NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF COMMERCE

DEPARTMENT OF FINANCE

BACHELOR OF COMMERCE HONOURS DEGREE IN FINANCE

PART IV – 1st SEMESTER SUPPLEMENTARY EXAMINATION – JULY 2006

ADVANCED ASSET PRICING THEORY AND PRACTICE [CFI 4101]

TIME ALLOWED: 3 HOURS 30 MINUTES

INSTRUCTIONS

1. The paper is 3 hours 30 minutes, 30 minutes of which is reading time during which candidates may write on question paper but not in the answer book.
2. Answer any ***FOUR*** questions.
3. Write your answer on one side only. The back page may be used for rough work.
4. All workings must be shown.

Question 1 **[25 marks]**

1.1 List and Explain briefly the critical assumptions of portfolio Theory. **[6 marks]**

1.2 The returns of two stocks NUST Ltd and Delta Ltd are not correlated. Their variances and expected returns are 64% and 4% for NUST Ltd, 10% and 22% for Delta Ltd respectively.

What are the weights of the minimum risk portfolio comprising the two stocks? **[6 marks]**

1.3 Explain the theorem of Two Fund Separation. Suggest an investment management strategy based on the theorem. **[6 marks]**

1.4 Show that when an asset is held in a well diversified Portfolio, the relevant Portfolio marginal variance [i.e. Change in Portfolio variance caused by a very small change in the weight of one asset] is a weighted average of covariances of pairs of other assets in the Portfolio. **[7 marks]**

Question2 **[25 marks]**

2.1 Compare and Contrast the critical assumptions of the Capital Asset Pricing Model and the Arbitrage Pricing Theory. **[10 marks]**

2.2 Why would Fund Managers want to track the performance of a stock market index? **[5 marks]**

2.3 Discuss strategies by which a Fund Manager may want to track a stock market index highlighting the pros and cons of each strategy. **10 marks]**

Question 3 **[25 marks]**

3.1 What are the major criticisms of the capital asset pricing model? **[6 marks]**

3.2 The return of an asset ***i*** is given by

$$R_1 = \alpha_i + \beta_A F_1 + \beta_{12} F_2 + ... + \beta_{ik} F_K + \varepsilon_i$$

Define the variables $\alpha_1, \beta_{ik}, F_k and \varepsilon_i$ **[7 marks]**

3.2.1 The return of the Zimbabwe Stock Market index is given by a three factor asset pricing model as follows.

$$R_2 = 22\% + 3F_1 - 1F_2 - 1.6F_3$$

where $F_1 =$ unexpected changes in the inflation index.

$F_2 =$ unexpected changes in the levels of government borrowing.

$F_3 =$ Unexpected changes in the level of a political risk indicator.

The returns of three pure factor portfolios are also given by a three factor asset pricing model such as follows:

$$R_{p^1} = 30\% + F_1$$
$$R_{p^2} = 25\% + F_2$$
$$R_{p^3} = 25\% + F_3$$

The rate of return on 91 day Treasury Bills is 10%

3.2.2 Determine if an Arbitrage opportunity exists. **[12 marks]**

Question 4 **[25 marks]**

4.1 State the Critical assumptions of arbitrage futures valuation model.

[8 marks]

4.2 Derive from first principles the formula for no arbitrage Index futures valuation. **[10 marks**

4.3 Discuss, briefly, but fully three uses of Index futures. **[7 marks]**

Question 5 **[25 marks]**

You are the Fund Manager of an Equity Portfolio whose current value is $50 000 000. You want to be assured of a minimum portfolio value of $50 000 000 at the end of your Horizon Date of one year. It is projected that the value of your portfolio can either go up 25% or go down 25% at the end of any given interval of time. The risk free rate of interest is 20%.

5.1 Calculate the value of a call option on your Equity Portfolio using the Binomial approach and assuming exercise price, expiry date and binomial intervals are $50 000 000, one year and two respectively. **[13 marks]**

5.2 Calculate the amount that must be transferred from the Equity Portfolio to Treasury Bills and vice-versa at each node so as to replicate, dynamically ,the desired insured portfolio at the end of one year. What is the amount of the insured portfolio at each node?. **[12 marks]**