

# EXAMINATION

*4 November 2013 (am)*

## **Subject F101 — *Health & Care* 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 seven (7) questions, beginning your answer to each question on a new page.*
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.*

<p><i>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</i></p>
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## QUESTION 1

You are the pricing actuary for a small health insurer that sells only short-term medical cover. You currently use a formula approach to pricing.

- i. Evaluate the drawbacks of using a formula approach to pricing in the context of short-term medical cover. [6]

The board of directors has requested a 10-year projection of the insurer's solvency position. You argue that there is no point in doing a long-term projection as future profitability and pricing are heavily dependent on changes in the external environment.

- ii. State the purpose of a solvency capital requirement. [1]
- iii. Explain how a long-term cash flow projection can be used to aid decision making, noting the main areas where it might be useful. [4]
- iv. Describe the typical components of a full-model office for an insurer. [8]
- v. Discuss how future uncertainty can be accommodated in the long-term projection. [3]

[Total 22]

## QUESTION 2

A long term insurance company writing long-term care business is about to calculate its supervisory reserves for pre-funded products using a gross premium valuation method.

- i. State the principles that should be used and the main areas to be addressed when setting the reserving basis for each of the following:
  - a. Valuation interest rate
  - b. Mortality
  - c. Morbidity
  - d. Expenses [12]
- ii. Explain how this basis might relate to that used to price the product. [2]

[Total 14]

**PLEASE REMEMBER TO SAVE**

### QUESTION 3

An insurer sells critical illness cover, long-term care insurance and annually-renewable indemnity medical insurance in a market where the prices for medical goods and services are unregulated.

- i. Outline the key reasons that the prices for medical goods and services are regulated in many countries. [3]
- ii. Compare the risks, arising from unregulated prices, faced by the insurer in pricing each of these health insurance products. [3]
- iii. Discuss possible risk management measures that could be put in place for the PMI product. [4]

[Total 10]

### QUESTION 4

The insurance regulator in an emerging market country has asked you to advise them on regulating the private medical insurance (PMI) market. In particular, the regulator is concerned that insurers are not holding appropriate assets to cover their medical expense risks.

- i. Outline the factors that should be taken into account in assessing the appropriateness of assets for matching PMI products. [4]
- ii. Describe the factors you would consider in developing recommendations for investment regulations. [6]
- iii. Compare and contrast admissible assets and allowable assets. [2]
- iv. Discuss the advantages and disadvantages setting regulations on an admissible asset or allowable asset basis. [4]

[Total 16]

### QUESTION 5

Five years ago you were responsible for pricing a brand new private medical insurance (PMI) product that your company was introducing to the local health market. In light of the heavy losses suffered on the product, the CEO has asked you to carry out an investigation into the differences between the actual claims experience to that used in your pricing basis. Your results reveal a startling difference.

Describe eight possible reasons for the observed difference.

[Total 8]

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## QUESTION 6

You are given the following (per annum) hospital admission rates per age group for a comprehensive private medical insurance product based on the insurer's own data.

Age group	Length of Stay (days)				
	1	2	3	4	5+ (average 7)
21-40	0,08	0,03	0,02	0,01	0,01
41-60	0,12	0,04	0,02	0,01	0,01
60+	0,14	0,06	0,03	0,01	0,01

You have the following additional information:

- Costs for the insurer are made up of hospital costs (for example, ward fees and theatre fees) and medical specialist costs (for example, the medical specialists time);
  - The average hospital cost of the first day in hospital is expected to be R8500;
  - The average hospital cost of per subsequent day in hospital is expected to be R4000;
  - For surgical admissions the cost of specialist and related costs is 40% of hospital costs;
  - For medical admissions the cost of specialist and related costs is 20% of hospital costs; and
  - 60% of admissions are surgical admissions.
- i. Calculate the average cost of annual hospital cover for the age group 41 to 60. [3]
- ii. Outline the additional data requirements that would make rating more accurate. [3]
- iii. Use the data above to calculate the annual cost of cover for a R500 per day stated benefit cover with a 2 day waiting period for each of the age groups. In cases where the waiting period is exceeded cover applies from the first day. [3]
- iv. Explain whether you would use this calculated cost of cover in pricing this benefit. [2]

[Total 11]

**PLEASE REMEMBER TO SAVE**

## QUESTION 7

A major international reinsurer has just published a report on worldwide trends in critical illness (CI) products. The following have been identified in the report:

- A move toward standardised definitions of conditions;
  - An increase in products that offer reinstatement of critical illness cover, with conditions related to prior events being excluded;
  - Wide variations in the number of conditions covered by policies, ranging from single condition policies (for example, breast cancer) to products covering more than 100 conditions; and
  - An increase in the use of tele-underwriting (underwriting is conducted via a telephonic interview instead of the completion of a form or series of forms).
- i. Describe the implications of standardised definitions for policyholders and for insurers. [4]
  - ii. Explain the increased popularity of critical illness products that offer reinstatement of cover. [2]
  - iii. Outline the modelling difficulties that arise in pricing a CI product with reinstatements, particularly where conditions related to prior events are excluded. [3]
  - iv. List the main distribution channels for CI products. [2]
  - v. Explain how the number of conditions covered would influence the choice of distribution channel for a CI product. [4]
  - vi. Discuss how you would decide whether to implement tele-underwriting or not. [4]
- [Total 19]

**END OF PAPER**