



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE**

**UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF EDUCATION  
AND ACTUARIAL SCIENCE**

**4<sup>th</sup> YEAR 1<sup>st</sup> SEMESTER 2022/2023 ACADEMIC YEAR**

**MAIN CAMPUS**

---

**COURSE CODE: WAB 2405**

**COURSE TITLE: INVESTMENT AND ASSET MANAGEMENT II**

**EXAM VENUE: LAB 17**

**STREAM: ACTUARIALSCIENCE**

**DATE: 8/12/2022**

**EXAM SESSION: 9.00-11.00AM**

**TIME: 2.00 HOURS**

---

**Instructions:**

- 1. Answer question one (compulsory) and any other two questions.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

## **Question 1[30marks]**

- a. Define the following terminologies:
- i. Debentures [1mark]
  - ii. Ordinary shares [1mark]
  - iii. Eurobond [1mark]
  - iv. Swaps [1mark]
  - v. Options [1mark]
  - vi. No arbitrage [1mark]
- b. A loan of £80,000 is repayable by eight annual payments, starting in one year's time, with interest payable at 4½% pa. Payments one to three are half as much as payments four to eight. Calculate the loan outstanding one year before the loan is completely repaid. [5marks]
- c. i. Define Beta in the Capital Asset Pricing Model (CAPM) [2marks]
- ii. Explain why Beta is used in pricing securities. [3marks]
- d. In a market where the CAPM holds the following parameters are known:
- Risk-free rate of interest = 6%
- Expected market rate of return = 12%
- Standard deviation of an efficient portfolio's returns = 0.50
- Standard deviation of the market returns = 0.7
- Calculate the expected return on the portfolio. [4marks]
- e. State the assumptions underlying the mean-variance portfolio theory [5marks]
- f. Using mean-variance portfolio theory, prove that the efficient frontier becomes a straight line in the presence of a risk-free asset. [5marks]

## **Question 2[20marks]**

Consider two independent assets, Asset A and Asset B, with expected returns of 6% pa and 11% pa and standard deviations of returns of 5% pa and 10% pa respectively.

- i. If only Assets A and B are available, calculate the equation of the efficient frontier in expected return-standard deviation space. [4marks]
- ii. A third Asset, Asset C, is risk-free and has an expected return of 4% pa. A Lagrangian function is to be used to calculate the equation of the new efficient frontier. Write down, but do not solve, the five simultaneous equations that result from this procedure. [4marks]
- iii. Use your simultaneous equations to derive the relationship between  $A_x$  and  $B_x$ , the holdings of Assets A and B, on the new efficient frontier. [4marks]
- iv. Hence derive the equation of the new efficient frontier in expected return-standard deviation space. [8marks]

### **Question 3 [20marks]**

- a. List the characteristics that are particular to property investments. [5marks]
- b. List five main features of government bills [5marks]
- c. State five assumptions of arbitrage theory [5marks]
- d. State five assumptions of capital asset pricing model [5marks]

### **Question 4 [20marks]**

- a. A woman takes out a home improvement loan for £11,000 over 5 years. She makes monthly repayments in arrears and the bank charges an effective rate of interest of 6% pa.
  - i. What is the monthly repayment? [3marks]
  - ii. How much interest does she pay in the third year? [3marks]
  - iii. How much capital is repaid in the 20th instalment? [3marks]
  - iv. At the end of the fourth year she decides to make further improvements to her house and wants to borrow another £4,000 at that stage. If her total balance is to be repaid over 3 years by level monthly payments and there is no alteration to the interest rate, how much is each payment?  
[4marks]
- b. A loan of £3,000 is repayable by 36 monthly instalments, payable in arrears. The flat rate of interest charged on the loan is 8% pa.
  - i. What is the monthly repayment? [2marks]
  - ii. What is the APR on this transaction? [5marks]

### **Question 5 [20marks]**

- a. A three-year forward contract is to be issued on a particular company share. The current market value of the share is £4.50 and a dividend of £0.20 per share has just been paid. The parties to the contract assume that the future quarterly dividends will increase by 1% per quarter-year compound for the first two years and by 1½% per quarter-year compound for the final year. Assuming a risk-free force of interest of 5% per annum, and no arbitrage, calculate the forward price.  
[15marks]
- b. The current price of a stock is £200. Dividends are paid continuously and the current dividend yield is 4% pa. Calculate the value of the long position of the contract 2 years into the five-year term if the risk-free force of interest is 5% pa and the stock price has risen to £205 at that stage. [5marks]