INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

24 September 2019 (am)

Subject SP7 – General Insurance Reserving and Capital Modelling Specialist Principles

Time allowed: Three hours and fifteen minutes

INSTRUCTIONS TO THE CANDIDATE

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

2. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*

3. *Mark allocations are shown in brackets.*

4. *Attempt all questions, begin your answer to each question on a new page.*

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

Graph paper is NOT required for this paper.

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 large European telecommunications company (Telco) is concerned about losses it may incur as a result of cyber risks and is considering purchasing insurance cover to protect itself from these risks.

(i) Outline four events that Telco may be concerned about insuring and coverage that a cyber insurance policy might provide in connection with these events. [4]

(ii) Comment on how the EU General Data Protection Regulation (GDPR) may factor into Telco's concerns. [1]

[Total 5]

2 (i) Define "Claims Made Policy" in the context of general insurance business written. [1]

An insurance company provides Industrial All Risks insurance coverage to its clients. It has purchased excess of loss (XOL) reinsurance cover to protect itself against any large losses. It has purchased the following XOL coverage, with the same level of retention, with the following reinsurers:

1/1/2015–31/12/2015: Reinsurer A
1/1/2016–31/12/2016: Reinsurer B
1/1/2017–31/12/2017: Reinsurer C
1/1/2018–31/12/2018: Reinsurer D

A two-year insurance policy was issued on 21 December 2015. A claim, in excess of the reinsurance retention, was reported on 5 January 2018 with a date of loss of 5 June 2017.

(ii) Determine which reinsurer is liable to pay for the loss if:

(a) all reinsurers provided the reinsurance cover on a Risk Attaching basis.
(b) Reinsurers A and B provided the reinsurance cover on a Losses Occurring basis and Reinsurers C and D provided the reinsurance cover on a Risk Attaching basis.

[4]

[Total 5]

3 (i) Describe the structure of the International Association of Insurance Supervisors (IAIS). [4]

(ii) State the objectives of the IAIS. [1]

[Total 5]

4 (i) Outline the risks covered by:

(a) Credit insurance
(b) Professional Indemnity insurance.

[4]

A Reserving Actuary works for a general insurance company who has been writing Credit insurance and Professional Indemnity insurance for five years.

(ii) Describe the key features of the insurance cover that the Reserving Actuary would need to consider when determining whether a tail factor might be required. [6]

[Total 10]

5 (i) List the key factors for a general insurance company to consider in determining the appropriate weighting of investments to different asset classes. [4]

A medium-sized general insurance company writes predominantly Household, Motor and Employers' Liability insurance in its domestic market.

(ii) Suggest, with reasons, what weighting of asset classes this insurer might choose for its asset portfolio. [4]

(iii) Outline how this investment strategy might change if the company goes into run-off. [4]

[Total 12]

6 You are validating a stochastic capital model for a company that writes mainly liability insurance.

(i) Describe sources of process uncertainty within the capital model. [8]

(ii) Describe ways of assessing the model on a quantitative basis. [4]

(iii) Discuss how processes and governance mitigate risk. [2]

(iv) Describe how documentation mitigates risk. [2]

(v) Justify why the selection of accounting basis may be important in a capital model. [3]

[Total 19]

7 For the past six years, Small Syndicates Limited (SSL) has written a variety of general insurance liability products, primarily Public Liability, Product Liability and Employer's Liability. A new Chief Actuary has joined SSL and, citing the volatile nature of the portfolio, has proposed using stochastic reserving techniques to the Board.

(i) Outline the uses of stochastic reserving in examining claims variability. [3]

The Chief Actuary wants to explore simulation-based stochastic reserving methods.

(ii) Describe three simulation methods that should be considered. [6]

For one of the products, the claims development triangle was bootstrapped five times to give the following estimate of reserves:

Simulation	*Reserve estimate*
1	100,000
2	90,000
3	110,000
4	95,000
5	105,000

The Chief Actuary wants to use a Lognormal distribution to estimate reserves at the 75th percentile level of the claims distribution. Assume that:

- the mean of the Lognormal distribution is the same as the average from the five simulations above; and
- the Lognormal distribution has a Coefficient of Variation of 20%.

(iii) (a) Show that mu (μ) = 11.4933 and sigma (σ) = 0.19804, where mu and sigma are the parameters of the Lognormal distribution. [4]

(b) Estimate reserves at the 75th percentile for this line of business. [2]

(iv) Suggest reasons why simulation-based stochastic reserving methods may not be suitable for the portfolio SSL writes. [4]

[Total 19]

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Question 8 begins on page 6

8 (i) Define the following terms:

(a) available capital
(b) regulatory capital
(c) economic capital
(d) required capital.

[4]

The table below shows the results of sensitivity testing on economic capital for three different companies. Each company focuses on only one type of insurance or reinsurance product.

Sensitivity test	***Change in capital required***		
	Company A	*Company B*	*Company C*
Increase attritional loss volatility by 10%	0%	3%	0.5%
Double attritional loss volatility	0%	4%	3%
Increase large loss frequency by 10%	0%	1%	9%
Increase large loss severity by 10%	0%	1%	6%
Increase expected natural catastrophe exposure by 10%	12.5%	6%	0%
Double the likelihood of counterparty defaults	0.5%	0%	0%

Each increase should be considered additive (not multiplicative) where relevant.

Each company consistently uses the following definitions:

- large losses are those that are at least \$1m to the original insured and are modelled on a loss rather than event basis.
- natural catastrophe losses are all losses attributable to a natural catastrophe event, regardless of size of the event or loss to the insurer/reinsurer.

(ii) Suggest, with reasons, what product each company may write, taking into consideration reinsurance and different types of losses. [10]

A Capital Actuary works for another company, Company D, that writes business in the UK, Europe and the US covering a combination of Movable Property, Extended Warranty and Property Business. The Capital Actuary has been asked to come up with a method to allocate capital.

(iii) Discuss the important factors the Capital Actuary will take into consideration in this exercise. [4]

Company D has decided to carry out an actuarial investigation to assess the appropriateness of its reinsurance programme, using its own capital model.

(iv) (a) Propose, with reasons, the investigations that Company D may wish to carry out. [5]

(b) Outline other uses of the capital model in the management of Company D. [2]

[Total 25]

END OF PAPER