COST OF LONG TERM DEBT [Kd]

I) Cost of Irredeemable Debt

II) Cost of Redeemable Debt
- a) Approximation [Short-cut] Method
- & b) YTM/IRR Method.

I) Cost of Irredeemable Debt

→ Debentures or bonds which are NOT redeemed [principal amount is not to be repaid] during the life of the company.

→ No maturity period.

→ only Interest is paid every year. Principal amount is repaid only when company is closed [wind-up]

Example

A co. issued irredeemable debentures

a) Face value = ₹1,000 ; Int Rate = 10% ; Tax = 30%

b) F.V. = ₹1,000 ; Issue Price = ₹980
Issue Exp = ₹30 ; Interest = 10% ; Tax = 30%

c) F.V. = ₹1,000 ; Market Price = ₹1,080 ;
Floatation cost = 2% ; Interest = 10% ; Tax = 30%

Calculate Kd in all above cases.

Solution

a)

FV = ₹1,000	Int = ₹100	Int = ₹100	Int = ₹100 .....
Int = 10%	(-) Tax = (30)	(30)	(30)
Tax = 30%	70	70	70

$$1{,}000 = \frac{70}{Kd}$$

$$\Rightarrow Kd = \frac{70}{1000} = 0.07 \rightarrow 7\%$$

$$Kd = \frac{\text{Interest}(1-t)}{\text{Net Proceeds}} \times 100$$

where,

- Net Proceeds = Issue Price − Issue Exp. [F.C]
- If Market Price is given in Q^n; then use Market Price instead of Issue Price in N.P.
- If Issue Exp are not given in Q^n; then assume it to be "0".

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b) $Kd = \frac{100(1-0.30)}{980-30} \times 100 = \frac{70}{950} \times 100$

$= 7.37\%$

c) $Kd = \frac{100(1-0.30)}{1080 - (2\% \times 1{,}080)} \times 100\%$

$= \frac{70}{1058.40} \times 100 = 6.61\%$

Note:

i) Floatation cost is the cost which a company incurs while issuing a security [shares, deb etc] They are aka. Issue Expenses.

Eg: legal fees, registration fees, commission, listing exp. etc.

Treatment of floatation cost

→ If F.C. is given in "%" form → then logically F.C. should be calculated on ISSUE PRICE. [But, if Issue Price is not given & C.M.P. is given → then use CMP as IP]

→ However, if question specifically mentions to calculate F.C. on FACE VALUE → then do so.

II) **Cost of Redeemable Debentures**

IIa) **Approximation / Short-cut Method**

Illu 2 of ICAI SM

0	1	2	3	4	5
1/4/2017	1/4/2018	1/4/2019	1/4/2020	1/4/2021	1/4/2022
10,000 Deb	Int = 10	10	10	10	10
Int = 10%	Tax saving: (3.5)	(3.5)	(3.5)	(3.5)	(3.5)
FV = 100	6.5	6.5	6.5	6.5	6.5
IP = 110					RV = 100

$$= \frac{10(1-0.35) + \left(\frac{100-110}{5}\right)}{\left(\frac{100+110}{2}\right)}$$

$$= \frac{6.50 + (-2)}{105} = \frac{4.50}{105}$$

$$= 0.042857 \simeq \underline{4.29\%}$$

Eg:

FV = ₹100 | Int = 10 | 10 | 10

NP = ₹88 { IP = ₹90, IE = ₹2 }

Int = 10%

Tax = 40%

Tax = (4) | (4) | (4)

Saving

6 | 6 | 6

RV = 120

$$K_d = \frac{10(1-0.4) + \left(\frac{120-88}{3}\right)}{\left(\frac{120+88}{2}\right)}$$

$$= \frac{6 + 10.67}{104} = 0.1603$$

$$\simeq \underline{16.03\%}$$

Cost of Redeemable Debentures (Approximation Method) $= \frac{Int(1-t) + \left[\frac{RV-NP}{n}\right]}{\left[\frac{RV+NP}{2}\right]}$

Note :

i) When R.V. is not given, then assume F.V. = R.V.

ii) In above formula "n" = Remaining life of deb. or Years Remaining to Maturity

iii) If Question mentions that, "Discount on Issue" or "Premium on Redemption" of Debentures is also tax deductible, then using approximation method -

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

$$\Rightarrow K_d = \frac{\left[Int + \frac{(RV-NP)}{n}\right](1-t)}{(RV+NP/2)}$$

