FACULTY OF COMMERCE
DEPARTMENT OF FINANCE
BACHELOR OF COMMERCE HONOURS DEGREE IN
FINANCE
PART I 2ND SEMESTER SUPPLEMENTARY EXAMINATION - AUGUST 2011
FINANCIAL MATHEMATICS II [CFI 1201]
TIME ALLOWED: 3HOURS

INSTRUCTIONS TO CANDIDATES

1. **Attempt any FOUR questions**

2. **Start the answer to each full question on a fresh page of the answer sheet.**

3. **Questions may be written in any order, but must be legibly numbered.**

4. **Write legibly, showing all workings.**

INFORMATION TO CANDIDATES

1. **Each Question carries a total of 25 marks.**

2. **The businesses in this question paper are intended to be fictitious**

3. **The paper contains FOUR (4) QUESTIONS.**

Question One

(a) An investor purchases a $1000, 10% coupon bond at a price yielding 11% p.a over 20 years. Coupons are payable annually.

Calculate:

    (i)   The equilibrium price of the bond.   [5 marks]

    (ii)   The investor's realized yield if yields increase to 12% at the end of 10 years and the investor holds the bond to maturity.   [5 marks]

    (iii)   The investor's holding period yield if yields increase to 12% at the end of 10 years and the investor sells the bond at the end of 17 years.   [5 marks]

(b) Given results in (ii) and (iii) of (a) above, determine, giving reasons, whether the bond duration is below or above 17 years.   [6 marks]

(c) Discuss any **TWO** weaknesses of duration analysis as an approach to bond risk analysis.

                                                                           [4 marks]

                                                 Total   [25 marks]

Question Two

An analyst has estimated the following return distributions for stocks A and B:

State of the economy	Probability	Return on A (%)	Return on B (%)
Boom	0.3	20	7
Normal	0.6	15	16
Slump	0.1	5	22

Using the information in the table above, determine:

    (i)   The expected return and standard deviation of A and B.   [4;6 marks]

    (ii)   The covariance of returns for A and B.   [3 marks]

    (iii)   The correlation coefficient of returns of A and B.   [2 marks]

(iv) The expected return and standard deviation of a portfolio invested 40% in A and 60% in B. [2;3 marks]

(v) The minimum variance portfolio comprising stocks A and B. [5 marks]

Total [25 marks]

Question Three

(a) Define the following risks associated with bonds:

(i) Interest rate risk [4 marks]

(ii) Reinvestment rate risk [3 marks]

(b) Consider a $1000, 10% coupon bond that is issued at a price of $962 and has a term to maturity of 5 years, with coupons payable annually.

Calculate:

(i) The yield to maturity of the bond [4 marks]

(ii) The Macaulay duration of the bond [6 marks]

(iii) The Convexity of the bond [5 marks]

(iv) The approximate change in the value of the bond following a decrease in yields to 10.5% [3 marks]

Total [25 marks]

Question Four

(a) Shawntel Ltd is a public company that has just paid a dividend of $2.00 per share. The company's shares are currently trading at $46 and dividends are expected to grow at a constant rate of 5.4% indefinitely. The return on equity (ROE) for the company is 15%.

Calculate:

(i) The implied required return on equity (k_e) for Shawntel Ltd. [3 marks]

(ii) The implied payout ratio [3 marks]

(iii) The value per share if investors believe that the dividend growth rate will be 7% p.a for the first four years and 5.4% thereafter. (NB: Assume the same k_e as in (i) above) [5 marks]

(b) Distinguish between net operating cash flow and free cash flow to equity. [2 marks]

(c) The yield on 4-year treasury bonds is 15% and that on 3-year Treasury notes is 12%. Determine the implied 1-year forward rate 3 years from now. [3 marks]

(d) Briefly explain the following term structure theories:

  (i)   The Liquidity Preference Theory   [3 marks]

  (ii)   The Segmentation Theory   [3 marks]

  (iii) The Rational Expectations Theory   [3 marks]

Total   [25 marks]

Question Five

(e) State any **FOUR** assumptions underlying Modern Portfolio Theory (MPT). [4 marks]

(f) Determine whether each of the following portfolios is efficient given the following equation for the Capital Market Line (CML): $R_p = 0.06 + 0.6\sigma_p$ [8 marks]

Portfolio	Expected Return (%)	Standard Deviation (%)
A	8	5
B	9.9	6.5
C	9	5
D	11	8

(g) Interest rates are 8% and 5% in South Africa and in the US respectively. According to the International Fischer Effect (IFE), what is the expected depreciation in the South African rand?   [3 marks]

(h) Show that the condition: $\frac{i_h - i_f}{1 + i_f} = \frac{r_h - r_f}{1 + r_f}$ is consistent with the IFE; where i_h and i_f are home and foreign inflation rates respectively and r_h and r_f are home and foreign nominal interest rates respectively.   [6 marks]

Total   [20 marks]

END OF EXAMINATION PAPER