NANYANG TECHNOLOGICAL UNIVERSITY

SPECIAL TERM II EXAMINATION 2014-2015

BU8201 – Business Finance

July 2015 Time Allowed: 2 hours

INSTRUCTIONS

1 This paper contains **FOUR(4)** questions and comprises **SEVEN(7)** pages and **ONE(1)** Appendix 1 of **FIVE(5)** pages.

2 Answer **ALL** questions.

3 The number of marks allocated is shown at the end of each question.

4 Write all your answers to the multiple-choice questions in Question 1 of **Section A** on the same page in your answer book.

5 Begin your answer to each question in **Section B** on a separate page of the answer book.

6 Answers to the questions in **Section B** will be graded for content and appropriate presentation.

Section A

Question 1

This question consists of TEN(10) multiple-choice questions. Choose only one correct answer from the given choices (A), (B), (C), (D) and (E). Write all answers of this question on the same page in your answer book. Each multiple-choice question carries three(3) marks.

(1) Ten years ago, Tim invested $5,000. Eight years ago, Erica invested $10,000. Today, both Tim's and Erica's investments are each worth $15,000 today. Assume that both Tim and Erica continue to earn their respective rates of return. Which one of the following statements is correct concerning these investments?

Note: Question No. 1 continues on page 2

Question 1 (continued)

(A) Three years from today, Erica's investment will be worth more than Tim's.
(B) One year ago, Tim's investment was worth less than Erica's investment.
(C) Erica earns a higher rate of return than Tim.
(D) Tim has earned an average annual interest rate that is twice the average annual interest rate earned by Erica.
(E) None of the above statements is correct.

(2) Which one of the following statements is correct given the following two sets of project cash flows?

	Project A	Project B
Year 1	$6,000	$2,000
Year 2	$0	$3,000
Year 3	$2,500	$3,000
Year 4	$2,000	$3,000

(A) The cash flows for Project B are an annuity, but those of Project A are not.
(B) Both sets of cash flows have equal present values as if the discount rate is positive.
(C) The present value of the final cash flow for Project A will be discounted using an exponent of three.
(D) The present value of Project A cannot be computed because the second cash flow is equal to zero.
(E) As long as the discount rate is positive, Project B will always be worth less today than will Project A.

(3) A bond has a market price that exceeds its face value. Which of the following features currently apply to this bond?

(I) It is selling at a discount.
(II) It is selling at a premium.
(III) Its yield-to-maturity exceeds its coupon rate.
(IV) Its yield-to-maturity is less than its coupon rate .

(A) III only
(B) I and III only
(C) I and IV only
(D) II and III only
(E) II and IV only

Note: Question No. 1 continues on page 3

Question 1 (continued)

(4) Which of the following increase the price sensitivity of a bond to changes in interest rates?

(I) increase in time to maturity
(II) decrease in time to maturity
(III) increase in coupon rate
(IV) decrease in coupon rate

(A) II only
(B) I and III only
(C) I and IV only
(D) II and III only
(E) II and IV only

(5) Which one of the following statements is correct?

(A) The capital gains yield is the annual rate of change in a stock's price.
(B) Preferred stocks have constant growth dividends.
(C) A constant dividend stock cannot be valued using the dividend growth model.
(D) The dividend growth model can be used to compute the current value of any stock.
(E) An increase in the required return will decrease the capital gains yield.

(6) A firm is considering two mutually exclusive projects and have determined that the crossover rate for these projects is 12%. Project A has an IRR of 16% and Project B has an IRR of 18%. Given this information, which one of the following statements is correct?

(A) Project A should be accepted as its IRR is closer to the crossover point than is Project B's IRR.
(B) Project B should be accepted as it has the higher IRR.
(C) Both projects should be accepted as both of the project's IRRs exceed the crossover rate.
(D) Neither project should be accepted since both of the project's IRRs exceed the crossover rate.
(E) You cannot determine which project should be accepted given only the information provided.

Note: Question No. 1 continues on page 4

Question 1 (continued)

(7) As the degree of sensitivity of a project to a single variable rises, the:

(A) less important will that variable be to the final outcome of the project.
(B) less volatile will be the project's net present value to that variable.
(C) greater the importance of accurately predicting the value of that variable.
(D) greater the sensitivity of the project to the other variable inputs.
(E) less volatile will the project's outcome be.

