

WRITTEN EXAMINATION

5 OCTOBER 2023 (am)

Subject A213 — Contingencies Intermediate Technical

Time allowed: Two hours and fifteen minutes (which includes 15 minutes of reading time)

Total Marks: 100

INSTRUCTIONS TO THE CANDIDATE

1. *Ensure that you are logged in and authenticated through Examity before you attempt the examination.*
2. *Your computer must be placed, and camera angled, so that your head and shoulders as well as your writing area on your desk are visible to the Live Proctor Examity agent. Readjust your camera if you bump or move your computer by accident.*
3. *Ensure that you have your exam permit handy. It reflects your candidate number to input **as part of the two hours 15 minutes examination and not before the start of the examination.** Write your candidate number at the top of each page during the examination time only. Do not use your name or member number anywhere on your answer script.*
4. *The cell phone to be used to scan your final answer script must be switched **OFF** during the two hours and 15 minutes examination time. Place the cell phone at the top of your examination pad / writing pages in view of the Examity agent.*
5. *You are strongly encouraged to use the first 15 minutes as reading time only, however, you may start answering the paper whenever you are ready.*
6. *The question paper is only available on the ASSA Exam Platform as a PDF download and may not be printed.*
7. *You are required to write your answers on a clean A4 examination pad. Write only on one side of the paper and number your pages.*
8. *Attempt all questions, beginning your answer to each question on a new page.*
9. *Write in black or dark blue pen.*
10. *Show calculations where appropriate. You may use blank paper to make notes. This paper must not be scanned as part of your answer script. You may use a calculator from the approved list only.*
11. *You may not access any file from your computer, use any other computer program (e.g. Email, MS Word, Excel) or open any other browser during the examination. The use of Grammarly and Grammarly Premium or similar is also not permitted in examinations.*
12. *You may not use any other material (e.g., a Formulae and Tables book) during the examination. Any such information that may be required will be provided to you in the examination.*
13. *Mark allocations are shown in brackets.*

14. *Assume that months are all equal length, unless otherwise stated.*
15. *At the end of the two hours and 15 minutes examination time, you must stop writing and start scanning and uploading your script. **You may NOT continue to write or review your script during this time.***
16. *Scan ALL your answer pages to PDF so that your candidate number is clear at the top of each page.*
17. *Save your PDF scanned file using your candidate number as file name. Do not use your name or member number anywhere in your answer script nor as file name.*
18. *Transfer your scanned script file to your computer and upload it to the ASSA Exam Platform.*
19. *Click on the **Upload Answers** link below the examination paper link. Ensure you click on **Finish** below the upload box and again on **Finish All and Submit**, before the 20-minute upload time is up. (After submission, the number of files successfully submitted will be reflected.)*

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.

END OF INSTRUCTIONS

QUESTION 1

Briefly outline the reasons why a life insurer would use a more prudent than best-estimate basis when setting its premium rates.

[Total 2]

QUESTION 2

i. Explain why an insurer may prefer to offer a with-profit product compared to without-profits product?

[2]

ii. Describe how a terminal bonus could be a useful tool in enhancing the overall returns for policyholders.

[3]

[Total 5]

QUESTION 3

On 1 January 2020, an insurer issued a ten-year joint life term assurance policy, to lives both aged 55 exactly. Under the policy, the sum assured of R2 000 000 is payable immediately on the first death of the two lives.

Premiums of R4 000 per annum are payable monthly in advance for ten years, or until the first death of the lives assured.

On 31 December 2022 the policy is still in force. Calculate the gross premium reserve at this date.

Basis:

Mortality: PMA92C20 for the first life and PFA92C20 for the second life

Interest: 4% per annum

Renewal expenses: 3% of each premium

Claim expenses: R800 incurred immediately on the payment of a claim.

[Total 12]

QUESTION 4

On 1 January 2012, a small insurer issued several 25-year endowment assurance policies to lives then aged 35 exactly. Level premiums were payable annually in advance throughout the term of the policy, ceasing on the earlier death of the assured life. The sum assured of R100 000 was payable on survival to the end of the term or at the end of year death, if earlier.

Premiums and reserves are calculated on the following basis.

Mortality: AM92 Select

Interest: 6% per annum

Expenses: 60% of the first premium

5% of each premium excluding the first

You are given the following information:

- The total sums assured in force on 1 January 2022 were R50 000 000.
- The total death claims occurring during 2022 and paid on 31 December 2022 were R400 000.
- During 2022, policies with sums assured of R2 000 000 were surrendered. Surrender values, paid on 31 December 2022, were calculated as the retrospective reserve using the above basis, but with interest of 4% per annum.

PLEASE TURN OVER

- The company incurred expenses of R150 000 on 1 January 2022.
- The company earned a total return of 8.5% on its assets during 2022.
- The reserves per policy in force on 31 December 2021 was R23 389.18.

- Show that the annual premium per policy payable is R1 987.94. [3]
 - Calculate the reserve at the end of the 2022 calendar year. [4]
 - Calculate the surrender values that were payable on 31 December 2022. [11]
 - Comment on the relative values of your answers to parts (ii) and (iii) above. [2]
 - Calculate, the total profit or loss for the 2022 calendar year for these policies. [8]
 - Comment on the sources of profit. [7]
- [Total 35]

QUESTION 5

An insurer issued a 20-year term assurance policy to a life then aged 45 exactly. The initial sum assured of R750 000 was increased by 6% per annum compounded at the beginning of the second and each subsequent policy year. The sum assured is payable immediately on death and level monthly premiums are payable in advance throughout the term of the policy or until earlier death.

Basis:

Mortality:	AM92 Ultimate
Rate of interest:	6% per annum
Initial commission:	50% of the first premium
Initial expenses:	R4 000 at inception
Renewal commission:	5% of each premium from the start of the second month
Renewal expenses:	R750 per annum at the start of the second and subsequent policy years, inflating at 6% per annum compound.
Claim expense:	R3 000 payable immediately on death.
Inflation:	The renewal expenses quoted are as at the start of the policy.

- Calculate the expected present value of the benefits under the policy. [8]
 - Calculate the monthly premium payable. [13]
 - Comment on the impact on the monthly premium if the payment conditions were changed to allow for premium payments to be made monthly in arrears. [3]
- [Total 24]

PLEASE TURN OVER

QUESTION 6

A special whole life assurance policy issued to a life aged 45 exactly provides a benefit of R250 000 on death within 15 years of inception and R400 000 on death thereafter. Benefits are payable at the end of the year of death.

Basis:

Mortality AM92 Ultimate

Interest 4% per annum

Calculate the standard deviation of the random variable representing the present value of benefits, given that the expected present value of these benefits is R105 032.

[Total 10]

QUESTION 7

A life insurance company sells an insurance product with a policy term of two years that pays benefits to the customer as described below. Annual premiums of R110 000 are payable in advance.

- A death benefit of R1 000 000 at the end of the year of death during policy term.
- A survival benefit of R250 000 paid upon survival to the end of the policy term.
- No benefit is payable if a policyholder withdraws from the contract.

Basis:

Force of mortality 1% per annum.

Force of withdrawal 5% per annum

Rate of interest 9% per annum

i. Calculate the dependent probabilities for the above decrements.

[3]

ii. Calculate the net present value of the benefits offered.

[9]

[Total 12]

[GRAND TOTAL 100]

END OF EXAMINATION