IIb) YIELD TO MATURITY OR INTERNAL RATE OF RETURN
[YTM] [IRR]

Illu 2

0	1	2	3	4	5
1/4/2017	1/4/2018	1/4/2019	1/4/2020	1/4/2021	1/4/2022
NP = 110	6.50	6.50	6.50	6.50	6.50 + 100 = 106.50

PV_1 PV @ IRR
+ PV_2 PV @ IRR
+ PV_3 PV @ IRR
+ PV_4 PV @ IRR
+ PV_5 PV @ IRR
= 110

Here, IRR = Kd } IRR is the rate at which the sum of PV of future cf = N.P.

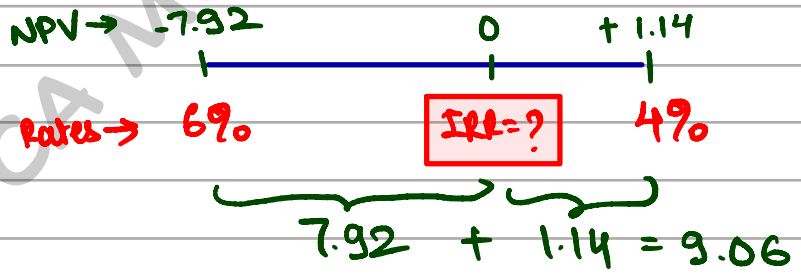
Calculation of IRR

Year	Particulars	cf	DF (10%)	Dcf	DF (6%)	Dcf
0	Net Proceeds	(110)	1	(110)	1	(110)
1-5	Int Net of Tax	6.50	3.791	24.64	4.212	27.38
5	R.V.	100	0.621	62.10	0.747	74.70
	N.P.V.			(23.26)		(7.92)

IRR is the rate at which **NPV = 0**

Yr	Particulars	cf	DF (4%)	Dcf
0	Net Proceeds	(110)	1	(110)
1-5	Int (Net of Tax)	6.50	4.452	28.94
5	R.V.	100	0.822	82.20
	N.P.V.			1.14

If investor is expecting 4% return on his money, NPV of ₹1.14 → signifies → 4% return toh milega hi → 4% ke upar ₹1.14 bhi milege.



$$IRR = 4\% + \frac{1.14}{9.06}(6\% - 4\%) = 4.25\%$$

$$IRR = \text{Lower Rate} + \frac{NPV@LR}{NPV@LR - NPV@HR}(HR - LR)$$

$$x = \frac{1.14}{9.06} \times 2\%$$

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* AMORTIZATION OF BONDS

→ A bond may also be amortised every year, i.e. principal amount is repaid every year rather than on maturity.

→ In such a situation, principal amount every year & interest will be calculated on BALANCE principal amount.

→ Here, we will NOT calculate Kd. However, here we will use Kd to calculated "Value of Bond" which is amortised.

$$\text{Value of Bond} = \frac{C_1}{(1+kd)^1} + \frac{C_2}{(1+kd)^2} + \ldots + \frac{C_n}{(1+kd)^n}$$

Illu 5:

	0	1	2	3	4	5
Principal	5,000	4,000	3,000	2,000	1,000	–
Principal (–) Repaid		1,000	1,000	1,000	1,000	1,000
Int@8%		400	320	240	160	80
CF		1,400	1,320	1,240	1,160	1,080

PV = ?

$$\text{PV of Bond} = \frac{1400}{(1.06)^1} + \frac{1320}{(1.06)^2} + \frac{1240}{(1.06)^3} + \frac{1160}{(1.06)^4} + \frac{1080}{(1.06)^5}$$

OR

Year	Particulars	Cf	DF(6%)	Dcf
1	Cf_1	1,400	0.943	1320.20
2	Cf_2	1,320	0.890	1174.80
3	Cf_3	1,240	0.840	1041.60
4	Cf_4	1,160	0.792	918.72
5	Cf_5	1,080	0.747	806.76
	Value of Bond			5,262.08

* COST OF CONVERTIBLE DEBENTURES

→ Holders of convertible debentures have an option on maturity to either

- Receive cash
- OR
- Receive specified no. of Equity Shares

→ Calculation of cost of Conv. Deb is SAME AS that of redeemable deb.

① Approximation Method or ② YTM/IRR Method

However, difference lies in calculation of REDEMPTION VALUE.