EXAMINATION

27 May 2020 (am)

Subject F102 — *Life Insurance*
Fellowship Principles

Time allowed: Three hours and fifteen minutes

INSTRUCTIONS TO THE CANDIDATE

1. *Enter your candidate number as required in your examination answer.*

2. *Questions are only available in Moodle and may not be printed.*

3. *You are required to submit all of your answers in this Moodle learning platform only. You MAY NOT use any other computer program (e.g. MS Word or Excel) during the examination.*

4. *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.*

5. *Mark allocations are shown in brackets.*

6. *Attempt all eight (8) questions.*

7. *Show calculations where this is appropriate. You may use blank paper to carry out rough work calculations. You may use an electronic calculator from the approved list.*

8. *You may return to your answers to review and amend during the allotted examination time. Once you are happy with your answers you need to **Finish all and Submit** your work. Once you have submitted you will not be able to make any more changes to your answers.*

9. *It is the candidate's responsibility to ensure that all work is submitted BEFORE the end of the allotted examination time. Take this into account when planning your review and submission.*

Note: Answers will be saved automatically during the examination. However, 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 life insurer in a developing country has been selling single-premium deferred annuities for a number of years. The features of the product are summarised below:

- The product is sold on a without-profit basis;
- Regular annuity payments are level and paid from age 65 for the remaining life-time of the annuitant; and
- The level of the annuity is determined when the single premium is paid.

i. Describe the most suitable investments for matching the liabilities.

[5]

The new marketing manager has suggested that in order to make the product more attractive and improve sales she would like to add an option that can be exercised by deferred annuitants at age 65 to allow them to convert future income into an immediate lump sum at the guaranteed conversion rate of R10 per R1 p.a. of annuity income given up.

ii. Explain how the insurer could calculate the cost of offering this option.

[6]

[Total 11]

QUESTION 2

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

[2]

Forsure is the leading life insurer in a particular country and holds a significant portfolio of term assurance, whole of life and annuity policies. It has decided to review the per policy expense experience underlying its product offering.

Forsure operates a head office in each of the country's two main cities, Mortalitown and Longevitown. The Longevitown office performs all the functions associated with the annuity business while the Mortalitown office performs all the functions associated with the assurance business, as well as the group-wide functions of the executive, marketing and actuarial teams.

Forsure operates one administration platform for signing up new business and administering in-force policies. However, it operates two distinct claims administration systems – one for assurance claims and another for annuity payments. The annuity payment system was developed and implemented in the past financial year.

ii. Describe how a pricing actuary would go about conducting a per policy experience analysis for expenses and, in particular, how this would be done by Foresure's pricing actuary.

[9]

[Total 11]

PLEASE TURN OVER

QUESTION 3

A large established life insurer has been selling a comprehensive critical illness product for many years.

i. Outline briefly the customer needs that a critical illness product could potentially meet.

[3]

ii. Explain why, in practice, the critical illness benefit payouts might not correspond well to the needs, as outlined above.

[3]

As a response to increased competition in the market, the insurer is considering launching a tiered version of its critical illness product, offering additional lower sum assured tiers of benefits for less serious forms of the illnesses currently covered. Several insurers in the market have been selling such a version of the product for a number of years.

iii. Describe the factors that the pricing actuary should consider when setting the risk rates for this new option.

[5]

iv. Discuss how the reinsurance strategy for the tiered product may differ from that for the standard critical illness product.

[3]

[Total 14]

QUESTION 4

XYZ Life is a large life insurance company that sells a range of conventional and accumulating with-profits products, distributing surplus using regular and terminal bonuses.

i. Outline 4 reasons why a company might want to defer profit distribution under its with-profits products.

[5]

The funds backing the accumulating with-profit product liabilities are invested in line with the following long-term strategic asset allocation:

Asset class	**Weight**
Local equity	40%
Local bonds	30%
Local cash	5%
Foreign equity	15%
Foreign bonds	10%

The recent performance of the fund assets has been below inflation.

ii. Discuss the factors that will determine the level of the regular bonus rates that can be declared, with particular reference to the long-term strategic asset allocation.

[7]

[Total 12]

PLEASE TURN OVER

QUESTION 5

You are the head of the valuations team for a large listed insurance company, operating in a developing economy. The company sells conventional without-profits and with-profits policies, as well as unit-linked policies.

i. Describe how you would value the company's large, well-established, portfolio of without-profits whole of life assurance liabilities, on a market consistent basis for the purpose of determining the financial position of the company for the published accounts.

