Solution of Practice Questions

Lecture # 3-9

Q1: Mr. Ali finds an opportunity which requires Rs. 20,000 to invest today at the rate of 12%. How much time this investment opportunity will take to generate a cash inflow of Rs. 60,000?

Sol 1:

This concept is relevant to time value of money and can be solved by using either formula of present value or future value.

Future value = present value * (1+r)^t

60,000 = 20,000 * (1+0.12)^t

60,000 / 20,000 = (1.12)^t

3 = (1.12)^t

As per mathematics rule, taking log on both side helps to solve the "power" so,

Log (3) = Log (1.12)^t

0.477 = t log(1.12)

0.477 = t (0.049)

t = 0.477 / 0.049 = **9.73 years**

Q2: Mr. Hassan is currently 30 years old. He wants to invest in a pension fund that provides interest rate of 15%. After the age of 50 years, this fund will start generating Rs. 60,000 per annum for Mr. Hassan forever? How much he should invest today for this opportunity?

Sol 2:

This concept is relevant to delayed perpetuity because investment is required today when Mr. Hassan is of 30 years while payments will start to receive after age of 50 years. There is delay of 20 years.

Present value of delayed perpetuity = Cash flow / r(1+r)^t

Present value of delayed perpetuity = 60,000 / 0.15(1+0.15)^20

Present value of delayed perpetuity = 60,000 / (0.15*16.366)

Present value of delayed perpetuity = 60,000 / 2.455

Present value of delayed perpetuity = **Rs. 24,440** (approximately)

Q3: An investment opportunity offers cash inflow of Rs. 10,000 at end of each year up to five years at rate of 15%. How much amount this opportunity is required today to invest?

Sol 3:

This concept is relevant to time value of money. As opportunity is generating equal cash flows for five years so, it will be solved by using formula of annuity.

PV of annuity = cash flow * [{1- 1/ (1+i)^t}/i]

PV of annuity = 10,000 * [{1- 1/ (1+0.15)^5}/0.15]

PV of annuity = 10,000 * [{1- 1/ 2.011}/0.15]

PV of annuity = 10,000 * [{1- 0.497}/0.15]

PV of annuity = 10,000 * [0.503/0.15]

PV of annuity = 10,000 * 0.3533 = Rs. 33,533 (approximately)

Q4: There are following two bond issues:

	Face Value (Rs.)	Maturity period (Years)	Coupon Rate (paid semiannually)	Market Required Return
Bond # 1	Rs. 1,000	5	8%	10%
Bond # 2	Rs. 1,000	5	12%	10%

Required:

a) Analyze whether bonds are issued at premium or discount by providing appropriate reasoning.
b) Calculate current value of each bond.

Sol 4:

Part a)

Bond # 1 is issued at discount as market required return (yield to maturity) is greater than current yield (coupon rate). The reason behind this, selling of bond at discount means investor will receive capital gain when bond will be matured. This is the fact that makes inverse relation between YTM and bond price because increase in YTM (market rate) is offset by lowering the bond price.

Bond # 2 is issued at premium as YTM is less than coupon rate. Decrease in YTM than coupon rate is offset by offering the bond at premium. When bond will be sold at premium then investor

will have to bear capital loss at time of maturity so, coupon rate and the return received from market will become almost equal.

Part b)

Value of bond **= C [{1-1/(1+i/n)^t*n}/i/n] + Face Value / (1+i/n)^t*n**

Where t*n = Year * compounding frequency, i = Market required return, C = Coupon payment

OR
Intrinsic value of bond **= C (PVIFA $_{i/2,2n}$) +M(PVIF $_{i/2,2n}$)**

Bond # 1:

Coupon payment = (1,000*8%) / 2 = Rs. 40

Value of bond = 40 (PVIFA $_{5\%,10}$) + 1000(PVIF $_{5\%,10}$)

Using financial tables for rate 5% and time period 10, *PVIFA = 7.722* and simple *PVIF = 0.614*

= 40 (7.722) + 1000(0.614)
= 308.88 + 614 = Rs. 922.88

Bond # 2:

Coupon payment = (1000*12%) / 2 = Rs. 60

Value of bond = 60 (PVIFA $_{5\%,10}$) + 1000(PVIF $_{5\%,10}$)

Using financial table

= 60 (7.722) + 1,000(0.614)
= 463.32 + 614 = Rs. 1,077.32

Q5: Latif Manufactures Limited- manufacturer of sports balls- has declared expected dividend of Rs. 2 per share at the growth rate of 6%. If company's stock is currently trading at Rs. 50 then what will be the investor's required rate of return.

Sol 5: This concept is relevant to dividend discount model and will be solved by using following formula constant growth model which is also known as Gordon growth model:

P0 = D1 / (r-g)

Important Notes:

1. D1 is also known as next year dividend or expected dividend. If current dividend is given instead of expected dividend then D1 is calculated by using formula D1 = D0 (1+g). Here D0 represents current dividend.

2. Investor's required rate of return which is denoted by "r" is also known as cost of common stock.

By putting values in the above given formula:

$50 = 2 / (r-0.06)$

$r - 0.06 = 2/50 = 0.04$

$r = 0.04 + 0.06 = 0.1$ or 10%

Q6: In continuation of Question # 5, Latif Manufacturer is using 40% loan in its capital structure at interest rate of 12%. If tax rate is 40% then:

a) Calculate after tax cost of debt
b) Also calculate WACC (weighted average cost of capital) by using the investor's required return (also known as cost of equity and calculated in question # 5) and using cost of debt calculated in part "a" of Question # 6.

(Q#6 is from lecture # 9- need to consult the topic of WACC)

Sol 6:

Part a)

After tax cost of debt = Interest rate (1-tax)

Note: If after tax cost of debt is given then there is no need to calculate this.

After tax cost of debt = 0.12 (1-0.40) = 0.072 = 7.2%

Part b)

WACC = Wd * Kd (1-t) + Wc * Kc

Where

Wd = Weight of debt

Kd (1-t) = After tax cost of debt

Wc = Weight of common equity / stock

Kc = Cost of equity also known as investor's required return on stock

Important Notes:

1. Weight of debt (Wd) as per given information in question is 40% so, remaining is of equity means weight of common stock (Wc) is 60%.
2. Cost of common equity (investor's required return) is already calculated in question # 5 which is 10%

3. After tax cost of debt calculate in part “a” of Q # 6 is 7.2%

WACC = 0.4*0.072 + 0.6*0.10

WACC = 0.0288 + 0.06 = **0.0888 = 8.88%**