4	70	0.683	191.24
5	70	0.621	217.35
6	1070	0.564	3,620.88
		∑ABC	4,366.45

New Duration ₹ 4,366.45/ ₹ 868.85 = 5.025 years

The duration of bond decreases, reason being the receipt of slightly higher portion of one's investment on the same intervals.

Question – 16

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.

Solution:

To calculate duration of bond we need YTM, which shall be calculated as follows:

Let us try NPV of Bond @ 5%

$$= \frac{600}{(1.05)^1} + \frac{600}{(1.05)^2} + \frac{600}{(1.05)^3} + \frac{600}{(1.05)^4} + \frac{10,600}{(1.05)^5} - 10,796.80$$

= ₹ 571.43 + ₹ 544.22 + ₹ 518.30 + ₹ 493.62 + ₹ 8,305.38 – ₹ 10,796.80

= – ₹ 363.85

Let us now try NPV @ 4%

$$= \frac{600}{(1.04)^1} + \frac{600}{(1.04)^2} + \frac{600}{(1.04)^3} + \frac{600}{(1.04)^4} + \frac{10,600}{(1.05)^5} - 10,796.80$$

= ₹ 576.92 + ₹ 554.73 + ₹ 533.40 + ₹ 512.88 + ₹ 8,712.43 – ₹ 10,796.80

= ₹ 93.56

Let us now interpolation formula

$$= 4\% + \frac{93.56}{93.56 - (-363.85)} \times (5\% - 4\%)$$

$$= 4\% + \frac{93.56}{93.56 - (-363.85)}$$

$$= 4\% + \frac{93.56}{457.41} = 4.20\%$$

Duration of X Ltd.' s Bond

Year	Cash flows	P.V. @ 4.2%		Proportion bond value	Proportion bond value × time (Years)
1	600	0.9597	575.82	0.0533	0.0533
2	600	0.9210	552.60	0.0512	0.1024
3	600	0.8839	530.34	0.0491	0.1473
4	600	0.8483	508.98	0.0472	0.1888
5	10600	0.8141	8,629.46	0.7992	3.9960
			10,797.20	1.0000	4.4878

Duration of the Bond is 4.4878 years say 4.49 years.

Duration of Y Ltd.'s Bond

Year	Cash flows	P.V. @ 4.2%		Proportion bond value	Proportion bond value × time (Years)
1	400	0.9597	383.88	0.0387	0.0387
2	400	0.9210	368.40	0.0372	0.0744
3	400	0.8839	253.56	0.0357	0.1071
4	400	0.8483	339.32	0.0342	0.1368
5	10400	0.8141	8,466.64	0.8542	4.2710
			9,911.80	1.0000	4.6280

Duration of the Bond is 4.6280 years say 4.63 years.

Decision: Since the duration of Bond of X Ltd. is lower and also carrying higher interest rate hence it should be preferred.

Question – 17

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)

Solution:

Macaulay's Duration

Year	CF	YTM (10%)	P.V.	Weights	W × year
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	10,850	0.621	6737.85	0.714	3.570
			9431.50		4.252

$$\text{Macaulay's Duration} = \frac{D}{1 + YTM}$$

$$= \frac{4.252}{1.10} = 3.865$$

Intrinsic Value

Yield = 12%

IV_0 = (850 × 3.605) + (10,000 × 0.567)

= ₹ 8,734.25

Yield = 8%

IV_0 = (850 × 3.993) + (10,000 × 0.681)

= ₹ 10,204.05

Calculation of Convexity

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

$$= \frac{10{,}204.05 + 8{,}734.25 - 2 \times 9{,}431.50}{2 \times 9{,}431.0 \times (0.02)^2}$$

$$= 9.979$$

$$C.A = C^* \times 100 \times \Delta Y^2$$

$$= 9.979 \times 100 \times (0.02)^2$$

$$= 0.399$$

Bond price after CA

Yield ↓ 200 BP

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

$$= 8.129$$

Price = 9,431.50 + 8.129% = 10,198

Yield ↓ 200 BP

* On the basis of Macaulay Duration after C.A.

  Price = ₹ 10,198

* On the basis of Intrinsic Value

  Price = 10,204.05

Question – 18

An investor, in the beginning of 2022, has purchased substantial number of 8 year 7.50% ₹ 1,000 bond with 5% premium on maturity at a required Yield to Maturity (YTM) of 8.50%. However, due to the continuing war in Europe, the inflation is running very high in the economies of the countries. The yield on the bonds is decreasing. The risk averse investor wants to protect himself from further loss and decides to sell the bonds in 2023. He has got a proposal from

another investor who is willing to purchase these bonds by shelling out a maximum amount of ₹ 797.50 per bond.