(8) Which one of the following statements is correct concerning unsystematic risk?

(A) An investor should be rewarded for assuming unsystematic risk.
(B) Eliminating unsystematic risk is the responsibility of the individual investor.
(C) Unsystematic risk is rewarded when it exceeds the market level of unsystematic risk.
(D) Beta measures the level of unsystematic risk inherent in an individual stock.
(E) Standard deviation is a measure of unsystematic risk.

(9) The WACC of a firm is dependent on the firm's:

(I) growth rate.
(II) capital structure.
(III) preferred dividend payment.
(IV) retention ratio.

(A) I and III only
(B) II and IV only
(C) I, II, and IV only
(D) I, III, and IV only
(E) I, II, III, and IV

(10) A reverse stock split:

(A) decreases the price per share.
(B) decreases the value of the company.
(C) increases the number of shares.
(D) decreases the number of shareholders.
(E) increases the price per share.

(TOTAL: 30 marks)

Section B

Question 2

(a) A bank has launched a promotion program for its housing loans. Annual nominal interest rate for its housing loans will be at a special rate of 2% for the first two years, and a normal annual interest rate of 5% will then apply for the remaining loan period. If Sam takes up a 20-year $1 million housing loan from the bank, which will be amortized over the loan period with end-of-the-month installment payments, what monthly installment would Sam have to pay after the first two years of special interest rate?

(5 marks)

(b) A company has decided that will only pay dividend every 2 years instead of every year. It estimates that the each dividend payment will be 10% higher than the previous dividend payment made two years ago. If the required return for its stock is 15%, and assuming the first dividend of $1 will be paid 2 years from now (thereafter dividends will be paid every two years), what is its estimated price of its stock?

(5 marks)

(c) Five years ago, a company issued 10-year callable bonds with coupon rate of 8%, par value of $1,000. Coupons for the bonds are paid annually. If the current interest rate for the bonds is 7.5%, determine (with appropriate calculations) whether the callable bonds are likely to be called if the call premium for each of the bonds is $60.

(5 marks)

(d) A retirement annuity allows you to deposit a lump sum today, and it will then allow you to withdraw $1,000 at the end of every month in the first year. In each of the subsequent years, your monthly withdrawal will be 10% lower compared to the monthly withdrawal in the previous year. If you are considering a 5-year annuity under such a plan, what is the minimum amount of lump sum you have to deposit today, assuming the applicable annual nominal interest rate is 6%, compounded monthly?

(5 marks)

(TOTAL: 20 marks)

Question 3

Benny is a working adult while his wife is a full-time housewife. Starting from the new year 2016, Benny plans to deposit $4,000 in the couple's bank account at the end of every odd month (i.e. January, March, May, etc.) of a year, while his wife Dora would withdraw half that amount, i.e. $2,000, from the bank account at the end of every even month (i.e. February, April, June, etc.) of a year to meet household expenses. Nominal annual interest rate for the bank account is 5%, with monthly compounding.

(a) How much will the couple have in the bank account at the end of the first year?
(7 marks)

(b) If the monthly deposit and withdrawal patterns remain unchanged, how many years will be required for the couple's bank account to reach $500,000?
(8 marks)

(c) If the monthly amount which Dora withdraws is always half the monthly amount which Benny deposits, and the couple wants to have $800,000 in their bank account 20 years from now, how much must Benny deposit each time?
(10 marks)

(TOTAL: 25 marks)

Question 4

Spandix Corporation is considering a replacement for its existing production system with a new system which it thinks is more efficient and cost effective. The applicable tax rate is 35%. Details of the old and new systems are as follows:

Old Production System
Current book value: $500,000
Annual depreciation: $80,000
Remaining useful life: 5 years
Current market selling price: $300,000
Estimated salvage value 5 years from now (if system is not replaced): $40,000
Annual maintenance cost: $80,000

New Production System
Recommended selling price: $2,000,000
Annual depreciation: $400,000
Useful life: 5 years
Estimated salvage value 5 years from now: $60,000
Annual maintenance cost: $25,000

Note: Question No. 4 continues on page 7

Question 4 (continued)

(a) What is the relevant initial cash flow (at t=0) for evaluating the project?

