**Time Value of Money**

1. If the interest rate is 12 percent what are the doubling periods as per the rule of 72 and the and the rule of 69 respectively.

Rule 72 = 72/r = 72/12 = 6%

Rule 69 = 0.35 + 69/r = 0.35 +69/12 = 0.35+5.75 = 6.1%

1. A borrower offers 16 percent nominal rate of interest with quarterly compounding .What is the effective rate of interest.

Effective Rate of Interest = (1+0.16/4)^4 -1 = 16.98%

1. Fifteen annual payments of rs. 5000 are made into a deposit account that pays 14% interest per year what is the future value of Annuity at the end of 15 years.

FVA = 5000\*FVIFA (14%,15)

= 5000\* 43.842 = 219210.

1. A finance company advertises that it will pay a four lump sum of Rs 44650 at the end of five years to investors who deposit annually 6000 for five years. What is the interest rate ratio in this offer.

44650 = 6000\*FVIFA(r, 5)

FVIFA(r,5) = 44650/6000 =7.441667

r = 20%.

1. What is the present value of the following cash stream if the discount rate is 14%.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| year | 0 | 1 | 2 | 3 | 4 |
| Cash flow | 5000 | 6000 | 8000 | 9000 | 8000 |

**Solution:**

|  |  |  |  |
| --- | --- | --- | --- |
| year | cashflow | PVIF @ 14% | PV cashflows |
| 0 | 5000 | 1 | 5000 |
| 1 | 6000 | 0.877 | 5262 |
| 2 | 8000 | 0.769 | 6152 |
| 3 | 9000 | 0.675 | 6075 |
| 4 | 8000 | 0.592 | 4736 |
|  |  |  | 27225 |

1. Suppose you deposit Rs 10000 with an investment company which pays 16% interest with quarterly compounding , how much this deposit grow in 5 years.

FV = P(1+r/4)^4\*n

FV= 10000(1+0.16/4)^4\*5

FV = 21911.23

## Find the present value of $10,000 to be received at the end of 10 periods at 8% per period.

## PV=A/(1+r)^n

PV = 10000/(1+0.08)^10=4631.935

1. Suppose you make an investment of $1,000. This first year the investment returns 12%, the second year it returns 6%, and the third year in returns 8%. How much would this investment be worth, assuming no withdrawals are made?

FV = P(1+r1)(1+r2)(1+r3)

FV = 1000(1+0.12)(1+0.06)(1+0.08)

FV = 1281.176

1. Suppose you make an investment of $10,000. This first year the investment returns 15%, the second year it returns 2%, and the third year in returns 10%. How much would this investment be worth at the end of three years, assuming no withdrawals are made?

FV = 12903 (working similar to 9th sum).

1. If the interest rate is 10% then what is the present value of $1000 to be received after 5 years.

PV = A/(1+r)^n

PV = 1000/(1+0.10)^5 = 620.9213.

1. You want to save some money in a bank with the expectation of receiving $50,000 in 5 years. One bank has proposed a monthly compounding rate of 9.5%. How much money do you need to deposit in the bank today?

FV = A (1+r)^n

50000= A\*(1+0.095)^60

A=215.8355

1. If a person gets $1000 at the end of the first year, $2000 at the end of the second year, and $3000 at the end of the third year from any investment, what will be his present value if the interest rate is 10%?

PV = A/(1+r)n

PV = 1000/(1.10)+2000/(1.10)^2+3000/(1.10)^3

PV = 4815.928.

1. If you deposit $50,000.00 in Bank at 13.5% monthly compounding then what amount will you get after 10 years.

FV = P(1+r)^n

FV = 50000(1+0.135)^120

FV = 198826097200.

1. Harry has taken a loan of $ 10,000 from a bank for 3 years. After 4 years, he has paid a total of $13,310. What is the annual compound interest rate?

FV = P(1+r)^n.

13310 = 10000(1+r)^4

(1+r)^4 = 1.331

1+r = 1.074099

r = 7.4%

**Leverages**

1. Calculate operating leverage, financial leverage and combined leverage under situation 1 and 2 in financial plans A & B from the following information relating to the operation and capital structure of a company.

