# NANYANG TECHNOLOGICAL UNIVERSITY

## SPECIAL TERM I EXAMINATION 2014-2015

## BU8201 – Business Finance

June 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.

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## 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) You need $50,000 as a down payment for a house 5 years from now. You can earn 4% annual compounded interest on your savings. You can either deposit one lump sum today for this purpose or you can wait a year and deposit a lump sum. How much additional money must you deposit if you wait for one year rather than making the deposit today?

Note: Question No. 1 continues on page 2

Question 1 (continued)

(A) $1,078.98
(B) $1,111.13
(C) $1,643.85
(D) $1,748.03
(E) $1,920.18

(2) You are considering two projects with the following cash flows:

| | Project X | Project Y |
|---|---|---|
| **Year 1** | $5,000 | $1,000 |
| **Year 2** | $4,000 | $2,500 |
| **Year 3** | $2,500 | $4,000 |
| **Year 4** | $1,000 | $5,000 |

Which of the following statement(s) is (are) true concerning these two projects?

(I) Both projects have the same present value, if their discount rates are positive.
(II) Both projects have the same present value if the discount rate is zero.
(III) Project X has a higher present value than Project Y, if the discount rate is positive.
(IV) Project Y has a higher present value than Project X, if the discount rate is positive.

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

(3) An 8% bond that pays interest semi-annually was issued last year. Which two of the following most likely apply to this bond today if the current market interest rate for the bond is 6%?

(I) Repayment of the bond is not amortized over the period of the bond.
(II) The current yield is equal to the coupon rate.
(III) The yield-to-maturity is equal to the coupon rate.
(IV) The market price of the bond is different from its par value .

Note: Question No. 1 continues on page 3

Question 1 (continued)

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

(4) If you expect interest rates to decline in the near future, which one of the following bonds should you purchase now to maximize your gains if the rate decline does occur?

(A) short-term; low coupon
(B) short-term; high coupon
(C) long-term; zero coupon
(D) long-term; low coupon
(E) long-term; high coupon

(5) Based on the dividend growth model, if you expect the market rate of return to increase across the board on all stocks, then you should also expect:

(A) an increase in all stock values.
(B) all stock values to remain constant.
(C) a decrease in all stock values.
(D) dividend-paying stocks to maintain a constant price while non-dividend paying stocks decrease in value.
(E) dividend-paying stocks to increase in price while non-dividend paying stocks decrease in value.

(6) Which of the following statements related to the internal rate of return (IRR) are correct?

(I) The IRR method of analysis may result in multiple IRRs if the cash flows are non-normal.
(II) The IRR that causes the net present value of the differences between two project's cash flows to equal zero is called the *crossover rate*.
(III) For independent projects, the IRR method would have the same accept/reject recommendations as that of the net present value method.
(IV) Both the timing and the amount of a project's cash flows affect the value of the project's IRR.

Note: Question No. 1 continues on page 4

Question 1 (continued)

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

(7) Which one of the following statements concerning scenario analysis is most correct?

(A) The pessimistic case scenario determines the maximum loss, in current dollars, that a firm could possibly incur from a given project.
(B) Scenario analysis defines the entire range of results that could be realized from a proposed investment project.
(C) Scenario analysis determines which variable has the greatest impact on a project's net present value.
(D) Scenario analysis helps managers analyze various outcomes that are possible given reasonable range for each of the assumptions.
(E) Management is guaranteed a positive outcome for a project when the worst case scenario produces a positive NPV.

(8) Which one of the following is an example of unsystematic risk?

(A) Income taxes are increased across the board
(B) A national sales tax is adopted
(C) Inflation decreases at the national level
(D) An increased feeling of prosperity is felt around the globe
(E) Consumer spending on entertainment decreased nationally

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

(A) The after-tax cost of debt of a firm is usually greater than the prevailing yield-to-maturity on the firm's bonds.
(B) It is more risky for a firm to issue preferred stock compared to issuing bonds.
(C) A firm's cost of retained earnings is usually lower than the cost of new common equity.
(D) The cost of equity of a firm can only be estimated using CAPM.
(E) A firm's weighted average cost of capital will remain constant as long as its capital structure remains constant.

