

# EXAMINATION

29 May 2017 (am)

## Subject F103 — *General Insurance* Fellowship Principles

*Time allowed: 3 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 seven (7) 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.*

<p><i>In addition to this paper you should have available the 2002 edition of the <i>Formulae and Tables</i> and your own electronic calculator from the approved list.</i></p>
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## QUESTION 1

- i. Define the following terms associated with reinsurance, identifying for each the type(s) of reinsurance with which they are commonly associated:
- Commutation; and
  - Reinstatement premium.

[3]

Company X, a general insurer, writes commercial property insurance. It has in place the following reinsurance arrangements, which operate in the order given below:

- Surplus with Reinsurer A, having 4 lines.  
The maximum retention limit is R75m (based on Expected Maximum Loss (EML)).
- Risk Excess of Loss with Reinsurer B, providing cover of 80% of losses in the layer R130m in excess of R70m.  
The reinsurance premium for each policy on this element of the cover is set at 1% of the potential maximum recovery from Reinsurer B.

You have been provided with the following information:

Policy	Sum Insured	EML	Surplus Retention	Claim Amount	Premiums		
					Received by X	Paid to A	Paid to B
1	R160m	R100m	maximum permitted	0	R2m	(a)	(b)
2	(d)	R200m	minimum permitted	R100m	R15m	(c)	R1m

- ii. Determine the amounts (a) – (d) in the above table.

[5]

[Total 8]

## QUESTION 2

An insurer operating in a particular country sells both credit and creditor insurance. The company is reviewing its investment strategy.

- Describe the cover provided by credit and creditor insurance. [5]
- By describing the characteristics of creditor insurance liabilities, outline suitable matching assets. [7]
- Outline briefly 8 other key considerations in reviewing the investment strategy. [4]

[Total 16]

**PLEASE TURN OVER**

### QUESTION 3

A reinsurance company is quoting on a large book of commercial motor insurance policies. As part of the tender process, the reinsurance company has been provided with the past 10 years of exposure and claims data on the book of business.

- i. Explain why adjustments may need to be made to the past data by the reinsurer when pricing. [2]
  - ii. List 6 examples of time delays which could require adjustments to be made to past data. [3]
  - iii. List 4 reasons why there may be changes in the risk and/or cover provided over time, and for each outline how these changes can be dealt with in the reinsurance pricing exercise. [8]
- [Total 13]

### QUESTION 4

You are undertaking an actuarial claims investigation for the following portfolios of Insurer A:

Year	Portfolio A			Portfolio B		
	Premium	Ultimate Claims (x)	x - average	Premium	Ultimate Claims (x)	x - average
2006	100,000	61,000	-3,400	50,000	11,240	-20,816
2007	100,000	68,576	4,176	50,000	15,000	-17,056
2008	100,000	63,568	-832	50,000	82,000	49,944
2009	100,000	65,253	853	50,000	-	-32,056
2010	100,000	72,586	8,186	50,000	-	-32,056
2011	100,000	62,448	-1,952	50,000	11,321	-20,735
2012	100,000	61,558	-2,842	50,000	32,000	-56
2013	100,000	64,087	-313	50,000	-	-32,056
2014	100,000	61,658	-2,742	50,000	144,000	111,944
2015	100,000	63,267	-1,133	50,000	25,000	-7,056
Average	100,000	64,400		50,000	32,056	

- i. Define and determine the following insurance risk metrics for each portfolio:
    - a. Sample standard deviation of ultimate claims;
    - b. 1-in-10 year value at risk;
    - c. 90<sup>th</sup> percentile of ultimate claims; and
    - d. Largest insurance loss over the period.

[6]
  - ii. Identify, with justification, the portfolio which you believe to be the riskier from the insurer's perspective. [2]
- [Total 8]

**PLEASE TURN OVER**

## QUESTION 5

You are performing an independent review of the claims reserves as at 31 December 2016 for a selected number of classes of business as part of the year-end audit. So far you have gathered the following information on the selected classes of business.

Motor	<ul style="list-style-type: none"> <li>This is an established class of business with a credible history of claims data consisting of personal and commercial business.</li> <li>There were significant floods in the third and fourth quarters of the latest financial year. This has affected a number of reinsurers and there is some concern over reinsurer default.</li> <li>The case estimation philosophy was adjusted in the middle of 2014 to move closer to a best estimate basis.</li> <li>At the beginning of 2014 the company outsourced the management of salvages &amp; recoveries, significantly reducing the delay of settlement for salvages &amp; recoveries.</li> </ul>
Commercial Liability	<ul style="list-style-type: none"> <li>This is an established class of business with a credible history of claims data, consisting primarily of Employers' Liability and Product Liability written on a losses-occurring and claims-made basis respectively.</li> <li>There has been a sudden surge in court award inflation over the past two years.</li> </ul>
Marine	<ul style="list-style-type: none"> <li>This is a new class of business, for which there is limited claims history available, consisting of Marine Hull and Marine Liability insurance.</li> <li>You have been provided with the pricing loss ratios, however the actual claims experience in each of the last two underwriting years has turned out to be worse than assumed in the pricing basis.</li> </ul>

As part of the review you will be calculating independent estimates of the booked claims reserves for each class being reviewed. The company's policy is to book claims reserves at the 75<sup>th</sup> percentile of the claims reserve distribution for published reporting purposes.

- i. Outline 3 different ways that claims cohorts can be grouped for the purpose of projecting the claims run-off. [3]
  - ii. Describe, with reasons, actuarial reserving methodologies that would be appropriate to use for the calculation of a best estimate claims reserve for each class of business being reviewed. You should also consider any issues, relating to your selected methodologies, which may arise given the information provided, and how these issues could be addressed. [10]
  - iii. Outline 3 other key issues/considerations that you should take into account when calculating the booked claims reserves. [3]
- [Total 16]

**PLEASE TURN OVER**

## QUESTION 6

A well-established general insurance company writes a wide range of classes of business.

- i. Outline 3 reasons why capital allocation is desirable for this company. [3]
- ii. Describe the main drawback of the marginal capital method of allocation and outline how the Shapley method overcomes this drawback. [5]

The company has a functioning internal capital model, but with simplified assumptions for modelling catastrophe risk. The company would now like to model catastrophe risk in more detail.

- iii. Describe the process the company may follow in modelling earthquake risk on the commercial property book of business, outlining key considerations in the process. For each commercial property risk, the postal code and EML is available. [8]

[Total 16]

## QUESTION 7

A new insurer in a particular country, established through private capital, has chosen to specialise in offering insurance cover for rare vehicles, including vehicles manufactured in low numbers for specific purposes and vintage/collector vehicles from a variety of countries.

- i. Suggest, with reasons, the distribution channels that the insurer may use for this product. [4]
- ii. Discuss the insurability of such risks, and where appropriate suggest ways to improve the insurability. [9]

After two years of operation the company's actuary has completed the development of an internal capital model and has discovered that the company's available capital is marginally above the minimum capital requirement set by the regulator.

- iii. Outline briefly the factors the company should consider when deciding how much free capital it should hold. [4]
- iv. Outline 6 ways the insurer could, in the near future, increase the ratio of available capital to the minimum capital requirement. [6]

[Total 23]

**END OF PAPER**