Investor follows intrinsic value method for valuation of the Bonds.

You are required to determine

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

(ii) Will it be a right decision of the new investor if he is looking for Required Yield to Maturity (YTM) as 12% p.a.?

Period	1	2	3	4	5	6	7
PVIF (8.50%, n)	0.9217	0.8495	0.7829	0.7216	0.6650	0.6129	0.5649

(Exam May – 2023) (9 Marks)

Solution:

(i) (A) Market Price of Bond

= 1,000 × 7.50% × (PVIAF 8.50%,7) + 1,050 × (PVIF 8.5%,7)

= 75 × 5.1185 + 1050 × 0.5649

= 383.89 + 593.15 = ₹ 977.04

(B) Duration of Bond

Year	Cash Flow	P.V. @ 8.5%		Proportion of Bond Value	Proportion of Bond Value × Time (years)
1	75	0.9217	69.128	0.071	0.071
2	75	0.8495	63.713	0.065	0.130
3	75	0.7829	58.718	0.060	0.180
4	75	0.7216	54.120	0.055	0.220
5	75	0.6650	49.875	0.051	0.255
6	75	0.6129	45.968	0.047	0.282
7	1125	0.5649	635.513	0.651	4.557
			977.035		5.695

Duration of the Bond is 5.695 years.

Alternatively, it can also be calculated as follows:

Year (1)	Cash flow (2)	PVF (3)	PV (4)	(1) × (4)
1	75	0.9217	69.13	69.13
2	75	0.8495	63.71	127.42
3	75	0.7829	58.72	176.16
4	75	0.7216	54.12	216.48
5	75	0.6650	49.88	249.40
6	75	0.6129	45.97	275.82
7	1125	0.5649	635.51	4448.57
			977.04	5562.98

Duration of the Bond $= \frac{5,562.98}{977.04} = 5.69$ years

(C) Volatility of Bond

Volatility = Duration/(1 + YTM)

= 5.695/ (1 + 0.085) = 5.249

Or = 5.69/ (1 + 0.085) = 5.24

(ii) PV of Bond @ 12% YTM

= ₹ 75 PVIAF (12%, 7) + ₹ 1050 × PVIF (12%, 7)

= ₹ 75 × 4.5637 + ₹ 1050 × 0.4523

= ₹ 342.28 + ₹ 474.92 = ₹ 817.20

Since, Intrinsic Value of Bond is ₹ 817.20 the decision of new investor is right at purchase price of ₹ 797.50.

BOND IMMUNIZAITON

Question – 19

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.

(SM TYK – 27, MTP March – 2021 & RTP November – 2021)

Solution:

Bond Duration [Bond X]

YEAR	CF	PVF (10%)	PV	WEIGHT	YEAR × W
1	1,070	0.909	972.63	1	1
			972.63	Bond Duration = 1	

Bond Duration [Bond Y]

YEAR	CF	PVF (10%)	PV	WEIGHT	YEAR × W
1	80	0.909	72.72	0.078	0.078
2	80	0.826	66.08	0.071	0.142
3	80	0.751	60.08	0.064	0.192
4	1080	0.683	737.64	0.788	3.152
			936.52	Bond Duration = 3.564	

Duration of Liability = 2 years, hence we have to invest in bond having duration is 2 years but such bond is not available

In this situation, we have to invest in both bonds in a proportion so that duration of bonds should be 2 years

Immunization is a period at which

$D_L = D_A$

$2 = (1 \times W_A) + (3.564 \times W_B)$

$2 = W_A + 3.564\ (1 - W_A)$

$2 = W_A + 3.564 - 3.564\ W_A$

$W_A = 0.61$

$W_B = 0.39$

Investment in x = ₹ 1,00,000 × 0.61

= ₹ 61,000

= ₹ 61,000 × 0.826

= ₹ 50,386

No. $= \frac{₹\ 50,386}{972.73} = 51.80$

= 52 Bonds

Investment in y = ₹ 1,00,000 × 0.39

= ₹ 39,000

= ₹ 39,000 × 0.826

= ₹ 32,214

No. $= \frac{₹\ 32,214}{936.52} = 34.40$

= 34 Bonds

Question – 20

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 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 C 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)

Solution:

