ACTUARIAL SOCIETY OF SOUTH AFRICA

EXAMINATION

1 November 2023 (am)

Subject F102 — *Life Insurance* Fellowship Principles

Time allowed: *Three hours and twenty minutes (which includes five minutes for downloading and uploading your answer document)*

Total marks: *100*

INSTRUCTIONS TO THE CANDIDATE

1. *Ensure that you are logged in and authenticated through Examity before you attempt the examination.*
2. *The question paper is only available in the ASSA Exam Platform as a PDF download and may not be printed. Copy/paste of questions or parts thereof is allowed from the question paper to your Word answer document only.*
3. *Download the Word answer document template from the ASSA Exam Platform. Save this Word answer document on your desktop using your Candidate Number as filename. You are required to submit your answers in Word format ONLY using this document. No answers in any other format (e.g. handwritten) will be accepted. Save work regularly.*
4. *Ensure that your Candidate Number appears in the "header" of your Word answer document. [Double-click on the header at the top of the Word document, input your Candidate Number only in the header, then press "Esc" to close the header.]* ***Do not use your name or member number anywhere in your Word answer document.***
5. *You may not access any file from your computer, use any other computer app (e.g., Email or Excel) or open any other browser during the examination. Nor may you use Grammarly, Grammarly Premium or similar add-ins.*
6. *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 within the examination.*
7. *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.*
8. *Mark allocations are shown in brackets.*
9. *Attempt all eight (8) questions, starting each on a new page (as provided for in the Word answer document).*
10. *Show calculations where appropriate. You may use blank paper to carry out rough work calculations. You may use a calculator from the approved list only.*
11. *Upload your Word answer document only into the ASSA Exam Platform. Once you have uploaded your document, you must click on* ***Finish Attempt*** *to save your document. You will still be allowed to go back and make changes (****Review Attempt****) if you have time.*
12. *Once you are satisfied with your uploaded document, click* ***Finish Attempt*** *and* ***Finish all and Submit****. Once you have submitted you will not be able to make any changes.*
13. ***You must submit your Word answer document BEFORE the end of the allotted examination time.*** *You should stop writing and start uploading during the last five minutes. Take this into account when planning your review and submission. There will be no time announcements.*

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

END OF INSTRUCTIONS

QUESTION 1

An insurance company sells regular premium 10-year conventional with-profits endowment assurance policies. It offers guaranteed minimum maturity values and surrender values on these policies equal to a return of premiums paid accumulated at 10% per annum.

i. Outline how option pricing techniques can be used to determine the cost of the guaranteed minimum maturity and surrender values.

[3]

The company operates in a developing economy with a limited set of bonds and stocks available in the local market.

ii. Explain the difficulties associated with pricing these guarantees using option pricing techniques.

[2]

The company is considering expanding its sales to a different country.

iii. Discuss the main taxation considerations that the company should take into account in making this decision.

[4]
[Total 9]

QUESTION 2

An actuarial student proposes using the "equating policy values" method when policyholders request altering their conventional without-profits whole life assurance policy to a conventional without-profits term assurance policy with the same sum assured. The policy value before the alteration would be set equal to 90% of the policy's asset share as at the date of alteration. The policy value after alteration would be calculated using the current pricing basis for new products.

Discuss the considerations that you would take into account in evaluating this proposal.

[13]

QUESTION 3

A well-established life insurance company that sells conventional without-profits business only is considering changing its distribution model, from being mainly through independent intermediaries to an internet-based direct selling model.

i. Outline the considerations and actions required by the company prior to implementing this change.

[10]

ii. Outline the reasons why it would be preferable for the company to sell term assurances, rather than whole life assurances, through direct selling.

[6]
[Total 16]

PLEASE TURN OVER

QUESTION 4

A life insurer selling stand-alone conventional without-profits critical illness policies is performing data checks for its annual valuation at 31/12/2023. A summary of total sums assured in force for this business is shown below, as well as sums assured related to policy movements for calendar years (CY) 2022 and 2023.

	31/12/2021 R millions	31/12/2022 R millions	31/12/2023 R millions
Sums assured in force	2 200	2 300	2 500

	CY 2022 R millions	CY 2023 R millions
Sums assured from new policies	550	600
Sums assured lapsed	150	75
Sums assured paid out	300	250

i. Perform 4 checks on the data provided.

[4]

ii. Comment briefly on your results.