Installed capacity – 2,000 units

Actual production and sales – 50% of the capacity

Selling price ₹20 per unit

Variable Cost ₹10 per unit

Fixed Cost:

Under Situation I ₹ 4,000

Under Situation II ₹ 5,000

|  |  |  |
| --- | --- | --- |
| **Capital Structure:** | **Financial Plan** | |
|  | **A (₹)** | **B (₹)** |
| Equity | 5,000 | 15,000 |
| Debt (Rate of Interest 10%) | 15,000 | 5,000 |
|  | 20,000 | 20,000 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Particulars** | **Financial Plan A** | | **Financial Plan B** | |
|  | **Situation 1** | **Situation 2** | **Situation 1** | **Situation 2** |
| units | 1000 | 1000 | 1000 | 1000 |
| Sales | 20000 | 20000 | 20000 | 20000 |
| Less: Variable Cost | 10000 | 10000 | 10000 | 10000 |
| Contribution | 10000 | 10000 | 10000 | 10000 |
| Fixed Cost | 4000 | 5000 | 4000 | 5000 |
| EBIT | 6000 | 5000 | 6000 | 5000 |
| Less: Interest | 1500 | 1500 | 500 | 500 |
| EBT | 4500 | 3500 | 5500 | 4500 |
|  |  |  |  |  |
| DOL = contribution/EBIT | 1.6666667 | 2 | 1.66666667 | 2 |
| DFL = EBIT / EBT | 1.3333333 | 1.4285714 | 1.09090909 | 1.1111111 |
| DCL | 2.2222222 | 2.8571429 | 1.81818182 | 2.2222222 |

2. The selected financial data for A, B and C companies for the year ended 31st March, 2014 were as follows:

|  |  |  |  |
| --- | --- | --- | --- |
|  | A | B | C |
| Variable cost as a % of sales | 66.67 | 75 | 50 |
| Interest Expense | 200 | 300 | 1000 |
| Degree of Operating Leverage | 5 | 6 | 6 |
| Degree of Financial Leverage | 3 | 4 | 2 |
| Income Tax rate | 35% | 35% | 35% |

Prepare an income statement for each of the companies.

|  |  |  |  |
| --- | --- | --- | --- |
| **Income Statement:** |  |  |  |
| **Particulars** | **A** | **B** | **C** |
| Sales | 9000 | 36000 | 24000 |
| Less: Variable cost | 6000 | 27000 | 12000 |
| Contribution | 3000 | 9000 | 12000 |
| Less: Fixed cost | 2400 | 7500 | 10000 |
| EBiT | 600 | 1500 | 2000 |
| Less: Interest | 200 | 300 | 1000 |
| EBT | 400 | 1200 | 1000 |
| Less: Tax @ 35% | 140 | 420 | 350 |
| EAT | 260 | 780 | 650 |
|  |  |  |  |
| DFL | 3 | 4 | 2 |
| DFL = EBIT/EBT | x/x-200 | x/x-300 | x/x-1000 |
| DOL | 5 | 6 | 6 |
| DOL = Contribution / EBIT |  |  |  |
| Contribution = DOL \* EBIT | 5\*600 | 6\*1500 | 6\*2000 |
| Variable cost as a % of sales | 66.67 | 75 | 50 |

3. From the following prepare income statement of Company A and B.

|  |  |  |
| --- | --- | --- |
|  | A Co., | B Co., |
| Financial Leverage | 4:1 | 5:1 |
| Interest Expense | ₹ 6,00,000 | ₹ 7,00,000 |
| Operating Leverage | 3:1 | 4:1 |
| Variable cost as a % of sales | 66.67 | 50 |
| Income Tax rate | 30% | 40% |
| No. of Equity shares | 100000 | 70000 |

|  |  |  |
| --- | --- | --- |
| **Income Statement:** |  |  |
| **Particulars** | **A Co.,** | **B Co.,** |
| Sales | 7200000 | 7000000 |
| Less: Variable cost | 4800000 | 3500000 |
| Contribution | 2400000 | 3500000 |
| Less: Fixed cost | 1600000 | 2625000 |
| EBiT | 800000 | 875000 |
| Less: Interest | 600000 | 700000 |
| EBT | 200000 | 175000 |
| Less: Tax @ 35% |  |  |
| EAT |  |  |
|  |  |  |
| DFL | 4 | 5 |
| DFL = EBIT/EBT | x/x-600000 | x/x-700000 |
| DOL | 3 | 4 |
| DOL = Contribution / EBIT |  |  |
| Contribution = DOL \* EBIT | 3\*800000 | 4\*875000 |
| Variable cost as a % of sales | 66.67 | 50 |

