UNIT : 3

SECONDARY MARKET - STOCK EXCHANGE

* VALUATION OF BOND :

* Bond Theorm :

(1) If the market price of the bond increases, the yield would decline and vice versa.

° Three things should be remember :
→ Bond price are fixed
→ Interest Rate Fixed
→ Maturity period is also fixed

(2) If the bonds yield remain the same over it's life, the discount or premium depends on the maturity period. CM.P., Yield & Time period all are fluctuated.)

(3) If the bonds yield remain constant over it's life, the discount or premium amount will decrease at an increasing rate at it's life get shorter.

(4) A rise in the bond price for decline in the bond yield is greather than the fall in the bond price for rising in the yield.

(5) change in the price will be lesser for the % cha in bond's yield if its coupen rate is heigher.

* Calculation of Bond :

1) Current yield :- $\frac{I}{\text{Market Price}}$

2) Yield to Maturity :-

S.C. $YTM = \frac{C + (P \text{ or } D) / YTM}{P_0 + P_1 / 2}$

where, = C = cash flow or Interest
P = Premium D = Discount
YTM = time
P_0 = current Premium / Price.
P_1 = Face Value

3) Yield to Maturity : (Long)
= I (P.V. annuity Int. factor in % & Year) +
F.V. (P.V. of interest factor %, year)

3) Yield to call :-

$$YTC = I \left[\frac{H.V. - M.V.}{H.V. - L.V.} \right] \times i$$

4) Duration :- or t :-

Q-1 From the following information calculate current yield and yield to Maturity :-

A four year bond with 7% coupon rate and maturity value of ₹ 1000 is currently selling at ₹ 905. what is its yield to Maturity ?

→ Current Yield : $\frac{I}{M.P.} \times 100$

$= \frac{70}{905} \times 100$

$= 7.73\%$

→ $YTM = \frac{C/I + (P/D)/YTM}{P_0 + P_1/2}$

$= \frac{70 + 95/4}{1000 + 905/2}$

$= \frac{70 + 23.75}{1000 + 952.5}$

$= \frac{93.75}{1952.5}$

$= 6.48\%$ 9.8%.

→ Trial and Error Method :-

YTM = 70 (PVAIF 8%, 4) + 1000 (PVIF 8%, 4)

= 70 (3.312) + 1000 (0.7350)

= 231.84 + 735

= 966.84 (L.V.)

@ 6% = 70 (3.4651) + 1000 (0.7921)

= 242.55 + 792.1

= 1034.657 (H.V.)

$$YTM = I + \left[\frac{I.V. - F.V.}{H.V. - L.V.}\right] \times i$$

$$= 6 + \left[\frac{966 - 1000}{1034.68 - 966.84}\right] \times 2 \quad (8.6)$$

$$= 6 + \left[\frac{-34}{67.817}\right] \times 2$$

$$= 6 + [0.5013) \times 2$$

$$= 6 + (-0.0027)$$

$$= 7$$

Q-2 A Bond have 1000 F.V., Coupon Rate 15%, Current M.V. is 900 and 5 years Maturity. Calculate its YTM :-

→ Current Yied $= \frac{I}{M.V.} \times 100$

$= \frac{150}{900} \times 100$

$= 16.67\%$

→ $YTM = \frac{CY + D \text{ or } P/(YTM)}{P_0 + P_1/2}$

$= \frac{150 + 100/5}{1000 + 900/2}$

$= \frac{150 + 20}{1000 + 450}$

$= \frac{170}{1450}$

$= 17.89$

* Trial & Error Method :-

YTM = I (PVAIF 17%, 5) + F.V. (PVIF, 17%, 5)
= 150 (3.1995) + 1000 (0.4561)
= 479.925 + 456.1
= 936.025

= 150 (PVAIF 16%, 5) + F.V. (PVIF 16%, 5)
= 150 (3.2743) + 1000 (0.4761)
= 491.145 + 476.1
= 967.245

= 150 (PVAIF 14%, 5) + 1000 (PVIF 14%, 5)
= 150 (3.4331) + 1000 (0.5114)
= 514.965 + 519.4
= 1034.365

= 150 (PVAIF 18%, 5) + F.V. (PVIF 18%, 5)
= 150 (3.1272) + 1000 (0.4371)
= 469.08 + 437.1
= 906.18

= 150 (PVAIF 19%, 5), 1000 (PVIF 19%, 5)
= 150 (3.0576) + 1000 (0.4190)
= 458.64 + 419
= 877.64

→ $YTM = I + \left[\frac{LV - F.V.}{H.V. - L.V.}\right] \times i$

$= 18 + \left[\frac{906.18 - 1000}{1034.365 - 906.18}\right] \times 3 \quad (18 + 15)$

$= 18 + \left[\frac{-93.82}{128.185}\right] \times 3$: 90.195

$= 18 + 2.1964$

Q-3 Bond of ₹ 1000 Face Value, Coupen Int. Rate is 12%. will matyre after 7 yeaus. What is the value of the bond if Discount rate are 14 and 12%. If Market Price of the Bond is 970, what is YTM?

