



EXAMINATION

31 May 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 program (e.g., Email or Excel), or open any other browser during the examination.
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

- i. Outline the key investment principles for a life insurance company that will determine its investment strategy.

[2]

A large well-established life insurance company sells a wide range of conventional contracts in a particular country.

- ii. Suggest, with reasons, a suitable portfolio of assets to match the following policies written by the insurer:
- a. Without-profits whole life assurance; and
- b. Without-profits immediate annuities.

[3]

The company is planning to launch a unit-linked endowment assurance. The unit fund is to be invested in a mix of equities and bonds. On maturity the benefit payable will be the higher of the unit fund and a minimum guaranteed maturity value based on premiums accumulated at a minimum guaranteed annual return.

- iii. Outline how you would determine the cost of the investment guarantee using stochastic modelling techniques.

[3]

[Total 8]

QUESTION 2

An insurance company sells a without-profit 20-year term assurance product. The maximum sum insured is large and hence underwriting is required.

- i. Outline the options available to the underwriter to deal with risks identified in the underwriting process as being non-standard.
- ii. Describe the process of “claims underwriting” and explain briefly how claims underwriting plays a role in managing risk for the insurance company.

[4]

[3]

The insurer is concerned about a possible concentration of risk caused by many of its policyholders living in the same apartment complexes and many working for a few large employers.

- iii. Describe how catastrophe reinsurance operates and explain briefly how it could help to manage the risk described above.

[3]

[Total 10]

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QUESTION 3

An insurance company has used the inception / disabled life annuity approach for modelling and pricing its income protection business since it launched 15 years ago.

- i. Describe the inception / disabled life annuity approach to costing income protection benefits. [3]
- ii. Describe the multi-state modelling approach to costing income protection benefits, indicating the additional assumptions required and explaining how this approach differs from the inception / disabled life annuity approach. [5]

It has been proposed that the company changes its current modelling approach and introduces a multi-state modelling approach instead.

- iii. Discuss the factors the company should consider when evaluating this proposal. [3]

The income protection product has recently been reporting experience losses.

- iv. State 6 possible reasons for the recent experience losses for the income protection product. [3]
- [Total 14]

QUESTION 4

A life insurance company that sells without-profits term assurance contracts only is considering how to calculate the adjusted premium to charge policyholders who request a change in their smoking status classification. These are policyholders who were classified as smokers when they bought the policy but have now stopped smoking for an extended period of time. In terms of the company's new business underwriting practices, these lives would now be classified as non-smokers. The sums assured on their policies are to remain unchanged.

The company proposes calculating the new premium for an altered policy by equating prospective policy values. The original pricing basis will be used to calculate the policy value before alteration and the current pricing basis applicable to new business policies sold to non-smokers will be used to calculate the policy value after alteration.

Discuss the considerations that you would take into account in evaluating this proposal. [11]

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QUESTION 5

- i. Define “appropriation” and “expropriation” prices for unit-linked business.

[2]

A small insurer selling regular-premium unit-linked pure endowments in a developing country is experiencing strong growth.

- ii. Explain whether the company is more likely to be using the “offer” basis or the “bid” basis for calculating the unit price for its unit-linked pure endowment.

[2]

Key reasons for strong new business growth include generous upfront commission paid to brokers, an attractive minimum guaranteed maturity value of a return of premiums paid, and strong investment returns earned on US technology shares which make up the largest portion of the unit fund.

The company is reviewing the assumptions for the product for the statutory valuation.

- iii. List 8 assumptions that are likely to be needed for the valuation.

[2]

The capital requirements are calculated using a risk-based VaR approach, based on a specific confidence level over a one-year period.

- iv. List, and explain with reasons, 6 risks you would expect to be significant contributors to the capital requirements for this endowment product.

[8]

[Total 14]

QUESTION 6

An established life insurance company sells conventional with-profits endowment assurance policies where policyholders share only in the investment and mortality surplus with bonuses distributed using the “additions to benefits” method. It has been the life insurance company’s practice, and is its strategy, to distribute a significant proportion of the surplus in the form of terminal bonuses.

- i. Discuss the key factors influencing the appropriate asset mix for these with-profits policies and suggest appropriate assets.

[5]

The insurer is considering closing the book of with-profits endowment policies to new business.

- ii. Discuss the factors that the company should consider when deciding upon the split between reversionary and terminal bonuses for future bonus declarations on the closed book in both the short-term and long-term.

[8]

[Total 13]

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QUESTION 7

Continent Life writes an annually renewable term assurance product with very low sums assured in an African country. The product only covers the policyholder's life and policyholders must be aged between 18 and 70. Low- and middle-income earners are targeted with this product.

The product is sold solely through Continent Life's direct marketing team, and the insurance application is done entirely via the policyholder's mobile phone using a dedicated phone application ("app"). The company has not asked for policyholder information other than the name and date of birth at new business stage and has historically charged a single undifferentiated premium rate per unit of sum assured to all policyholders.

The product has been making mortality losses for several years and it has been proposed that age-rating is implemented for this product.

- i. Discuss the main factors to consider in evaluating this proposal.

[8]

Assume that the proposal was adopted and that it is now three years after implementing the age-rating change. Continent Life is conducting a withdrawal experience analysis based on the last five years of data.

- ii. List 4 factors by which data could be grouped for this analysis.

[2]

The results of the analysis show that lapse and withdrawal rates for this book as a whole, for the preceding year, were significantly higher than expected.

- iii. Suggest some further analysis the company could carry out and outline briefly actions the company may take to address the poor withdrawal experience identified.

[5]

[Total 15]

QUESTION 8

Critical illness (CI) insurance in a particular country may only be offered through conventional products providing lump sum benefits. Almost all companies in the country provide cover for the 10 major CIs identified by the National Industry Body (NIB). From time to time the NIB will revise the list of illnesses included in the list of major CIs.

TopCI has written CI insurance in this country for many years. To distinguish itself from the other players in the CI market it intends to launch a new CI product as outlined below, to be sold through independent intermediaries:

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- Initially policyholders will select only 5 of the 10 major CIs to include in their cover.
 - Initial underwriting will be carried out in the same way as would have been done had all 10 CIs been covered.
 - On stated dates, and without any further evidence of health having to be provided, policyholders will have the option to increase the number of CIs covered under their policy – up to the maximum number then recognized by the NIB.
 - The initial premium rate for this policy will be significantly less than the premiums charged for the other CI products available in the market (as those generally cover all 10 of the major CIs).
 - The premium rates to be charged in respect of any additional CIs added to the cover are not guaranteed.
- i. Outline the additional morbidity risk TopCI would face if it offers the proposed CI product as well as its current (standard) CI product. [4]
 - ii. Outline briefly 6 reasons why the proposed product may produce disappointing levels of new business take-up. [3]
 - iii. Suggest 8 ways (other than reinsurance) in which TopCI could reduce the morbidity risk if it decides to offer the proposed product (without changing the core product features outlined above), explaining how each suggestion will help reduce the risk. [8]
- [Total 15]

END OF PAPER