DEGREE PROGRAMMES

COMPUTER BASED TEST
APRIL 2024 SEMESTER

MODULE NAME	**: LIFE CONTINGENCIES 2**
MODULE CODE	**: FIN61504**
EXAM DURATION	**: 1 HOUR and 30 MINUTES**

This paper consists of <u>THREE (3)</u> printed pages, inclusive of this page.

Candidate Number _____ **Table Number** _____

Tutorial Group _____

<u>Instructions to Candidates:</u>

1. All the questions are to be answered in the Microsoft Excel.
2. Show complete workings or keystrokes as applicable.
3. This examination paper contains **<u>three (3) compulsory</u>** questions.

Section	Marks
Answer ALL questions.	60 marks
	60 Marks

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TO BE RETURNED AT THE END OF THE EXAMINATION.

QUESTION 1 **[16 marks]**

Mortality tables for males and females are given in the ***'Q1 Base'*** worksheet. Assuming the two lives are independent with respect to the mortality, find the probability for a male life aged 32 exact and a female life aged 31 exact that:

(a) both lives are still alive on the date of the female's 60^{th} birthday.

(5 marks)

(b) both lives have died before the date of the female's 60^{th} birthday.

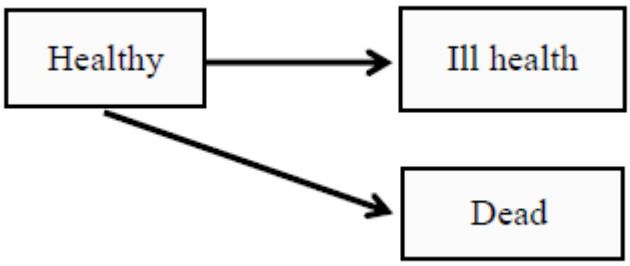
(5 marks)

(c) the female has died before age 60 exact and the male life is still alive at the end of the year of the female's death.

(6 marks)

QUESTION 2 **[15 marks]**

An insurance company has estimated the independent probabilities of two decrements in a population of healthy lives. These are set out in the ***'Q2 Base'*** worksheet. Transitions can occur out of the healthy state into one of two absorbing exit states: ill health or dead.



Forces of decrement are assumed to be independent and constant over individual years of age.

(a) Construct a double decrement table, using the template provided, for integer ages from 50 to 100. Assume a radix of (al)_50 = 100,000.

(13 marks)

(b) Evaluate the probability that a healthy individual aged 60 exact will leave the population by ill health or death before their 81^{st} birthday.

(2 marks)

QUESTION 3 **[29 marks]**

A life insurance company issues a 10-year unitised with-profits contract to a policyholder currently aged 50 exact.
The basic policy information, charging structure and the basis used by the company to carry out profit testing, are all set out in the ***'Q3 Base'*** worksheet.
The unit price increases each year in line with the company's declared bonus interest rate.
You should ignore non-unit reserves.

(a) Calculate the unit cashflows for each year of the policy, per policy in force at the start of the year.

(7 marks)

(b) Calculate the expected non-unit cashflows for each year of the policy, per policy in force at the start of the year.

(16 marks)

(c) Calculate the present value of the profit from the policy at outset.

(6 marks)

END OF QUESTION PAPER