(5 marks)

(b) What are the appropriate annual operating cash flows and terminal cash flow for evaluating the project?

(10 marks)

(c) Without knowing the weighted average cost of capital (WACC) of Spandix Corporation, and based on the cash flows computed in part (a) and part (b) above, determine and explain whether Spandix should or should not replace its old production system?

(10 marks)

(TOTAL: 25 marks)

- END OF PAPER -

Appendix 1

Selected Formulas

Chapter 2

$$\text{Stockholders' equity} = \text{Paid-in capital} + \text{Retained earnings}$$

$$\text{Stockholders' equity} = \text{Total assets} - \text{Total liabilities}$$

$$\text{Net working capital} = \text{Current assets} - (\text{Payables} + \text{Accruals})$$

$$\text{FCF} = (\text{EBIT}(1-\text{T}) + \text{Depreciation\&Amortization}) - \begin{pmatrix} \text{Capital} \\ \text{expenditures} \end{pmatrix} + \begin{pmatrix} \text{Change in net} \\ \text{working capital} \end{pmatrix}$$

Chapter 3

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

$$\text{Quick, or acid test ratio} = \frac{\text{Current assets} - \text{Inventories}}{\text{Current liabilities}}$$

$$\text{Inventory turnover ratio} = \frac{\text{Sales}}{\text{Inventories}}$$

$$\text{Days sales outstanding (DSO)} = \frac{\text{Receivables}}{\text{Average sales per day}} = \frac{\text{Receivables}}{\text{Annual sales}/365}$$

$$\text{Fixed assets turnover ratio} = \frac{\text{Sales}}{\text{Net fixed assets}}$$

$$\text{Total assets turnover ratio} = \frac{\text{Sales}}{\text{Total assets}}$$

$$\text{Debt ratio} = \frac{\text{Total debt}}{\text{Total assets}}$$

$$\text{Times-interest-earned (TIE) ratio} = \frac{\text{EBIT}}{\text{Interest charges}}$$

$$\text{Operating margin} = \frac{\text{Operating income (EBIT)}}{\text{Sales}}$$

$$\text{Profit margin} = \frac{\text{Net income}}{\text{Sales}}$$

$$\text{Return on total assets (ROA)} = \frac{\text{Net income}}{\text{Total assets}}$$

$$\text{Basic Earning Power (BEP)} = \frac{\text{EBIT}}{\text{Total assets}}$$

Note: Appendix 1 continues on page 9

Appendix 1 (continued)

$$\text{Return on common equity (ROE)} = \frac{\text{Net income}}{\text{Common equity}}$$

$$\text{Price/Earnings (P/E) ratio} = \frac{\text{Price per share}}{\text{Earnings per share}}$$

$$\text{Book value per share} = \frac{\text{Common equity}}{\text{Shares outstanding}}$$

$$\text{Market/Book ratio (M/B)} = \frac{\text{Market price per share}}{\text{Book value per share}}$$

$$\begin{aligned}\text{ROE} &= \text{Profit margin} \times \text{Total assets turnover} \times \text{Equity multiplier} \\ &= \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total assets}} \times \frac{\text{Total assets}}{\text{Total common equity}}\end{aligned}$$

Chapter 6

$$\begin{aligned}\text{Quoted interest rate (r)} &= r^* + IP + DRP + LP + MRP \\ &= r_{RF} + DRP + LP + MRP\end{aligned}$$

