EXAMINATION

30 May 2013 (am)

Subject F102 — *Life Insurance*
Fellowship Principles

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Use the instructions and password provided at the examination center to log in.*

2. *Submit your answers in Word format only using the template provided.*

3. *Save your work regularly throughout the examination on the supplied computers' hard drive.*

4. *You have 15 minutes at the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made.*
   You then have three hours to complete the paper.

5. *You must not start typing your answers until instructed to do so by the supervisor.*

6. *Mark allocations are shown in brackets on exam papers.*

7. *Attempt all eight (8) questions, beginning your answer to each question <u>on a new page</u>.*

8. *Candidates should show calculations where this is appropriate.*

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.

AT THE END OF THE EXAMINATION

Save your answers on the hard drive AND hand in this question paper.

In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator from the approved

 © Actuarial Society of South Africa

QUESTION 1

A life insurance company has a small closed book of business consisting of conventional without-profits endowment assurance policies. The assets backing this business are predominately fixed income in nature but also include some equities.

i. Outline the factors you would consider in assessing the appropriateness of the current investment strategy for this business.

[7]

ii. Outline the modeling process you would use to establish the extent of matching between assets and liabilities.

[3]
[Total 10]

QUESTION 2

You are the product development actuary of a life insurance company which is about to launch a new without-profits term assurance product. The final issues to be dealt with are the reinsurance and the underwriting of the product.

i. List the factors you would need to consider in setting the retention limits for this new product.

[5]

The marketing director has suggested that medical tests should not form part of the underwriting process because people dislike going for medicals.

ii. Suggest at least four ways in which you could design, underwrite and price the product in order to reduce the risks associated with not using medical tests, outlining briefly any problems associated with each suggestion.

[6]
[Total 11]

QUESTION 3

The statutory valuation of a book of life annuities in payment to retirees has shown that a loss has arisen over the valuation period.

i. Discuss the major possible reasons for a loss having arisen, on the valuation basis, over the period.

[5]

ii. Suggest steps that may be taken in response to the loss arising, explaining how each might affect the embedded value of the book of annuities.

[7]
[Total 12]

PLEASE TURN OVER

 © Actuarial Society of South Africa

QUESTION 4

You are an actuary working for a niche insurer specialising in critical illness products. Recently, the life assurance industry has been moving towards standardising the claim qualification criteria for the major causes of critical illness claims (i.e. heart attack, stroke, cancer and coronary artery bypass surgery claims). Up to now, the only product sold by your company has been a simple stand-alone critical illness product that covers the four conditions above without any tiered benefits. You are instructed to start work on a new stand-alone critical illness product that only covers these four conditions, but includes three levels of tiered benefits.

i. Outline the advantages of this standardising of claim criteria across the industry.

[4]

ii. Discuss how the product design and pricing requirements differ between the new and existing product.

[5]

iii. Comment on the merits of the statement that tiered critical illness products would always be cheaper than non-tiered products.

[2]

[Total 11]

QUESTION 5

A proprietary South African life insurer sells a range of conventional ("additions to benefits") with-profits products. Shareholders receive 10% of all bonuses declared by the company. Recent returns have been poor on the with-profits funds due to a global recession and interest rates in the market are at an all-time low. The statutory actuary has, however, been conservative in the past years by declaring low reversionary bonuses. Historically surplus has been mainly distributed through the terminal bonus. The with-profits funds have thus remained with strong free asset positions.

In performing the recent valuation an error is discovered in the way in which the asset shares have been calculated historically. As a result of this data error, the asset shares have been significantly overstated. The error is rectified and a large portion of the free assets have been eliminated as a result of the error.

i. Describe how asset shares should be calculated.

[3]

ii. Describe the different ways in which bonuses can be declared under the conventional "additions to benefits" method and which sources of surplus are best distributed by each type of bonus.

[3]

After informing the necessary stakeholders of the impact of the error, the statutory actuary requests a change in the bonus strategy of the company.

iii. Discuss the likely impact on policyholders and shareholders of adopting each of the following strategies:
   a. Declaring lower reversionary bonuses for the next few years.
   b. Decreasing the terminal bonuses.

[8]

[Total 14]

PLEASE TURN OVER

© Actuarial Society of South Africa

QUESTION 6

You are the valuation actuary for a life company that has seen strong growth in its sales of without-profits term assurances.

You are about to perform the annual statutory valuation, which is done using a gross premium valuation method.

i. Explain how an analysis of surplus might be used to check your data.

[4]

ii. Outline how the assumptions used in the statutory valuation basis might compare to those in the pricing basis, and identify the elements of the pricing basis that would not normally be part of the supervisory valuation basis.

[7]
[Total 11]

QUESTION 7

A life insurance company is considering the alteration basis it should use for its without-profits endowment assurance business.

i. When setting a surrender value basis, explain how the relationship between:

- the prospective reserve using the original pricing basis;
- the prospective reserve using a realistic basis; and
- the earned asset share

will give an indication of the profit extracted on the surrender.

[5]

It is proposed that if a policyholder wishes to reduce the sum assured on this product, a revised premium will be calculated as follows:

A premium will be calculated on the current premium basis for the new sum assured, but then reduced by an amount equivalent to the surrender value, if any, of the original product spread over the remaining premium payment period (using the original pricing basis).

The surrender value is:

- zero at early policy durations, and
- equal to the prospective reserve on the pricing basis of the original product, when this value is positive.

ii. Discuss the suitability of this proposal.

[7]
[Total 12]

PLEASE TURN OVER

© Actuarial Society of South Africa

QUESTION 8

A small, recently-established proprietary life office intends to launch ten-year unit-linked endowment assurance policies which provide the following benefits:

- A guaranteed sum assured (or the bid value of the unit fund, if higher) payable on the first of death, maturity or the diagnosis of one of a stated list of critical illnesses.
- The bid value of the unit fund less a penalty, payable on surrender.

Premiums and charges operate as follows:

- Level monthly premiums will be payable throughout.
- The first year's premiums will be allocated to buying capital units (with an annual management charge of 6%), with subsequent premiums buying accumulation units (with an annual management charge of 1%).
- The only other charges on the policy are to be the monthly risk benefit charges, which will be based on the sum at risk each month and will be deducted from the unit fund.
- The level of the risk benefit charges is not guaranteed beyond the first year.

i. List the policyholder needs which could be met by such a policy.

[3]

ii. Outline briefly the risks accepted by policyholders who take out this policy.

[4]

iii. Outline the risks faced by the company in respect of:
   a. morbidity; and
   b. expenses.

[8]

iv. State the four main factors which affect the capital requirements of a policy, and comment, under each of these factors, on the capital requirements for the above policy relative to those for an annual premium conventional without-profits policy providing comparable risk cover.

[4]

[Total 19]

END OF PAPER

 © Actuarial Society of South Africa