[5]

The company's portfolio of endowment assurance policies has historically been quite small and has always been valued on a net premium basis. It has, however, grown substantially in the last three years and although it remains a small portion of the company liabilities, the CEO has asked you to use a less outdated valuation method for the published accounts. He has suggested using a more realistic gross premium valuation approach.

ii. Comment on the impact that the CEO's suggestion may have on the company's profitability shown in the published accounts.

[3]

Subsequent to the accounts being published shareholders request a meeting to discuss the change in valuation approach.

iii. Outline the potential areas of concern for the shareholders.

[2]
[Total 10]

QUESTION 6

Epsilon Life offers a range of conventional without-profits endowment assurances and whole of life assurances. The company allows policyholders to make their whole of life and endowment assurance policies paid-up with a reduced sum assured. Paid-up policyholders have the option to reinstate their policies at any time in the future, with a sum assured not exceeding the original sum assured, should they resume premium payments.

Epsilon Life calculates all post-alteration benefits and premiums by equating policy values of the prospective reserve after the alteration with the policy's prospective reserve immediately before the alteration, allowing for alteration expenses. Both prospective reserves are determined on a realistic basis.

You have been asked to determine the premium required to reinstate a paid-up whole of life assurance policy to its original sum assured.

PLEASE TURN OVER

i. Outline how the various assumptions required to carry out the calculation could be set, commenting on how these assumptions may differ in the calculation of the policy values immediately before and after the reinstatement.

[6]

ii. Comment on the suitability of Epsilon Life's approach to determining post-reinstatement benefits and premiums compared to the general principles which should be considered for policy alterations.

[6]

[Total 12]

QUESTION 7

A large life insurance company has written a wide range of unit-linked business for many years. A popular product for the middle-income market is the "Education Savings Plan", a regular premium unit-linked endowment assurance designed as a savings policy for parents to save for the tertiary education of their children. The key features of the product are as follows:

- Maturity benefit: 100% of the bid value of the units;
- Death benefit: 100% of the bid value of the units;
- Surrender benefit: 100% of the bid value of the units, less a surrender penalty;
- Charges: Annual fund management charge expressed as a percentage of the bid value of the units; and
- No medical underwriting.

Over the past two years, the insurer has experienced a significant increase in surrenders on the Education Savings Plan product. The company is considering introducing the additional benefits listed below, which would be new in the market, in order to improve the persistency experience for the product:

- Partial surrender, whereby policyholders can withdraw up to 50% of the bid value of units in any given year while keeping the policy in-force;
- Alteration of premium, whereby policyholders will be able to increase or decrease premiums at any time during the term and by any amount; and
- Optional waiver of premium on total permanent disability or redundancy.

Discuss the suitability of the additional benefits under the headings:

a. Meeting customers' needs
b. Marketability and competitiveness
c. Profitability
d. Risk characteristics

[13]

PLEASE TURN OVER

QUESTION 8

Bharata is a developing country with a large population spread across a number of districts, each with a mix of rural and urban areas. The majority of the large low-income workforce belongs to either urban industrial cooperatives or rural agricultural cooperatives. Members of these cooperatives have traditionally had limited access to financial services.

Ten years ago, Bharata's government began to sponsor a National Insurance Scheme (NIS) that provides death cover for members of the urban cooperatives on a compulsory basis. The benefit amount is a fixed amount of $10 000 in local currency, which is in the region of twice the average annual income of the low-income population in the country.

Every year, Bharata's insurers are invited to tender to be the insurance provider in a specific district or districts. Insurers quote a premium rate per district, priced on a single rate per member basis, in their tender. The business is awarded, on a district-by-district basis, to the insurer with the lowest quoted premium for that district. The successful insurer for each district is then responsible for paying all the claims related to the scheme for that district in return for the premium, which is fully paid by the government.

From next year, the NIS will be extending its coverage to provide compulsory death cover to members of the rural cooperatives at the same level as the cover currently provided to members of the urban cooperatives.

Insurers licensed in the country have been invited to tender on the provision of insurance cover to the NIS for the following year. As usual, insurers are required to quote premiums per district on a single rate per member basis, irrespective of the age or sex of the member or type of cooperative.

A large insurer that has provided death cover for urban cooperatives under the NIS in the past, is planning to tender on the provision of insurance to the NIS in respect of all districts covered by the scheme.

i. Explain how the insurer would determine the assumptions for the mortality rates and expense loadings to be used in the pricing basis to determine the premiums for the scheme in respect of the individual districts for the coming year. (An explanation of how to carry out experience investigations is not required.)
[7]

ii. Describe the mortality and expense risks associated with this product, faced by the insurer.
[6]

iii. Suggest how the insurer could manage the mortality and expense risks associated with this product.
[4]

[Total 17]

END OF PAPER

