

Actuarial Society of South Africa

COMPUTER BASED EXAMINATION

5 OCTOBER 2021

Subject A213 — Contingencies

Time allowed: One hour and 45 minutes (which includes reading time)

Maximum: 50 marks

INSTRUCTIONS TO THE CANDIDATE

1. *Ensure that you are logged in and authenticated through Examity before you attempt the examination. An ID verification process will only be done once you access the examination question section at the examination start time. This will NOT impact your allocated writing time and your examination time will count down only once you enter the examination after ID verification.*
2. *You are strongly encouraged to use the first 15 minutes as reading time only, however, you may commence answering the paper whenever you are ready.*
3. *You are given this question paper and the Excel file. You will download the Excel file in the ASSA Exam Platform. You may not use your own Excel file.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all questions. Each question is to be answered on a separate Excel sheet as per the provided template.*
6. *You may not use any other computer program or files, nor open any other browser during the examination.*
7. *You MAY NOT make use of a Formulae and Tables book during the examination. Any such information that may be required will be provided to you within the examination.*
8. *Save your work throughout the examination. Save your file using your candidate number as file name. (DO NOT USE YOUR NAME OR MEMBER NUMBER.)*
9. *Upload your Excel answer file with your solutions into the ASSA Exam Platform. You need to upload your file BEFORE the examination time expires.*
10. *Once you have added your file, you MUST click on FINISH ATTEMPT to save your file. You will still be allowed to go back and make changes (Review Attempt) if you have time.*
11. *Once you are satisfied with your uploaded file, click **FINISH ATTEMPT** and the **FINISH ALL AND SUBMIT** whereafter you will not be able to make more changes.*

12. An option to opt out of the exam will become available one hour after the official examination start time. If you select the Opt-Out option, you agree and understand that your entire script/answers will be deleted and cannot be retrieved at a later stage and that your script or part thereof will not be put forward for marking.

Note: The Actuarial Society of South Africa will not be held responsible for any late submissions or loss of data where candidates have not followed instructions as set out above.

**NO TIME ANNOUNCEMENTS ARE MADE DURING THE EXAMINATION.
PLEASE MANAGE YOUR TIME.**

END OF INSTRUCTIONS

QUESTION 1

A new insurance company has decided to launch a new endowment assurance product called PandemiCare.

PandemiCare pays a benefit on death if it was caused by any pandemic illness. A life aged 30 exactly purchases a policy that pays a benefit on death of R1 000 000 at the end of year of death or on survival to age 60.

Calculate the annual premium, payable annually in advance or until earlier death, for this policy.

Basis:

Interest	8% per annum
Initial expenses	R2 000
Profit loading	0%
Renewal expenses	R1 000 per annum, payable annually in advance

Mortality and being infected by a pandemic illness is such that:

$$l_x = 4^{-0.1x} l_0 \text{ with } l_0 = 100000$$

[Total 15]

QUESTION 2

Following a global pandemic, a large insurer is worried about its shrinking book size and subsequently its ability to cover its overhead expenses from the income it generates from its book. The insurer has just sold conventional without-profit endowment assurance policies to lives aged exactly 45. The policies have a term of ten years and the sum assured is R1 500 000 which is payable at the end of year of death or on maturity.

Each policyholder pays a level premium of R125 000 per year which is paid in advance while the policyholder is alive.

Basis:

Mortality	AM92 Ultimate
Interest rate:	5% pa effective
Initial commission:	25% of one year's annual premium
Renewal commission:	2½% of each premium except the first
Initial expenses:	R2 500
Renewal expenses:	Rx. Renewal expenses are incurred at the start of each year, except the first
Death claim expense:	R5 000, payable at the end of year of death
Maturity claim expense:	R3 000
Expense inflation:	All non-commission expense amounts, including Rx, are quoted as at the inception of the policy and are assumed to inflate at the rate of 5% pa effective from this date.

- i. Calculate the expected cashflows in each policy year, assuming the policy is in force at the start of the year and thereafter calculate the renewal expense amount, Rx, so that the expected net present value of the profit emerging over the duration of the policy is zero.

[20]

The company sold 2 500 of these policies that must cover an annual overhead expense of R10m (also quoted as at the inception of this policy).

- ii. Comment on the company's ability to cover its overheads given your calculations in i) above.

[5]

[Total 25]

REMEMBER TO SAVE

PLEASE TURN OVER

QUESTION 3

A life insurance company issues a special 15-year endowment assurance policy to a healthy life currently aged 30, exactly, that pays benefits in the event of sickness, surrender or death. A benefit is payable at the end of the policy year of claim. The policy ceases on payment of any benefit.

The company uses the following basis to price its policies:

- Independent force of contracting the rare disease and becoming sick: 25% in year one, 24% in year two, and so on, decreasing by one percentage point each year to 16% in year ten,
- Independent force of surrender: 12.5% in year one, 12% in year two, and so on, decreasing by half a percentage point each year to 8% in year ten
- The independent mortality rates are assumed to follow the AM92 Select table.

The company assumes that each force of decrement is independent and constant over each year of age.

Calculate, for each policy year, the dependent probabilities of sickness, surrender and death.

[Total 10]

[GRAND TOTAL 50]

REMEMBER TO SAVE

END OF EXAMINATION