(i) Calculation of Bond Duration

Bond A

Year	Cash flow	P.V. @ 9%		Proportion of bond value	Proportion of bond value × time (years)
1	10	0.917	9.17	0.086	0.086
2	10	0.842	8.42	0.079	0.158
3	10	0.772	7.72	0.073	0.219
4	10	0.708	7.08	0.067	0.268
5	10	0.650	6.50	0.061	0.305
6	10	0.596	5.96	0.056	0.336
7	10	0.547	5.47	0.051	0.357
8	10	0.502	5.02	0.047	0.376
9	10	0.460	4.60	0.043	0.387
10	110	0.4224	46.46	0.437	4.370
			106.40	**1.000**	**6.862**

Duration of the bond is 6.862 years or 6.86 year

Bond B

Year	Cash flow	P.V. @ 9%		Proportion of bond value	Proportion of bond value × time (years)
1	11	0.917	10.087	0.091	0.091
2	11	0.842	9.262	0.083	0.166
3	11	0.772	8.492	0.076	0.228
4	11	0.708	7.788	0.070	0.280
5	11	0.650	7.150	0.064	0.320
6	11	0.596	6.556	0.059	0.354
7	11	0.547	6.017	0.054	0.378
8	111	0.502	55.772	0.502	4.016
			111.224	**1.000**	**5.833**

Duration of the bond B is 5.833 years or 5.84 years.

Bond C

Year	Cash flow	P.V. @ 9%		Proportion of bond value	Proportion of bond value × time (years)
1	9	0.917	8.253	0.082	0.082
2	9	0.842	7.578	0.076	0.152
3	9	0.772	6.948	0.069	0.207
4	9	0.708	6.372	0.064	0.056
5	109	0.650	70.850	0.709	3.545
			100.00	**1.000**	**4.242**

Duration of the bond C is 4.242 years or 4.24 years

(ii) Amount of Investment required in Bond B and C

DL = DA

6 = (6.86 × 0.45) + 5.84 W_B + 4.24 (0.55 – W_B)

6 = 3.087 + 5.84 W_B + 2.332 – 4.24 W_B

0.581 = 1.6 W_B

W_B = 0.3631 (36.31%)

W_C = 1 – 0.45 – 0.3631

= 0.1869 (18.69%)

(iii) With revised yield the Revised Duration of Bond stands

0.45 × 7.15 + 0.36 × 6.03 + 0.19 × 4.27 = 6.20 year

No portfolio is not immunized as the duration of the portfolio has been increased from 6 years to 6.20 years.

(iv) New percentage of B and C bonds that are needed to immunize the portfolio.

DL = DA

6.00 = (7.15 × 0.45) + 6.03 W_B + 4.27 (0.55 – W_B)

6.00 = 3.218 + 6.03 W_B + 2.348 – 4.27 W_B

0.434 = 1.76 W_B

W_B = 0.2466 (24.66%)

W_C = 1 – 0.45 – 0.2466

= 0.3034 (30.34%)

(IV) OPTION EMBEDDED BONDS

(1) CONVERTIBLE BONDS

Question – 21

The following data is related to 8.5% Fully Convertible (into Equity shares) Debentures issued by JAC Ltd. at ₹ 1,000.

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

You are required to 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

(g) Premium pay back period

(RTP November – 2021)

Solution:

(a) Conversion Value of Debenture

= Market Price of one Equity Share × Conversion Ratio

= ₹ 25 × 30 = ₹ 750

(b) Market Conversion Price

$$= \frac{\text{Market Price of Convertible Debenture}}{\text{Conversion Ratio}}$$

$$= \frac{₹\ 900}{30} = ₹\ 30$$

(c) Conversion Premium per share

Market Conversion Price – Market Price of Equity Share

= ₹ 30 – ₹ 25 = ₹ 5

(d) Ratio of Conversion Premium

$$\frac{\text{Conversion premium per share}}{\text{Market Price of Equity Share}} = \frac{₹\ 5}{₹\ 25} = 20\%$$

(e) Premium over Straight Value of Debenture

$$\frac{\text{Market Price of Convertible Bond}}{\text{Straight Value of Bond}} - 1 = \frac{₹\ 900}{₹\ 700} - 1 = 28.6\ \%$$

(f) Favorable income differential per share

$$\frac{\text{Coupon Interest from Debenture} - \text{Conversion Ratio} \times \text{Dividend Per Share}}{\text{Conversion Ratio}}$$

$$\frac{₹\ 85 - 30 \times ₹\ 1}{30} = ₹\ 1.833$$

(g) Premium pay back period

$$\frac{\text{Conversion premium per share}}{\text{Favourable Income Differential per Share}} = \frac{5}{1.833} = 2.73 \text{ years}$$

Question – 22

Following information is related to the Convertible Bond of A Ltd. which is currently priced at ₹ 1060 per Bond:

(1) Conversion Parity Price - ₹ 53

(2) Conversion Premium – 10.41667%

(3) Percentage of Downside Risk with respect to Straight Value of Bond – 12.766%

Calculate:

(i) No. of shares on Conversion.