Risk and Return

1. Miss Jyoti purchased 10 shares of Xavier Ltd. on 1/1/2020 for ₹ 75 per share, during the year 2020 Xavier Ltd. paid dividend of ₹ 12 per share. The market price of the share on 31/12/2020 was ₹ 93 per share. You are required to find out the returns earned by Ms. Jyoti during the year 2020.

Return = [ Dividend + (Price at the end – price at the beginning)]/price at the beginning \*100

Return =[ 12+(93-75)]/75\*100 = 40%

1. Ms. Pallai purchased 100 shares of Kumar Ltd on 1/1/2020 for ₹ 95 per share, during the year 2020 Kumar Ltd. paid dividend of ₹ 17 per share. The market price of the share on 31/12/2020 was ₹ 106.50 per share. You are required to find out the returns earned by Ms. Pallai during the year 2020.

Return = [17+(106.50-95)]/95\*100 = 30%

1. Mukesh purchased 5 shares of Multan Ltd. for ₹ 57 each on 1/4/2020, during the year 2020-2021 company paid a dividend of ₹ 5 per share. Mr. Mukesh sold the share on 31/3/2021 for ₹ 50 each. You are required to find out the returns earned by Mukesh during the year 2020-21.

Return = [5+(50-57)]/57\*100 = -3.5%

1. Jones purchased 12 shares of Liverpool Ltd., for ₹ 190 per share on 1/1/2017, during the time span of 3 years Liverpool Ltd., paid following dividends per share 2017 - ₹ 7, 2018 - ₹ 9, 2019 - ₹ 12. Jones sold the shares on 31-12-2019 for ₹ 225 per share, find out the holding period returns earned by Jones. Calculate Annualised returns also.

Holding period return = [total dividend +(Pe-Pb)]/Pb \*100

HPR = [(7+9+12)+(225-190)]/190\*100 = 33.2%

Annualised Return = 33.2/3 = 11.1%

1. Torres purchased some shares of Ronaldo Ltd. for ₹ 1770 per share on 1/4/2020, he sold the shares on 30/9/2020 for ₹ 2250 per share, during this time period Ronaldo Ltd. paid normal dividends of ₹ 70 per share. Find out the holding period returns of Torres. Also find out Annualised return.

HPR = [70+(2250-1770)]/1770\*100 = 31%

Annualised Return = 31/6\*12 = 62%

1. XYZ Ltd. paid the following dividend per share and had following market price per share during the period 2015 – 2018.

|  |  |  |
| --- | --- | --- |
| Year | Dividend per share | Market price per share |
| 2015 | 7 | 95 |
| 2016 | 9 | 105 |
| 2017 | 11 | 90 |
| 2018 | 12 | 158 |

Calculate the annual rate of return for last 3 years.

Return = [Dividend +(pe-pb)]/pb\*100

2016 = (9+(105-95))/95\*100 = 20%

2017 = (11+(90-105))/105\*100 = -3.81%

2018 = (12+(158-90))/90\*100 = 88.89%

1. Find the expected returns of ABC Ltd.

|  |  |  |
| --- | --- | --- |
| Year | Dividend per share | Market price per share |
| 2014 | 1.53 | 31.25 |
| 2015 | 1.53 | 20.75 |
| 2016 | 1.53 | 30.88 |
| 2017 | 2.00 | 67.00 |
| 2018 | 2.00 | 100.00 |
| 2019 | 3.00 | 154.00 |