Chapter 7

$$\text{Expected rate of return } (\hat{r}) = P_1 r_1 + P_2 r_2 + \ldots + P_N r_N = \sum_{i=1}^{N} P_i r_i$$

$$\text{Standard deviation} = \sigma = \sqrt{\sum_{i=1}^{N} (r_i - \hat{r})^2 P_i} \qquad \text{Estimated } \sigma = \sqrt{\frac{\sum_{t=1}^{N} (\bar{r}_t - \bar{r}_{Avg})^2}{N-1}}$$

$$\text{Coefficient of variation} = CV = \frac{\sigma}{\hat{r}}$$

$$\hat{r}_p = w_1 \hat{r}_1 + w_2 \hat{r}_2 + \ldots + w_N \hat{r}_N = \sum_{i=1}^{N} w_i \hat{r}_i \qquad b_p = w_1 b_1 + w_2 b_2 + \ldots + w_N b_N = \sum_{i=1}^{N} w_i b_i$$

$$RP_i = (RP_M) b_i$$

$$r_i = r_{RF} + (r_M - r_{RF}) b_i$$

Chapter 8

$$\text{Future value} = FV_N = PV(1+I)^N$$

$$\text{Present value} = PV = \frac{FV_N}{(1+I)^N}$$

$$FVA_N = PMT(1+I)^{N-1} + PMT(1+I)^{N-2} + PMT(1+I)^{N-3} + \ldots + PMT(1+I)^0 = PMT\left[\frac{(1+I)^N - 1}{I}\right]$$

Note: Appendix 1 continues on page 10

Appendix 1 (continued)

$$FVA_{due} = FVA_{ordinary}(1+I)$$

$$PVA_N = \frac{PMT}{(1+I)^1} + \frac{PMT}{(1+I)^2} + \ldots + \frac{PMT}{(1+I)^N} = PMT\left[\frac{1-\frac{1}{(1+I)^N}}{I}\right]$$

$$PVA_{due} = PVA_{ordinary}(1+I)$$

$$\text{PV of a perpetuity} = \frac{PMT}{I}$$

$$PV = \frac{CF_1}{(1+I)^1} + \frac{CF_2}{(1+I)^2} + \cdots + \frac{CF_N}{(1+I)^N} = \sum_{t=1}^{N} \frac{CF_t}{(1+I)^t}$$

$$\text{Periodic rate } (I_{PER}) = \frac{\text{Stated annual rate}}{\text{Number of payments per year}} = \frac{I}{M}$$

$$\text{Number of periods} = (\text{Number of years})(\text{Periods per year}) = N \times M$$

$$\text{Effective annual rate } (EFF\%) = \left(1 + \frac{I_{NOM}}{M}\right)^M - 1.0$$

Chapter 9

$$\text{Bond's value } (V_B) = \frac{INT}{(1+r_d)^1} + \frac{INT}{(1+r_d)^2} + \cdots + \frac{INT}{(1+r_d)^N} + \frac{M}{(1+r_d)^N}$$

$$= \sum_{t=1}^{N} \frac{INT}{(1+r_d)^t} + \frac{M}{(1+r_d)^N}$$

$$\text{Price of callable bond} = \sum_{t=1}^{N} \frac{INT}{(1+r_d)^t} + \frac{\text{Call price}}{(1+r_d)^N}$$

$$\text{Price of semiannual-coupon bond } (V_B) = \sum_{t=1}^{2N} \frac{INT/2}{(1+r_d/2)^t} + \frac{M}{(1+r_d/2)^{2N}}$$

Chapter 10

$$\text{Value of stock } (\hat{P}_0) = \text{PVof expected future dividends}$$

$$= \frac{D_1}{(1+r_s)^1} + \frac{D_2}{(1+r_s)^2} + \cdots + \frac{D_\infty}{(1+r_s)^\infty}$$

$$= \sum_{t=1}^{\infty} \frac{D_t}{(1+r_s)^t}$$

Note: Appendix 1 continues on page 11

Appendix 1 (continued)

Constant growth stock: $\hat{P}_0 = \frac{D_0(1+g)^1}{(1+r_s)^1} + \frac{D_0(1+g)^2}{(1+r_s)^2} + \cdots + \frac{D_0(1+g)^\infty}{(1+r_s)^\infty}$

$= \frac{D_0(1+g)}{r_s - g} = \frac{D_1}{r_s - g}$

Expected rate of return = Expected dividend yield + Expected growth rate, or capital gains yield