(ii) Current Market Price Per Share of A Ltd.

(iii) Straight Value of Bond

(MTP October – 2023)

Solution:

(i) The No. of share on Conversion shall be computed as follows:

$$\text{Conversion Parity Price} = \frac{\text{Bond Price}}{\text{No.of Shares on Conversion}}$$

$$₹\ 53 = \frac{1060}{\text{No.of Shares on Conversion}}$$

Accordingly, No. of shares on Conversion = 20

(ii) To determine current Market Price Per Share of A Ltd. we shall use Conversion Premium as follows:

$$\text{Conversion Premium} = \frac{\text{Market Price of Bond} - \text{Conversion Value of Bond}}{\text{Conversion Value of Bond}}$$

$$0.1041667 = \frac{1060 - \text{Conversion Value of Bond}}{\text{Conversion Value of Bond}}$$

Conversion Value of Bond = ₹ 960

Since the No. of share on Conversion = 20

The current market price of share of A Ltd. shall be = ₹ 960/ 20 = ₹ 48 per share

(iii) To determine the Straight Value of Bond we shall use Percentage of Downside Risk as follows:

Percentage of Downside Risk

$$= \frac{\text{Market Price of Bond} - \text{Straigth Value of Bond}}{\text{Straight Value of Bond}}$$

$$0.12766 = \frac{1060 - \text{Straigth Value of Bond}}{\text{Straight Value of Bond}}$$

Straight Value of Bond = ₹ 940 per Bond

Question – 23

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

(SM TYK – 23)

Solution:

Intrinsic Value of Debenture

IV_0 = (12 × 3.993) + (100 × 0.681)

= ₹ 116.016

Conversion Value

Price = ₹ 4 [20 × 4] = ₹ 80

Price = ₹ 5 [20 × 5] = ₹ 100

Price = ₹ 6 [20 × 6] = ₹ 120

Investor will exercise option when price of share is ₹ 6

Question – 24

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?

Solution:

(i) Conversion Value = ₹ 21 × 2 = ₹ 42

(ii) Conversion Premium $= \frac{₹\ 50 - 42}{42} \times 100 = 19.05\%$

(iii) EPS

	Before Conversion	After Conversion
EAT	15,00,000	15,00,000
(-) PD [40,000 × 50 × 7%]	1,40,000	-
Earnings	13,60,000	15,00,000
÷ No.	5,00,000	5,80,000 [5,00,000 + 40,000 × 2]
EPS	2.72	2.586
EPS Reduced by	0.28 (3 – 2.72)	0.414

(iv) Revise EPS

	Before Conversion	After Conversion
EAT	25,00,000	25,00,000
(-) PD [40,000 ×7%]	1,40,000	-
Earnings	23,60,000	25,00,000
÷ No.	5,00,000	5,80,000 [5,00,000 + 40,000 × 2]
EPS	4.72	4.31

Question – 25

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.

Solution:

(i) Current Market Price of Bond

Time	CF	PVIF 8% PV (CF)	PV (CF)
1	14	0.926	12.964
2	14	0.857	11.998
3	14	0.794	11.116
4	14	0.735	10.290
5	114	0.681	77.634
		P_0 =	124.002

Say ₹ 124.00

(ii) Minimum Market Price of Equity Shares at which Bondholder should exercise conversion option:

$$\frac{124.00}{20.00} = ₹\ 6.20$$

(iii) Duration of the Bond

Year	Cash flow	P.V. @ 8%		Proportion of bond value	Proportion of bond value × time (years)
1	14	0.926	12.964	0.105	0.105
2	14	0.857	11.998	0.097	0.194
3	14	0.794	11.116	0.089	0.267
4	14	0.735	10.290	0.083	0.332
5	114	0.681	77.634	0.626	3.130
			124.002	1.000	4.028

Question – 26

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.