Note: Question No. 1 continues on page 5

Question 1 (continued)

(10) Which one of the following statements is most correct?

(A) Firms prefer to cut dividend payments rather than borrow money to fund a short-term cash need.
(B) Share repurchases tend to have tax disadvantages to shareholders.
(C) Maintaining a steady dividend is a key goal of most dividend-paying firms.
(D) Tax rates are the key factor in determining a firm's dividend policy.
(E) Stock prices tend to ignore expected changes in dividend payments.

(TOTAL: 30 marks)

**Section B**

Question 2

(a) Jack takes up a 5-year $240,000 loan from a bank with nominal loan interest rate of 6% per annum. The loan is to be repaid at the end of every month with equal monthly principal repayment over the period of the loan. Interest for each month is also to be paid at the end of every month and will be computed based on the outstanding principal amount at the start of the month. How much total dollar interest would Jack have to pay for the entire loan period?

(5 marks)

(b) A stock's dividend is expected to grow at an annual rate of 50% during the first 5 years, but will have zero growth subsequently. Assuming the appropriate discount rate for the first 5 years is 12%, and the appropriate discount rate subsequently is 10%, what is the estimated value of this stock if the stock recently paid $0.50 dividend?

(5 marks)

(c) A firm issues two bonds, Bond A and Bond B. Both bonds have the same par value and have 10 years to maturity. Bond A pays coupons semiannually, while Bond B pays coupons quarterly. Bond A has an annual coupon rate of 6% and its current market price is $960. If the current market price of Bond B is $1,050, what is its annual coupon rate ?

(5 marks)

Note: Question No. 2 continues on page 6

Question 2 (continued)

(d) A 4-year project has cash flows of $0.5 million, $1 million, $1.2 million and $Y at the end of each of the four years, respectively. The project has an IRR of 26%, and an NPV of $2.3 million at a discount rate of 12%. What is the project's cash flow at the end of the fourth year, i.e. what is Y?

(5 marks)

(TOTAL: 20 marks)

Question 3

George is 35 years old today, and he wants to start a 25-year plan to save for his semi-retirement at age 60. He will start by saving $500 at the end of each month, the first deposit will start one month from now. Because George expects his salary to increase over time, he plans to double his monthly saving every 5 years, till he reaches age 60. Nominal annual interest rate earned for his savings will be at 4%, compounded monthly.

(a) How much will George have in his savings account at age 40?

(7 marks)

(b) How much will George have in his savings account when he retires at age 60?

(8 marks)

(c) When George turns age 45, an unfortunate event happens and George needs to reduce his monthly savings from the planned amount for the next 5 years, i.e. till the day he reaches age 50 (while keeping the monthly deposits for all other months the same as in part (b) above). However, George does not want his savings account to be less than $1.1 million when he retires at age 60. What is the minimum monthly deposit George must make during the 5-year period between age 45 and age 50?

(10 marks)

(TOTAL: 25 marks)

Question 4

Rical Corporation is considering launching a production line for its new 3D printer cartridge that the company has spent $200,000 to develop. The new production line would require $3 million investment in equipment and facilities, which will be depreciated at the rate of $600,000 per year. The new production line will have to occupy a factory floor that is currently used to produce a peripheral product which generates before-tax annual cash flow of $300,000 for the company (and this existing production will have to be terminated to make way for the new 3D printer cartridge production).

Note: Question No. 4 continues on page 7

Question 4 (continued)

The company's current assets will have to increase by $100,000 and accounts payable will also increase by $60,000. The company estimates that the production of the new 3D printer cartridges will last only for 10 years because the product will be obsolete by then. At termination of the production, the equipment and facilities can be sold at $400,000, and the invested net operating working capital will be recovered. During the 10 years of production, the company expects annual sales to be $6 million per year for the first 5 years, and $10 million per year for the subsequent 5 years. Annual operating costs, excluding depreciation cost, is 50% of sales. The appropriate discount rate for the project is 12%, and the corporate tax rate is 30%.

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

(5 marks)

(b) What are the annual after-tax operating cash flows for the 10-year project?

(8 marks)

(c) What is the terminal cash flow for the project?

(6 marks)

(d) Should the company proceed with this project (show appropriate calculations)?

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

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

## 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

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

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

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

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

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

## 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.