$\hat{r}_s = \frac{D_1}{P_0} + g$

Growth rate $= (1 - \text{Payout ratio})\,\text{ROE}$

Zero growth stock: $\hat{P}_0 = \frac{D}{r_s}$

Horizon value $= \hat{P}_N = \frac{D_{N+1}}{r_s - g}$

Nonconstant growth stock : $\hat{P}_0 = \frac{D_1}{(1+r_s)^1} + \frac{D_2}{(1+r_s)^2} + \cdots + \frac{D_N}{(1+r_s)^N} + \frac{D_{N+1}}{(1+r_s)^{N+1}} + \cdots + \frac{D_\infty}{(1+r_s)^\infty}$

$= \frac{D_1}{(1+r_s)^1} + \frac{D_2}{(1+r_s)^2} + \cdots + \frac{D_N}{(1+r_s)^N} + \frac{\hat{P}_N}{(1+r_s)^N}$

= PV of nonconstant dividends + PV of horizon value, $\hat{P}_N$

Market value of company $(V_{Company})$ = PV of expected future free cash flows

$= \frac{FCF_1}{(1+WACC)^1} + \frac{FCF_2}{(1+WACC)^2} + \cdots + \frac{FCF_\infty}{(1+WACC)^\infty}$

Horizon value $(V_{Company\ at\ t=N}) = \frac{FCF_{N+1}}{WACC - g_{FCF}}$

$V_p = \frac{D_p}{r_p}$ $\hat{r}_p = \frac{D_p}{V_p}$

Chapter 11

WACC = (% of debt)(After-tax cost of debt) + (% of preferred stock)(Cost of preferred stock) + (% of common equity)(Cost of common equity)

$= w_d r_d (1-T) + w_p r_p + w_c r_s$

Note: Appendix 1 continues on page 12

Appendix 1 (continued)

After-tax cost of debt = Interest rate on new debt – Tax savings

$$= r_d - r_d T$$
$$= r_d (1 - T)$$

Component cost of preferred stock $= r_p = \dfrac{D_p}{P_p}$

Required rate of return = Expected rate of return

$$r_s = r_{RF} + RP = \frac{D_1}{P_0} + g = \hat{r}_s$$

$$r_s = r_{RF} + (RP_M) b_i$$
$$= r_{RF} + (r_M - r_{RF}) b_i$$

$$r_s = \hat{r}_s = \frac{D_1}{P_0} + \text{Expected } g$$

Cost of equity from new stock $= r_e = \dfrac{D_1}{P_0(1-F)} + g$

Chapter 12

$$NPV = CF_0 + \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \ldots + \frac{CF_N}{(1+r)^N} = \sum_{t=0}^{N} \frac{CF_t}{(1+r)^t}$$

$$\text{Payback} = \begin{matrix}\text{Number of} \\ \text{years prior to} \\ \text{full recovery}\end{matrix} + \frac{\begin{matrix}\text{Unrecovered cost} \\ \text{at start of year}\end{matrix}}{\begin{matrix}\text{Cash flow during} \\ \text{full recovery year}\end{matrix}}$$

$$\text{IRR: } CF_0 + \frac{CF_1}{(1+\text{IRR})^1} + \frac{CF_2}{(1+\text{IRR})^2} + \cdots + \frac{CF_N}{(1+\text{IRR})^N} = 0$$

$$\sum_{t=0}^{N} \frac{CF_t}{(1+\text{IRR})^t} = 0$$

$$\text{MIRR: } \sum_{t=0}^{N} \frac{COF_t}{(1+r)^t} = \frac{\sum_{t=0}^{N} CIF_t (1+r)^{N-t}}{(1+\text{MIRR})^N} \qquad \text{PV costs} = \frac{TV}{(1+\text{MIRR})^N}$$

Chapter 15

$$b_L = b_U \left[1 + (1-T)(D/E)\right]$$

- END OF APPENDIX 1 -

BU8201 BUSINESS FINANCE

Please read the following instructions carefully:

1. **Please do not turn over the question paper until you are told to do so. Disciplinary action may be taken against you if you do so.**

2. You are not allowed to leave the examination hall unless accompanied by an invigilator. You may raise your hand if you need to communicate with the invigilator.

3. Please write your Matriculation Number on the front of the answer book.

4. Please indicate clearly in the answer book (at the appropriate place) if you are continuing the answer to a question elsewhere in the book.