



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE

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

2nd YEAR 2nd SEMESTER 2024/2025 ACADEMIC YEAR

MAIN CAMPUS

COURSE CODE: WAB 2210

COURSE TITLE: INVESTMENT AND ASSET MANAGEMENT 1

EXAM VENUE: LAB 4

STREAM: EDUCATION, ACTUARIAL

DATE: 14/4/25

EXAM SESSION: 15-17.00 PM

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 terms [3marks]
- i) Internal rate of return
 - ii) Payback period
 - iii) Net present value
- b. Kenya has recently implemented tax reforms aimed at increasing government revenue, including adjustments to Capital Gains Tax (CGT), Withholding Tax, Corporate Tax, and Value Added Tax (VAT). Analyze the impact of the recent changes in Capital Gains Tax (CGT) on real estate and stock market investments in Kenya.

[5marks]

- c. Suppose a stock has two assets A and B with the following returns: Asset A=5,7,3,12,15,17,8,1,14,10 and asset B=20,15,2,11,7,8,12,3,4,9. Suppose we have the correlation coefficient of 0.1 and weighted average of return of A = 0.7. Calculate the mean and the variance portfolio of the stock. [7marks]
- d. The business plan for a new company that has obtained a 5-year lease for operating a local bus service is shown in the table below. Items marked with an asterisk represent continuous cashflows.

<i>Cashflow item</i>	<i>Timing</i>	<i>Amount (£000)</i>
Initial set up costs	Immediate	-100
Fees from advertising contracts	1 month	+200
Purchase of vehicles	3 months	-2,000
Fares from passengers*	from 3 months onwards	+1,000 <i>pa</i>
Staff costs and other operating costs*	From 3 months onwards	- 400 <i>pa</i>
Resale value of assets	5 years	+500

Determine the discounted payback period for this project assuming that it will be financed by a flexible loan facility based on an effective annual interest rate of 10% per annum. [5marks]

- e. Discuss how the principles of disclosure and transparency, investor protection, and anti-money laundering (AML) regulations apply to digital investment platforms in Kenya. [5marks]
- f. Calculate the rate of return of the following portfolio of the three assets. [5marks]

Security	Number of shares	price	rate of return
A	250	50	20%
B	500	30	17%
C	300	20	27%

Question 2 [20marks]

An investor is considering making an investment in one or both of two projects. The cashflows associated with the projects are as follows. The unit of time is years.

Project A: Initial payments of £2 million at time zero and £4 million at time 2 are made. In return a sum of £900,000 per annum is paid continuously from time 5 to time 25.

Project B: Regular payments of £100,000 are made at the start of each year for 10 years. In return, amounts of X, 2X, 3X and so on are made annually for 10 years, the first payment being made at time 11.

- (i) Find the net present value of Project A at an effective annual interest rate of 10%. [2marks]
- (ii) Show that the internal rate of return for Project A is 9.38% *pa*. [2marks]
- (iii) Find the value of X if the internal rate of return for Project B is the same as that for Project A [3marks]
- (iv) Find the value of X if both projects are to have the same net present value at 10% *pa*. [3marks]
- (v) The investor proposes to borrow all the money needed for the project. Funds are available at an interest rate of 7% per annum effective. Repayments can be made at any time, and positive cash balances can be invested to yield 3% per annum. If $X = £45,000$, find the accumulated value of each project at the end of the 25 year period. [10marks]

Question 3 [20marks]

A group of 3rd-year actuarial students from Jaramogi Oginga Odinga University of Science and Technology (JOOUST) plans to establish an insurance brokerage company. As future investors, they need to evaluate various factors before venturing into the business. Discuss **TEN** critical factors that they should consider before launching their insurance brokerage company. [20marks]

Question 4 [20marks]

- a. State and explain five types of systematic risk [5marks]
- b. State and explain five ways on which one can minimize risk exposure [5marks]
- c. State and explain five risk measures [5marks]
- d. Describe the basic principles of personal and corporate taxation [5marks]

Question 5 [20marks]

Define the following measures of investment risk:

- (i) variance of return [2marks]
- (ii) (ii) downside semi-variance of return [2marks]
- (iii) (iii) shortfall probability. [2marks]
- (iv) (iv) value at risk [2marks]
- (v) An investor is contemplating an investment with a return of £ R , where:

$$R = 300,000 - 500,000U$$

where U is a uniform $[0,1]$ random variable.

Calculate each of the following four measures of risk:

- (a) variance of return [4marks]
- (b) downside semi-variance of return [2marks]
- (c) shortfall probability, where the shortfall level is £100,000 [2marks]
- (d) Value at Risk at the 5% level. [4marks]