

# EXAMINATION

*10 June 2011 (am)*

## **Subject F103 — *General Insurance* Fellowship Principles**

*Time allowed: Three hours*

### **INSTRUCTIONS TO THE CANDIDATE**

1. *Enter all the candidate and examination details as requested on the front of EACH OF your answer booklets.*
2. *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.*
3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all eight (8) questions, beginning your answer to each question IN A SEPARATE BOOKLET.*
6. *Candidates should show calculations where this is appropriate.*

### **AT THE END OF THE EXAMINATION**

*Hand in your answer booklets, with any additional sheets firmly attached to the correct booklet, AND 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 list.*

## QUESTION 1

Company X, a general insurance company which writes only Commercial Fire business on large properties, is considering implementing one of the following two reinsurance programmes (the reinsurance arrangements in each programme operate in the order given):

### *Programme 1:*

- 25% Quota Share treaty with Company A.
- Individual Risk Excess of Loss with Company B, which covers 80% of the losses in the layer: \$150 million XS \$100 million.

### *Programme 2:*

- Surplus with Company C, with a maximum surplus retention of \$200 million (based on EML) and with 9 lines.  
The treaty stipulates that for a risk to be placed on the treaty Company X must retain an EML of at least \$50 million of that risk.

Subject to the above Company X selects its surplus retention on each risk depending on the Risk Category into which the underwriter places the risk, as follows:

<u>Risk Category</u>	<u>Policy regarding Retention</u>
I	Retain as much as possible.
II	Retain as little as possible.

In the previous year Company X agreed the following claims:

<u>Claim</u>	<u>Risk Cat.</u>	<u>Sum Insured</u>	<u>EML</u>	<u>Claim Amount</u>
1	I	\$ 450 m	\$ 150 m	\$ 120 m
2	I	\$ 800 m	\$ 300 m	\$ 300 m
3	II	\$ 800 m	\$ 600 m	\$ 400 m
4	II	\$ 600 m	\$ 400 m	\$ 320 m

- Define what is meant by "EML". [1]
- Explain how a reinsurer is likely to react to the situation where several claims on a reinsurance treaty have arisen which exceed the EML. [2]
- Outline briefly reasons why an insurance company may elect to retain a smaller portion of certain risks than others on a surplus treaty. [1]

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- iv. Determine the recovery Company X could have made had Programme 1 been in place the previous year. [4]
  - v. Determine the recovery Company X could have made had Programme 2 (and not Programme 1) been in place the previous year. [4]
  - vi. Outline the other factors which Company X should consider when determining an appropriate reinsurance programme. [5]
- [Total 17]

## QUESTION 2

You are the actuary for a recently established and rapidly growing general insurer which writes only motor insurance business. The assets of the company consist entirely of cash.

- i. Outline briefly the various areas of risk and uncertainty in respect of investments faced by the company. [5]
  - ii. Discuss the appropriateness of the investments currently held. [5]
  - iii. List the data, assumptions and other items that would be required to build a model for determining a suitable investment strategy for the insurer. [6]
  - iv. Outline briefly two methods that could be used by the insurer to calculate unearned premium reserves, and explain which would be preferable for this insurer. [4]
- [Total 20]

## QUESTION 3

Describe three ways in which general insurers can group claims data into cohorts of common origin for the purpose of claims analysis and projection. For each method you should also indicate any advantage(s)/disadvantage(s) as well as how IBNR claims are treated.

[8]

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## QUESTION 4

Claims occur on a portfolio of insurance policies according to a Poisson process with parameter  $\lambda$ . Claim amounts  $X$  in '000s of Rands are independently and uniformly distributed on the interval  $(0,250)$ , that is  $X \sim U(0,250)$ . The insurer's premium loading factor is 10%. Excess of loss reinsurance is effected with an excess point (retention limit) of  $M < 250$ . The reinsurer's loading factor is 15%.

- i. Develop an expression for finding the net of reinsurance adjustment coefficient  $R$ , explaining carefully each step in your derivation.

[7]

- ii. Explain briefly, and without calculation, how you would choose an optimal value of  $M$ .

[2]

[Total 9]

## QUESTION 5

- i. Define the terms "deductible" and "excess", highlighting the primary difference between them.

[3]

- ii. For a policy with sum insured  $S$ , on which a loss of  $L$  that exceeds  $S$  is suffered, state the amount of the loss that will be borne by the insured if:

- a. the policy is subject to a deductible of  $D$ ;  
b. the policy is subject to an excess of  $E$ .

[2]

- iii. Define the term "average" (as used in non-marine insurance).

[2]

[Total 7]

## QUESTION 6

A recent survey published by the regulator in the territory where you work suggests that approximately 25% of all claims lodged in the market are fraudulent.

You are an actuary working for a medium-sized insurer writing multiple lines of business. You have been asked to prepare a presentation on the steps that your company could take in order to reduce the number of fraudulent claims that it pays out on.

Outline briefly the various suggestions you would make.

[10]

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## QUESTION 7

You are the pricing actuary for a large general insurance company that is in the process of reviewing its premium rates. Over the past few years the company has spent a huge amount on its IT system and the database used to store both claims and policy information and thus does not expect to be missing any data required to analyse the experience of a particular risk group.

Outline why it may be necessary to make adjustments to the base data before it can be used in a rating exercise, and describe the adjustments that may be required.

[15]

## QUESTION 8

A farmer has recently bought an olive tree farm. He has no prior experience of this particular type of farming. He decides to take out insurance to protect himself against all major insurable risks in respect of the olive tree farm.

- i. Describe six types of insurance products the farmer may need and list the main perils covered by each product.
- ii. List four rating factors you would expect to be used in premium rating each insurance product identified in part (i).

[8]

[6]

[Total 14]

**END OF PAPER**