



TECHNICAL UNIVERSITY OF MOMBASA

**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

END-OF-SEMESTER EXAMINATION

SERIES: AUGUST 2024

TIME: 2HOURS

DATE: AUGUST 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.

QUESTION One

- a) A company has a \$20 million portfolio with a: beta of 1.2. It would like to use futures contracts on the S&P 500 to hedge its risk. The index futures price is currently standing at 1080, and each contract is for delivery of \$250 times the index.

i) Compute the hedge that minimizes risk? **(6Marks)**

- ii) Explain briefly what should the company do if it wants to reduce the beta of the portfolio to 0.6? **(6Marks)**

b) Suppose that USD /sterling spot and forward exchange rates are as follows:

Spot	2.00&0
90-day forward	2.0056
180-day forward	2.0018

Discuss the opportunities open to an arbitrageur in the following situations?

- i. A 180-day European call option to buy £1 for \$1.97 costs 2 cents. **(5Marks)**
- ii. A 90-day European put option to sell £1 for \$2.04 costs 2 cents. **(5Marks)**
- c) A trader enters into a short forward contract on 100 million yen. The forward' exchange rate is \$0.0080 per yen. Compute how much does the trader gain or lose if the exchange rate at the end of the contract is: -

- i. \$0.0074 per yen and **(4Marks)**
- ii. \$0.0091 per yen? **(4Marks)**

QUESTION Two

- a) Discuss the assumptions of the Black Scholes Model **(10Marks)**
- b) Use the Black-Scholes model to find the price for a call option with the following inputs: (1) current stock price is \$30, (2) strike price is \$35, (3) time to expiration is 4 months, (4) annualized risk-free rate is 5%, and (5) variance of stock return is 0.25. **(10Marks)**

QUESTION Three

a) Does a perfect hedge always succeed in locking in the current spot price of an asset for a future transaction? **(10Marks)**

b) On July 1, an investor holds 50,000 shares of a certain stock. The market price is \$30 per share. The investor is interested in hedging against movements in the market over the next month and has decided to use the September Mini S&P 500 futures contract. The index futures price is currently 1,500 and one contract is for delivery of \$50 times the index. The beta of the stock is 1.3. What strategy should the investor follow? **(10 Marks)**

QUESTION Four

- a) List down areas where swaps can be applied **(5Marks)**
- b) Explain why swaps a good as financial strategy to counter risks. **(5Marks)**
- c) Companies A and B face the following interest rates (adjusted for the differential impact of taxes):

	<i>Company A</i>	<i>Company B</i>
US dollars (floating rate):	LIBOR + 0.5%	LIBOR + 1.0%
Canadian dollars (fixed rate) :	5.0%	6.5%

Assume that A wants to borrow US dollars at a floating rate of interest and B wants to borrow Canadian dollars at a fixed rate of interest. A financial institution is planning to arrange a swap and requires a 50-basis-point spread. If the swap is to appear equally attractive to A and B, what rates of interest will A and B end up paying? **(10Marks)**

QUESTION Five

- a) Explain why brokers require margins when clients write options but not when they buy options. **(10Marks)**
- b) The treasurer of a corporation is trying to choose between options and forward contracts to hedge the corporation's foreign exchange risk. Discuss the advantages and disadvantages of each. **(10Marks)**



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