

The
Management
University
of Africa



Sponsored by the Kenya Institute of Management

UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DEGREE OF BACHELOR OF COMMERCE

INS 311: FUNDAMENTALS OF ACTUARIAL SCIENCE

DATE: 10TH APRIL 2026

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. **Write all your answers in the Examination answer booklet provided.**

QUESTION ONE

Read the Case Study below carefully and answer the questions that follow:

EAST AFRICAN ACTUARIES HIT 46 BUT ALL ARE KENYAN

An actuary is a business professional who analyses the financial consequences of risk or an expert in risk management. Kenya has seven newly qualified actuaries bringing the total number of the risk professionals in East Africa to 46. The Actuarial Society of Kenya (Task) on Tuesday said a consistent focus on transforming the actuarial profession in the country is beginning to show positive results, with the number of qualified members expected to increase rapidly.

“The growth is consistent and tremendous. Task has put specific initiatives to ensure the steady growth,” said the society president. All the qualified actuaries in the East African market are Kenyans. To be qualified, an actuarial science graduate has to successfully complete a series of professional papers from bodies that are full members of International Actuarial Association.

The papers include those from Canadian Institute of Actuaries (CIA), British Institute and Faculty of Actuaries (IFoA), Institute of Actuaries of Australia (IAA), American Actuarial Society (AAS) and the Actuarial Society of South Africa.

An actuary is a business professional who analyses the financial consequences of risk or an expert in risk management. Actuaries use mathematics, statistics and financial theory to measure the probability and risk of future events in healthcare, pensions, insurance, banking and investments.

Required:

- a) On the basis of the insight provided by the above case study, examine five of actuaries in pensions **(10 Marks)**
- b) Examine Five factors that account for the low uptake of actuarial science discipline **(10 Marks)**
- c) Discuss five challenges facing the actuarial profession **(5 Marks)**

QUESTION TWO

- a) Examine five responsibilities of an actuary in Insurance **(5 Marks)**
- b) Discuss Five techniques of risk financing available for business firms **(10 Marks)**

QUESTION THREE

- a) Suppose you are offered an opportunity to invest Sh.100'000 today with an assurance of receiving exactly Sh.300,000 in eight years. Compute the interest rate implicit in this case. **(6 Marks)**
- b) Examine two assumptions and three advantages of the of the Cox proportional hazards model. **(9 Marks)**

QUESTION FOUR

- a) Evaluate three benefits of using models in actuarial science. **(3 Marks)**
- b) Examine six models used by actuaries **(6 Marks)**

- c) Differentiate between adverse selection and moral hazard as applied in insurance **(6 Marks)**

QUESTION FIVE

- a) Mr X deposited 4000 \$ in a saving account paying 2% interest compounded daily. Find Future value of the money and compound interest he earned at the end of 5 years.

(7 Marks)

- b) Assume that you have 10,000 units of houses in Kayole Nairobi which you want to insure. Your expectation of loss through fire during the year is Kshs. 75,000,000/-. The industry expenses ratio experience is 30%. It is expected that a profit margin of 15% of net premium is to be realized. Required

- i) Pure Premium **(4 Marks)**
- ii) Gross premium **(4 Marks)**

QUESTION SIX

- a) Assume at age 22 there are 9,717,031 people living and that 18,365 of them will die by the end of the year. Also, assume that the entire population would like to be covered by a 1 year Term policy with a face value of Kshs. 1,000 each, Compute

- i) Number of deaths per thousand **(2 Marks)**
- ii) Net premium to be paid by each policyholder. **(3 Marks)**

- b) Discuss five factors to consider when computing premiums **(10 Marks)**