→ Current Yield :-

1) @ 14% = $\frac{I}{M.V.} \times 100$ = $\frac{140}{970} \times 100$ = 14.43%

2) @ 12% = $\frac{I}{M.V.} \times 100$ = $\frac{120}{970} \times 100$ = 12.37%

→ YTM = $\frac{CY + (P \text{ or } D)/YTM}{P_1 + P_0/2}$

@ 12% = $\frac{120 + 30/7}{1000 + 970/2}$ = $\frac{120 + 4.2857}{985}$ = 12.69%

@ 14% = $\frac{140 + 80/7}{1000 + 970/2}$ = $\frac{140 + 4.2857}{985}$ = 14.65%

→ YTM = I (PVAIF, 12%, 7) + F.V. (PVIF, 12%, 7)
= 120 (4.5638) + 1000 (452.3)
= 547.656 + 452.3
= 999.956

= 120 (PVAIF, 14%, 7) + F.V. (PVIF, 14%, 7)
= 120 (4.2883) + 1000 (0.3996)
= 514.596 + 899.60
= 914.196

= 120 (PVAIF, 13%, 7) + F.V. (PVIF, 13%, 7)
= 120 (4.4226) + 1000 (0.4250)

$= 530.712 + 425.1$

$= 955.812$

→ $YTM = I + \left[\frac{H.V. - M.V.}{H.V. - L.V.}\right] \times i$

$= 12 + \left[\frac{999.95 - 970}{999.95 - 955.812}\right] \times 1$

$= 12 + (25.95 / 94.188) \times 1$

$= 2.59$

Q-4 Jaya Ltd. has 14% debentures with F.V. of ₹100. Mature at par in 15 years. The Debentures is callable (CPVAF) in 5 years at ₹114. If currently sales ₹4,105 calculate each of the following.

1) Current Yield
2) Yield or Yield to Maturity.

→ Current Yield $= \frac{I}{M.V.} \times 100$ and $\frac{I}{M.V.} \times 100$

$= \frac{14}{114} \times 100$ $= \frac{14}{105} \times 100$

$= 13.33\%$ $= 12.28\%$

→ $YTM = I\ (PVAIF, 10\%, 5) + F.V.\ (PVIF, 13\%, 5)$

$= 14\ (3.5172) + 54.28\ [100 \times 0.5428]$

$= 49.2408 + 54.28$

$= 108.5208$

@12% = 107.21

@10% = 53.0712 + 62.09

= 115.16

@11% : 51.7426 + 59.35

= 111.0926

→ $YTC = I\left[\frac{H.V. - M.V.}{H.V. - L.V.}\right] \times i$

$= 14\left[\frac{115.16 - 114}{115.16 - 111.0926}\right] \times 1$

$= 14\left[1.16 / 4.0674\right]$

$= 14.29$

→ $YTC = I\left[\frac{H.V. - M.V.}{H.V. - L.V.}\right] \times i$

$= 14\left[\frac{107.21 - 105}{107.21 - 103.52}\right] \times i$

$= 14\,(2.21 / 3.69) \times i$

$= 14.60$

→ $\text{short-cut} = \frac{14 + 5/15}{100 + 105/2}$

$= \frac{14 + 0.33}{102.5}$

$= 13.98$

Q-5

✱ Duration Measures Time Structure of the bond and Bond Interest Rate Risk :-

T - Duration

R = Interest Rate

* Calculation of Bond duration :-

Formula for D or T is as besides :-

$$D \text{ or } T = \frac{\frac{C_1}{(1+r)^1}}{P_0} \cdot 1 + \frac{\frac{C_2}{(1+r)^2}}{P_0} \cdot 2 + \frac{\frac{C_3}{(1+r)^3}}{P_0} \cdot 3 + \cdots + \frac{\frac{C_n}{(1+r)^n}}{P_0}$$

Here, C = cash flow for the year or Int. amt.

Q Calculate the duration for the Bond A and Bond B with 7% and 8% coupon Interest Rate having maturity of 4 years. The face value of Bond is ₹ 1000.

* For Bond A :-

Here, F.V. 1000

Int. Rate (R) or (I) = 7%, T = 4 years

Year	Cash Flow	Present V. of Int. F.	CF X PVIF	$\frac{C_i}{(1+r)^i}$ / P_0	$\frac{C_i}{(1+r)^i}$ / P_0 X Year colo.
1	70	0.9346	65.422	0.0654	0.0654
2	70	0.8734	61.138	0.06113	0.1223
3	70	0.8163	57.141	0.0571	0.1713
4	1070	0.7629	816.303	0.8163	3.2652
			1000		⇒ 3.6242

* For Bond B :- F.V. ₹ 1000 ; ROI = 8%, T = 4 Years

year	Cash Flow	P.V.IF	CF X PVIF	$\frac{C_i}{(1+r)^i}$ / P_0	$\frac{C_i}{(1+r)^i}$ / P_0 X Year colo
1	80				
2	80				
3	80				
4	1080				

Q-6 Face Value = 100, Coupon Rate Int. = 12%, T = 5 Years; Calculate Duration :-

Year	Cash Flow	PVIF	CF X PVIF	$\frac{Ci}{(1+r)^t}$ / Po	$\frac{Ci}{(1+r)^t}$ / Po x Year Colo.
1	12				
2	12				
3	12				
4	12				
5	112				

7 Bond Face Value = 1000, Coupon Interest Rate 7%, Bond duration 6 Years.

Year	Cash Flow	PVIF	CF X PVIF	$\frac{Ci}{(1+r)^t}$ / Po	$\frac{Ci}{(1+r)^t}$ / Po x Year Colour
1	70				
2	70				
3	70				
4	70				
5	70				
6	1070				