INSTITUTE OF ACTUARIAL & QUANTITATIVE STUDIES

Subject: PTSA

Chapter: Unit 3 & 4

Category: Assignment 2

1. Unit 3

A market consists of shares of 3 companies A, B and C with capitalization of Rs 10,000 crores, Rs 15,000 crores and Rs 10,000 crores respectively.

Annual returns on the three shares (RA, RB and RC) have the following characteristics:

Company	*Standard deviation*
A	30%
B	20%
C	10%

The expected rate of return on the market portfolio is 12% p.a. The correlation between the returns on each pair of shares is 0.5.

The risk-free rate of return is 7% p.a.

i) Find the expected returns on A, B and C if the CAPM is assumed to hold.

ii) Split the variances of returns into systematic and specific risk for every company using the values in the question & the values obtained in (i) above.

2. Unit 3

An investor can invest in the following three assets which are uncorrelated with each other

Asset	Expected return	Standard deviation
A	7%	15%
B	4%	7%
C	3%	0%

i) Define efficient frontier and calculate the efficient frontier of the investor taking into account the numbers provided in the above table.

ii) Explain how an investor with a quadratic utility function would select a portfolio from those making up the efficient frontier.

3. Unit 3

Under Mean Variance Portfolio theory, derive how variance can be reduced using diversification as the principal tool, under the given two scenarios:

i) Independent assets

ii) Non-independent assets (where assets can be assumed to have positive co-variance)

4. Unit 3

i) Within the context of Capital Asset Pricing Model (CAPM), explain what is meant by the "market price of risk".

ii) In the market where CAPM is assumed to hold, the expected annual return on the market portfolio is 12%, the variance is 4%% and the effective risk free annual rate is 4%. An Agent wants an expected annual return of 18% on a portfolio worth of Rs.12,00,000/-.

a) Calculate the standard deviation of return on the corresponding efficient portfolio.
b) Calculate and explain the amount of money invested in each component of Agent's.

5. Unit 3

Assume that the security returns are generated by a single index model such that

$R_i = \alpha_i + \beta_i R_M + e_i$

Where R_i is the expected return for security i and R_M is the market's excess return. β_i and α_i are constants, e_i is the random variable representing the component of return not related to the market. The risk free rate is 2%. Suppose also that there are 3 securities A, B and C characterized by the following data:

Security	βi	$E(R_i)$	$\sigma(e_i)$
A	0.8	10%	25%
B	1.0	12%	10%
C	1.2	14%	20%

i) If σ_M= 20%, calculate the Variance of Securities A, B and C.

ii) Now assume that there are infinite number of assets with return characteristics identical to those of A, B and C respectively.

What will be the mean and variance of the portfolio's excess returns if:

a) The well diversified portfolio comprised of security A only.

b) The well diversified portfolio comprised of 55% of type B and 45% of type C securities.

c) Explain if there is an arbitrage opportunity in this market.

6. Unit 4

Company A is a mining company with operations in several countries. Company B is a technology company providing video conferencing services. Company C is a consumer company, an apparel producer, with facilities in several Latin American and Asian countries. Which of the companies belongs to an industry most likely to be affected by environmental factors that analysts should evaluate?

A. Company A
B. Company B
C. Company C

7. Unit 4

Write a short note on the two chief competitive strategies identified by Porter.

8. Unit 4

Explain in brief the three major categories of equity valuation models.

9. Unit 4

In this dividend discount model example, assume that you are considering the purchase of a stock which will pay dividends of $20 (Dividend 1) next year and $21.6 (Dividend 2) the following year. After receiving the second dividend, you plan on selling the stock for $333.3. What is the intrinsic value of this stock if your required return is 15%?

10. Unit 4

i) State the formula and assumptions of the Gordon Growth Model.

ii) Hi-Fi Company has the following information –

- Estimated dividends for the next period – $40,000
- The required rate of return – 8%
- Growth rate – 4%

Find out the stock price of Hi-Fi Company using the Gordon Growth Model.