[2]

The insurer uses a market-consistent approach for the valuation and calculates its risk-based solvency capital requirements using the Value-at-Risk (VaR) measure at a 99.5% confidence level over one year. It calculates its free capital as the excess of the value of its assets over its solvency capital requirements and value of liabilities, calculated using a gross premium valuation method.

iii. Discuss the expected impact of the following scenarios on the insurer's liabilities, capital requirements and free capital on 31/12/2023.

a. An unexpected large increase in claim administration expenses during 2023.
b. An unexpected decrease in claims in 2023 from one of the critical conditions covered, due to a new drug which reduces both the likely incidence and severity of this condition.

[6]
[Total 12]

PLEASE TURN OVER

QUESTION 5

A large life insurance company in a developed economy has been successfully selling conventional without-profits annuity business for many years but sales have declined in recent months. The company is considering launching a conventional with-profits annuity as an alternative to boost sales.

i. Discuss the key factors that need to be considered in the design of the with-profits annuity product.

[8]

ii. Describe how the company could go about setting its mortality assumption for the with-profits annuity. A description of experience investigations is not required.

[5]

[Total 13]

QUESTION 6

A medium-sized life insurance company in a developing market offers a wide range of unit-linked life insurance products. Recent changes in regulations allow life insurers to invest overseas, which had previously not been allowed. The office is planning to expand its range of products by launching a new (regular premium) unit-linked endowment assurance product with the following characteristics:

- Policy benefits:
  - The death benefit will be the bid value of units.
  - Surrender values will be equal to the bid value of units less a surrender penalty. However, on each 5^{th} policy anniversary there will be a guaranteed minimum surrender value equal to a return of 75% of premiums paid.
  - There will be a guaranteed minimum maturity value equal to a return of premiums.
- The unit fund to be offered will invest only in overseas equities.
- The only charge to be levied will be an annual management charge. The charge will be fixed at 6% p.a. for units issued in the first year and 1% p.a. on units issued thereafter.

i. Outline briefly the customer needs met by this product.

[2]

ii. Outline the risks that offering this product exposes the insurer to in respect of:

   a. investment performance;
   b. expenses; and
   c. withdrawals.

[9]

[Total 11]

PLEASE TURN OVER

QUESTION 7

i. List the 4 main types of underwriting.

[2]

A large life insurance company has a well-established book of risk business that is sold mainly through independent intermediaries. The company writes a significant number of policies on lives considered as non-standard risks with appropriate loadings to the premium rates. The loadings are also applied to the modelled mortality rate in the valuation.

ii. Outline the reasons that the company would accept non-standard risks.

[2]

iii. Outline the ways the company could monitor and manage the mortality risk associated with such non-standard risks, other than through alternative underwriting decisions such as imposing exclusions.

[4]

The company recently performed a valuation of these policies. Upon investigation, an error was identified whereby the loadings for premiums and mortality were not applied and the standard rates for both were used in the valuation. The actual premiums being paid by sub-standard lives are correct.

iv. Outline how this error would have impacted the valuation results.

[3]
[Total 11]

QUESTION 8

The government in a developing country has recently implemented new legislation relating to unit-linked retirement products. From the implementation date of the legislation:

- All future contributions to both new and existing unit-linked retirement products will be split into two parts:
  - One third of all contributions will go towards a unit-linked "accessible fund" (AF).
    The policyholder will be able to access these funds at any time prior to the specified retirement age but will be restricted to at most one withdrawal per calendar year. At retirement, the accumulated value in the AF may be taken as a lump sum or used to purchase an annuity.
  - Two thirds of all contributions will go to a unit-linked "retirement fund" (RF).
    The policyholder will not be able to access these funds prior to the specified retirement age. At retirement, the accumulated value in the RF must be used to purchase an annuity.
- Accumulated funds in existing unit-linked retirement products will, on implementation date, be transferred to the policyholder's RF.
- On death prior to retirement both the AF and RF are paid to the nominated beneficiaries.

PLEASE TURN OVER

Prior to this change, all contributions to unit-linked retirement policies had to be held by the insurer until retirement, at which time the unit funds had to be applied to purchase an annuity. Prior to retirement the only payments which were permitted were on death (equal to the full value of the fund) or after three months of unemployment (a once-off lump sum up to a specified legislated percentage of the fund).

i. Outline reasons why the government might have introduced this new legislation.

[5]

ii. Discuss how this legislation might affect an existing insurer in this market.

[6]

An insurer in this market is considering offering policyholders guaranteed annuity options. This will allow policyholders the option to lock-in annuity rates prior to purchasing their annuity at retirement if they annuitise with the insurer.

iii. Outline the advantages and disadvantages to the company of introducing this guaranteed option.

[4]

[Total 15]

END OF PAPER