Q1. An Indian investor obtains USD when the USD is worth INR 83 (direct quote) and invests in a one-year money market security that provides a yield (in USD) of 6 percent. At the end of one year, the investor converts the USD proceeds from the investment back to INR at the prevailing spot rate of INR 78.85 per USD. You are required to compute effective yield for the investor which incorporates actual yield earned plus exchange rate effect. **[5 Marks]**

Solution:

(1.06\*0.95)-1=0.7%

Q.2 The forecasted returns of two stocks in different economic conditions are as follows: **[1+1+3= 5 Marks]**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Economic Condition | | | | |
|  | Super growth | High growth | Low growth | Stagnation | Recession |
| Probability | 0.25 | 0.2 | 0.15 | 0.2 | 0.20 |
| Return on stock A (%) | 35 | 30 | 25 | 20 | -10 |
| Return on stock B (%) | 22 | 18 | 15 | 10 | -10 |

Calculate the following:

1. What is the expected return and risk if you invest only in stock A?
2. What is the expected return and risk if you invest only in stock B?
3. What is the expected return and risk if you invest in a portfolio consisting of stock A and B in equal proportion?

|  |  |  |  |
| --- | --- | --- | --- |
| **Solution** |  | expected return | standard deviation |
| a | Invest in A | 20.50 | 16.12 |
| b | Invest in B | 11.35 | 11.43 |
| c | Invest in PF | 15.93 | 13.77 |

Q3. Calculate the following: **[5\*2=10 Marks]**

(a) If you borrow $150,000 for a house at 8% simple annual interest rate for 15 years, what is your monthly payment? **[2 Marks]**

(b) You have $100,000 to invest at 4% interest. If you wish to withdraw equal annual payments for 4 years, how much could you withdraw each year and leave $0 in the investment account? **[2 Marks]**

(c) If you get payments of $15,000 per year for the next ten years and interest is 4%, how much would that stream of income be worth in present value terms? **[2 Marks]**

(d) What is the value of a $100 perpetuity if interest is 7%? **[2 Marks]**

(e) You can deposit $4000 per year into an account that pays 12% interest. If you deposit such amounts for 15 years and start drawing money out of the account (from 16th year onwards) in equal annual installments, how much could you draw out each year for 20 years? **[2 Marks]**

**Solution.**

a. 1433

b. 27548

c. 121663.50

d. 1428.57

e. 19964.12

Q4. Consider two five-year bonds with a face value of $1,000 each: **[5+5=10 Marks]**

Bond A: A 7% coupon bond with a yield to maturity (YTM) of 8%.

Bond B: A 12% coupon bond with a yield to maturity (YTM) of 11%.

Required:

(a) Calculate the Macaulay duration for both bonds and compare their interest rate sensitivity.

(b) Calculate the Modified duration for both bonds and compare their interest rate sensitivity.

Solution:

Bond A:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Cash Flow** | **PV** | **Proportion wrt Bond Price** | **Proportion\*Year (t)** |
| 1 | 70 | 64.81 | 0.07 | 0.07 |
| 2 | 70 | 60.01 | 0.06 | 0.13 |
| 3 | 70 | 55.57 | 0.06 | 0.17 |
| 4 | 70 | 51.45 | 0.05 | 0.21 |
| 5 | 1070 | 728.22 | 0.76 | 3.79 |
|  | **CMP** | **960.07** | 1.00 | **4.37** |
|  |  |  | Modified Duration | 4.05 |

Bond B:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Cash Flow** | **PV** | **Proportion wrt Bond Price** | **Proportion\*Year (t)** |
| 1 | 120 | 108.11 | 0.10 | 0.10 |
| 2 | 120 | 97.39 | 0.09 | 0.19 |
| 3 | 120 | 87.74 | 0.08 | 0.25 |
| 4 | 120 | 79.05 | 0.08 | 0.30 |
| 5 | 1120 | 664.67 | 0.64 | 3.20 |
|  | **CMP** | **1036.96** | 1.00 | **4.06** |
|  |  |  | Modified Duration | 3.65 |

**Bond A is more interest rate sensitive.**