INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

18 April 2013 (am)

Subject ST7 – General Insurance: Reserving and Capital Modelling Specialist Technical

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*

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 questions, beginning your answer to each question on a separate sheet.*

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

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, 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.

1 A general insurance company writes personal lines home insurance business. As the result of a review of its claims experience the company concluded that, for business written at the current premium rate, the combined ratio was 111%. It therefore increased all its rates by 20%, effective for all business written from 1 September, to target a 92.5% expected combined ratio. In the 3rd quarter £150m was written at the old rates and £50m at the new rates. The premiums written each quarter were:

Q1 £200m
Q2 £220m
Q3 £200m
Q4 £200m

(i) Calculate the UPR and estimate the AURR as at the end of the year (ignoring DAC), stating any assumptions made. [8]

(ii) Give reasons why the 92.5% expected combined ratio may not be appropriate. [4]

[Total 12]

2 A general insurance company with a stable portfolio of business has had moderate growth in recent years. The accounts for the financial year ending 31 December 2013 are forecast to be as follows:

	£'000s
Written Premium	4,000
Underwriting Profit	50
Investment Income on Technical Reserves	10
Insurance Profit	60
Free Reserves at 31 December 2013	1,000

The company invests its free reserves in short-term deposits which yield 2.5% per annum on the average of the free reserves at the beginning and end of the financial year. The company pays no dividends or taxes. The company is considering a policy of significant expansion and wants to know how this might affect its financial position. It is assuming that the present rate of insurance profit, as a percentage of written premium, and of investment return, will continue in each future financial year.

(i) Calculate the projected return on average capital employed for the year ending 31 December 2013. [3]

(ii) Calculate the maximum rate of growth that the company can sustain without weakening its solvency margin (as a percentage of written premium). [1]

From 1 January 2014 the company is planning to increase its written premium at the rate of 25% per annum for the next few years.

(iii) Project the company's solvency ratio over the period to end 2015. [3]

(iv) Comment on the expected solvency ratios of the company over the period to end 2015 [1]

(v) Calculate the ultimate solvency ratio of the company if the business continues to expand at this rate for many years. [2]

[Total 10]

3 (i) Describe VaR in the context of general insurance. [2]

A general insurance company is diversified by writing property business in a large number of different territories with around 25% of premium in each of the UK, California and Japan. Because the company considers its business to be well diversified, the only reinsurance purchased is quota share. The company's current net written premium income is £100 million. Over the past 10 years the combined ratio has been as follows:

Year	*Combined Ratio* (x)
1	85%
2	92%
3	87%
4	88%
5	93%
6	89%
7	94%
8	95%
9	101%
10	98%

It has been suggested that the theoretical capital the company requires at the 99.5% confidence level is as follows:

$$\mu = \frac{\sum x}{10} = 92.20\% \qquad \sigma = \sqrt{\frac{\sum (x-\mu)^2}{10}} = 4.79\%$$

Capital = $2.807 \times 0.0479 \times$ £100m = £13.4 million

(ii) Explain why this answer is likely to be misleading. [7]

[Total 9]

4 (i) Explain how an insurer may generate a reserve range by bootstrapping the Over-Dispersed Poisson (ODP) model. [6]

The company wishes to use the output in its capital model.

(ii) Outline the methods the insurer could use to allow for diversification between reserving and underwriting risk. [4]

[Total 10]

5 As part of a new regulatory framework, a motor insurer is required for the first time to estimate reserves on a discounted basis.

(i) Outline the issues to be considered when determining appropriate discount rates. [3]

The following information has been provided for a particular sub-class of business:

Held reserves as at 31/12/2012

Underwriting year	*Outstanding reported claims (£m)*	*IBNR (£m)*
2009	85.0	44.5
2010	145.0	70.5
2011	150.0	156.0
2012	80.0	322.5

Actuarial development profiles

Annual period	*0–1*	*1–2*	*2–3*	*3–4*	*4–5*	*5–6*	*6–7*
Paid link ratios	5.000	2.165	2.825	1.825	1.285	1.095	1.000
Incurred link ratios	6.000	2.569	1.432	1.210	1.095	1.015	1.000

The company has agreed to use a discount rate of 4% per annum.

(ii) Show that the discounted value for the reserves as at 31/12/2012 is £957.9m, stating any necessary assumptions. [7]

(iii) Derive the discounted mean term to settlement for the 31/12/2012 reserves [2]

(iv) Suggest an investment strategy that may be an appropriate match for the insurer's liabilities. [3]

[Total 15]

6 (i) List the principal types of liability insurance. [2]

(ii) Describe the claim characteristics of liability insurance. [4]

In a particular jurisdiction, a type of liability insurance has traditionally been written on a losses occurring basis. Insurers now intend to change to a claims-made basis.

(iii) Discuss the problems that this transition may cause. [8]

[Total 14]

7 A medium-sized general insurance company that writes personal and commercial lines property and liability business has recently appointed a new claims manager. He has introduced new procedures and a new instruction manual for setting claims reserves on outstanding claims. These changes were introduced about three months before the end of the financial year. All case reserves that have been set since then have used the new procedures. Other case reserves are being revised in line with the new procedures and this process is expected to take about a year.

(i) Discuss the potential effects of this change on the actuarial reserving process at the end of the year and the likely effect on the results of the calculations. [3]

(ii) Suggest the steps that may be taken to keep the process as accurate as possible, both in the first and subsequent years, commenting on their potential effectiveness. [12]

[Total 15]

8 A small general insurance company writing property and liability business, although solvent, has recently stopped underwriting and entered run-off.

Discuss appropriate considerations that it should make in setting its investment policy, suggesting appropriate investment types. [15]

END OF PAPER