Return = [Dividend +(pe-pb)]/pb\*100

2015 = [1.53+(20.75-31.25)]/31.25 \*100 = -28.7%

2016 = [1.53 + (30.88-20.75)]/20.75\*100 = 55.8%

2017 = [2+(67-30.88)]/30.88\*100 = 124%

2018 = [2+(100-67)]/67\*100 = 52.23%

2019 = [3+(154-100)]/100\*100 = 57%

1. Calculate expected returns from the following information for GEC Ltd.

|  |  |
| --- | --- |
| Month | Returns |
| January | 0.034 |
| February | -0.06 |
| March | -0.118 |
| April | 0.067 |
| May | -0.063 |
| June | -0.079 |
| July | -0.059 |
| August | 0.268 |
| September | 0.178 |
| October | 0.191 |
| November | -0.071 |
| December | -0.055 |

Arithmetic mean return = 1.95%

1. Calculate expected returns, variance and standard deviation from the following information for XYZ Ltd.

|  |  |
| --- | --- |
| Month | Returns |
| January | 0.04 |
| February | 0.09 |
| March | -0.06 |
| April | 0.075 |
| May | -0.05 |
| June | 0.08 |

|  |  |  |
| --- | --- | --- |
| **Month** | **Returns** | **Var** |
| January | 0.04 | 0.000117 |
| February | 0.09 | 0.003701 |
| March | -0.06 | 0.007951 |
| April | 0.075 | 0.002101 |
| May | -0.05 | 0.006267 |
| June | 0.08 | 0.002584 |
|  | **0.175** | **0.022721** |

Return = 0.175/6 = 0.02917 =29.17%

Total Variance = 0.022721 = 2.27%

Standard Deviation = SQRT(total variance) = 0.061537 = 6.15%

1. Investor’s assessment of return on a share of X Ltd. under three different situations is as follows:

|  |  |  |
| --- | --- | --- |
| Economic situation | Chance (P) | Return (%) |
| 1 | 0.25 | 35 |
| 2 | 0.50 | 30 |
| 3 | 0.25 | 15 |

Calculate the expected rate of return, variance and standard deviation.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Economic situation** | **Chance (P)** | **Return (%)** | **pR** | **R-Er** | **(R-Er)^2** | **p\*(R-Er)^2** |
| 1 | 0.25 | 35 | 8.75 | 7.5 | 56.25 | 14.0625 |
| 2 | 0.5 | 30 | 15 | 2.5 | 6.25 | 3.125 |
| 3 | 0.25 | 15 | 3.75 | -12.5 | 156.25 | 39.0625 |
|  |  | Er = | **27.5** |  | **Var =** | **56.25** |

Expected Return (Er) = 27.5%

Variance (Var) = 56.25%

Standard Deviation = SQRT (Var) = 7.5%

1. The current price of stock ‘Q’ is ₹ 150. The future prices with probabilities are given below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Future Prices (₹) | 120 | 150 | 180 | 210 | 240 |
| Probability | 0.1 | 0.2 | 0.4 | 0.2 | 0.1 |

Assuming that the company will not pay any dividend you are required to find out expected returns and standard deviation of the stock.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Current Price | 150 |  |  |  |  |  |  |
| **Future Prices** | 120 | 150 | 180 | 210 | 240 |  |  |
| **Return** | **-0.2** | **0** | **0.2** | **0.4** | **0.6** |  |  |
| **Probability** | 0.1 | 0.2 | 0.4 | 0.2 | 0.1 |  |  |
| **pR** | -0.02 | 0 | 0.08 | 0.08 | 0.06 | **0.2** | **Exp Ret** |
| **R-Er** | -0.4 | -0.2 | 0 | 0.2 | 0.4 |  |  |
| **(R-Er)^2** | 0.16 | 0.04 | 0 | 0.04 | 0.16 |  |  |
| **p\*(R-Er)^2** | 0.016 | 0.008 | 0 | 0.008 | 0.016 | **0.048** | **Variance** |
|  |  |  |  |  |  | **0.219089** | **SD** |
|  |  |  |  |  |  |  |  |

1. The risk free return is 10% and the return on market portfolio is 15%. Stock A’s Beta is 1.5; its dividends & earnings are expected to grow at the constant rate of 8%. If the previous dividend per share of Stock A was 2. What should be the intrinsic value per share of stock A?

