



**TECHNICAL UNIVERSITY OF MOMBASA**

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**SCHOOL OF APPLIED AND HEALTH SCIENCES  
DEPARTMENT OF MATHEMATICS AND PHYSICS  
UNIVERSITY EXAMINATION FOR:  
BACHELOR OF SCIENCE IN MATHEMATICS AND FINANCE**

**UNIT NAME: VALUATION AND ANALYSIS OF  
DERIVATIVES**

**UNIT CODE: BFI 4453**

**SUPPLEMENTARY PAPER**

**END-OF-SEMESTER EXAMINATION**

**SERIES: AUGUST 2024**

**TIME: 2HOURS**

**DATE: NOVEMBER 2024**

**Instructions to Candidates**

You should have the following for this examination

*-Answer Booklet, examination pass and student ID*

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

**Do not write on the question paper.**

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**QUESTION One**

- a) Distinguish between the terms *open interest* and *trading volume* (3Marks)
- b) What does a stop order to sell at \$2 mean? (4Marks)
  - i. When might it be used? (2Marks)
  - ii. What does a limit order .to sell at \$2 mean? (4Marks)
  - iii. When might it be used? (2Marks)

- c) Imagine you are the treasurer of a Japanese company exporting electronic equipment to the United States. Discuss how you would design a foreign exchange hedging strategy and the arguments you would use to sell the strategy to your fellow executives. **(10Marks)**
- d) Companies A and B have been offered the following rates per annum on a \$20 million 5-year loan:

|           | <b>Fixed Rate</b> | <b>Floating Rate</b> |
|-----------|-------------------|----------------------|
| Company A | 5.0%              | LIBOR + 0.1%         |
| Company B | 6.4%              | LIBOR + 0.6%         |

Company A requires a floating-rate loan; Company B requires a fixed-rate loan. Design a swap that will net a bank, acting as an intermediary, 0.1% per annum and that will appear equally attractive to both companies. **(5Marks)**

### QUESTION Two

- a) A portfolio is currently worth \$10 million and has a beta of 1.0. An index is currently standing at 800. Explain how a put option on the index with a strike price of 700 can be used to provide portfolio insurance. **(10Marks)**
- b) A foreign currency is currently worth \$1.50. The domestic and foreign risk-free interest rates are 5% and 9%, respectively. Calculate a lower bound for the value of a six-month call option on the currency with a strike price of \$1.40 if it is
- (a) European and **(5Marks)**
- (b) American. **(5Marks)**

### QUESTION Three

- a) Suppose that 6-month, 12-month, 18-month, 24-month, and 30-month zero rates are, respectively, 4%, 4.2%, 4.4%, 4.6%, and 4.8% per annum, with continuous compounding. Estimate the cash price of a bond with a face value of 100 that will mature in 30 months and pay a coupon of 4% per annum semiannually. **(10Marks)**
- b) Suppose that zero interest rates with continuous compounding are as follows:

| <i>Maturity (years)</i> | <i>Rate (% per annum)</i> |
|-------------------------|---------------------------|
| 1                       | 2.0                       |
| 2                       | 3.0                       |
| 3                       | 3.7                       |
| 4                       | 4.2                       |
| 5                       | 4.5                       |

Calculate forward interest rates for the second, third, fourth, and fifth years.  
**(10Marks)**

#### **QUESTION Four**

- a) Suppose that you enter into a 6-month forward contract on a non-dividend-paying stock when the stock price is \$30 and the risk-free interest rate (with continuous compounding) is 12% per annum. What is the forward price? **(10Marks)**
- b) A stock index currently stands at 350. The risk-free interest rate is 8% per annum (with continuous compounding) and the dividend yield on the index is 4% per annum. What should the futures price for a 4-month contract be? **(10Marks)**

#### **QUESTION Five**

- a) A US Treasury bond pays a 7% coupon on January 7 and July 7. How much interest accrues per \$100 of principal to the bondholder between July 7, 2009, and August 9, 2009? **(10Marks)**
- b) A Eurodollar futures price changes from 96.76 to 96.82. What is the gain or loss to an investor who is "long two contracts? **(10Marks)**



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