ACTUARIAL SOCIETY OF SOUTH AFRICA

EXAMINATION

4 November 2024 (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

Failure to adhere to any of these instructions could incur examination sanctions.

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. Do not name your answer script with your name or member number.*
4. *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.*
5. *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.*
6. *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. Microsoft Word spellcheck is allowed.*
7. *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.*
8. *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.*
9. *Mark allocations are shown in brackets.*
10. *Attempt all eight (8) questions, starting each on a new page (as provided for in the Word answer document).*
11. *Show all calculations. You may use blank paper to carry out rough work calculations. You may use a calculator from the ASSA-approved list only.*
12. *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.*
13. *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.*
14. ***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

A medium-sized life insurance company that only sells term assurances through the internet is considering launching an income protection product. The new product will be sold through independent intermediaries.

i. Discuss the key differences between the target markets of these two products.

[4]

ii. Compare the product design factors for these two products.

[10]

[Total 14]

QUESTION 2

A life insurance company recently launched a new conventional without-profits whole life assurance policy with an accelerated critical illness benefit for the first time.

It has been proposed that existing whole life assurance policyholders should be allowed to add an accelerated critical illness benefit to their policies. The alteration would be carried out using the "equating policy values" methodology, with the policy value before the alteration being calculated using the original pricing basis and the policy value after the alteration being calculated using the current pricing basis.

Discuss the considerations that should be taken into account in evaluating this proposal.

[12]

QUESTION 3

i. State 4 reasons why a life insurer would monitor its experience.

[2]

A large life insurance company sells a range of products, including unit-linked endowment assurances. The latest analysis of surplus arising shows that the unit-linked endowment book made a loss over the previous financial year.

ii. Outline briefly possible reasons why this may be the case.

[5]

The valuation actuary has determined that an investigation of the expenses (excluding commission) is required for the unit-linked endowments.

iii. List 4 different types of expenses for which assumptions are normally required to value the unit-linked endowments for reserving purposes.

[2]

iv. Explain the steps involved in performing an expense investigation to derive the expense assumptions required to value unit-linked endowments.

[6]

[Total 15]

PLEASE TURN OVER

QUESTION 4

An insurer that sells without-profits endowment assurance policies uses a market-consistent approach to do the valuation of its liabilities. The insurer pays a surrender value on early withdrawal.

i. Explain how a market-consistent approach could be applied to the valuation of the without-profits endowment assurance business, including how the key assumptions could be set.

[10]

The insurer is considering expanding into selling immediate annuities.

ii. Outline how and why the discount rate for the valuation of the immediate annuities may differ from the discount rate applied to the valuation of the endowment assurances.

[2]

[Total 12]

QUESTION 5

i. Outline the key features of the revalorisation method for distributing surplus on with-profits business.

[3]

A life insurance company in a developing country has a large book of with-profits pure endowments for which profits are calculated and distributed using the revalorisation method. The company's competitors use the additions to benefits method for surplus distribution.

ii. Outline possible reasons for the company choosing this method for surplus distribution.

[2]

iii. Explain the investment risk this product exposes the company to.

[3]

The company's assets backing the liabilities of this book are invested as follows:

Local fixed interest government bonds of various terms	80%
Local money market instruments and cash	20%

iv. Discuss the suitability of the asset split for the liabilities.

[4]

One of the company's directors suggests that some of the bond holdings should be switched into local equity holdings.

v. Comment on this suggestion.

[2]

[Total 14]

PLEASE TURN OVER

QUESTION 6

i. State 6 reasons why a life insurer would analyse the surplus arising over a period.

[3]

A niche insurer specializes in conventional term assurance, utilising sophisticated underwriting techniques at the time of sale and dynamic pricing that adjusts a life assured's regular premiums over time to reflect changes in the life assured's risk profile. The insurer has recently concluded an analysis of surplus which shows a mortality profit over the period.

ii. Suggest possible reasons for the mortality profit.

[4]

iii. List the data that would be required to perform an internal investigation into the mortality experience.

[3]

iv. Describe the factors the insurer should consider when reviewing its valuation mortality assumptions given the results from the internal investigation into mortality experience.

[2]

[Total 12]

QUESTION 7

A multinational life insurance company is planning to launch a product in Country A to cover the funeral costs of children. Country A has many regions with high child mortality rates. The insurance company will be the only company that will provide this type of insurance in Country A. The company currently sells this product in Country X, where there is relatively low child mortality.

The product features include:

- The policies will provide cover for all children of the policyholder, and the premium will be the same irrespective of the number of children covered.
- The policy will continue until the policyholder reaches age 65 or the youngest child reaches age 18, whichever occurs later.
- Underwriting will be limited to a few questions, including policyholder's age and address as well as the age and sex of their child/children.
- The policy will automatically include all future new-born children.

i. Explain why the company would use a cashflow rather than formula approach to price this product.

[8]

ii. Discuss how the company could set model points to price this product.

[5]

[Total 13]

PLEASE TURN OVER

QUESTION 8

A life insurance company operates several internal unit-linked funds. Unit prices are calculated daily. All the funds are expanding, and therefore are priced on an offer basis.

i. State the basic equity principle as it applies to the pricing of an internal unit-linked fund and explain the rationale behind it.

[3]

ii. Describe how this principle is applied when determining the appropriation and expropriation prices for a fund.

[2]

The following details are for the Equity Fund as at the end of 31 March 2024.

- Market value of assets (excluding cash) within the fund = R50 000
- Cash balance in the fund = R1 000
- Number of units = 10 000
- Selling costs of assets in the fund = R1 500
- Purchasing costs of assets in the fund = R1 100

The market value and cash balances allow for current assets and liabilities of the fund and any accrued income or tax adjustments.

There is an initial charge of 3%. All offer and bid prices are rounded to three decimal places.

Prices are calculated at the end of 31 March 2024, and applied to new requests for investments or disinvestments received during that day.

iii. Calculate the following in relation to this fund, stating any assumptions you make:

a. Appropriation price.
b. Expropriation price.
c. Offer price.

[3]

[Total 8]

END OF PAPER