Rf = 10% ; Rm =15% ; Beta = 1.5

Ke (re) = Rf + Beta (Rm –Rf)

Ke = 10+1.5 (15-10) = 10+1.5(5) = 17.5%

Intrinsic value of share (P0) = D1/(Ke –g) \*100

D1 =D0(1+g)

D1 =2(1+8%) =2(1.08) = 2.16

P0 = 2.16/(17.5 – 8)\*100 =22.74

1. The risk-free return is 8% and the expected return on a market portfolio is 12%. If the required return on a stock is 15%, what is its beta?

Rf = 8%; Rm= 12%; Ke =15% ; Beat = ?

Ke = Rf + Beta (Rm –Rf)

15 = 8 + Beta (12-8)

7 = Beta(4)

Beta = 7/4 = 1.75

1. The risk-free return is 9%. The required return on a stock whose beta is 1.5 is 15%. What is the expected return on the market portfolio?

Rf =9%; Beta = 1.5; Ke=15%; Rm=?

Ke = Rf + Beta (Rm – Rf)

15 = 9 + 1.5 (Rm – 9)

6 = 1.5(Rm -9)

4 =Rm -9

Rm =13%

1. You are considering purchasing the equity stock of MVM company. The current price per share is Rs.10. You expect the dividend a year hence to be Rs. 1.00. You expect the price per share of MVM stock a year hence to have the following probability distribution.

|  |  |  |  |
| --- | --- | --- | --- |
| Price a year hence | 10 | 11 | 12 |
| Probability | 0.4 | 0.4 | 0.2 |

1. What is the expected price per share a year hence?

Expected price = (10\*0.4)+(11\*.4)+(12\*0.2) = 10.8

1. The stock of Alpha company performs well relative to other stocks during recessionary periods. The stock of Beta company, on the other hand does well during growth periods. Both stocks are currently selling for Rs.50 per share. The rupee return (dividend plus price change) of these stocks for the next year would be as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Economic condition | Probability | Return on Alpha stock | Return on Beta stock |
| High growth | 0.3 | 55 | 75 |
| Low growth | 0.3 | 50 | 65 |
| Stagnation | 0.2 | 60 | 50 |
| Recession | 0.2 | 70 | 40 |

Calculate the expected return and standard deviation of :

1. Rs. 1000 in the equity stock of Alpha
2. Rs. 1000 in equity stock of Beta

**Investment of Rs. 1000 in stock Alpha**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Economic situation** | **Chance (P)** | **Return (%)** | **Overall Return** | **pR** | **Overall R-Er** | **(R-Er)^2** | **p\*(R-Er)^2** |
| High Growth | 0.3 | 55 | 1100 | 330 | -50 | 2500 | 750 |
| Low Growth | 0.3 | 50 | 1000 | 300 | -150 | 22500 | 6750 |
| Stagnation | 0.2 | 60 | 1200 | 240 | 50 | 2500 | 500 |
| Recession | 0.2 | 70 | 1400 | 280 | 250 | 62500 | 12500 |
|  |  |  | **Er =** | 1150 |  | **Var =** | 20500 |

|  |  |
| --- | --- |
| **Expected (Er) =** | **1150** |
| **Variance (Var) =** | **20500** |
| **STD Dev (SD) =** | **143.18** |

**Investment of Rs. 1000 in stock Beta**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Economic situation** | **Chance (P)** | **Return (%)** | **Overall Return** | **pR** | **Overall R-Er** | **(R-Er)^2** | **p\*(R-Er)^2** |
| High Growth | 0.3 | 75 | 1500 | 450 | 200 | 40000 | 12000 |
| Low Growth | 0.3 | 65 | 1300 | 390 | 100 | 10000 | 3000 |
| Stagnation | 0.2 | 50 | 1000 | 200 | -200 | 40000 | 8000 |
| Recession | 0.2 | 40 | 800 | 160 | -400 | 160000 | 32000 |
|  |  |  | **Er =** | 1200 |  | **Var =** | 55000 |

|  |  |
| --- | --- |
| **Expected (Er) =** | **1200** |
| **Variance (Var) =** | **55000** |
| **STD Dev (SD) =** | **234.52** |