INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

23 April 2021 (am)

Subject SP8 – General Insurance Pricing Specialist Principles

Time allowed: Three hours and fifteen minutes

In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator.

If you encounter any issues during the examination please contact the Assessment Team on T. 0044 (0) 1865 268 873.

1 (i) Suggest why the Chief Financial Officer of a listed company would have Directors' and Officers' (D&O) insurance. [3]

(ii) List the typical exclusions that a D&O policy would have in place. [4]

[Total 7]

2 (i) State the desirable qualities for a complement of credibility. [3]

For a particular class of business, the following information is available:

- Claim counts follow a Poisson distribution.
- Claim sizes follow a lognormal distribution with a coefficient of variance equal to 3.
- Claim sizes and claim counts are independent.
- Claims are all independent of each other.
- The number of claims in the first year was 1,000.
- The aggregate loss in the first year was \$6.75 million.
- The risk premium for the first year was \$5 million.
- The exposure in the second year is identical to the exposure in the first year.
- The full credibility standard is to be within 5% of the expected aggregate loss 95% of the time.

(ii) Calculate the credibility premium for aggregate claims for the second year. [4]

[Total 7]

3 (i) Compare direct and indirect expenses. [4]

(ii) Discuss how investment income is allowed for when setting the office premium. [4]

[Total 8]

4 Outline the approaches to pricing a stop loss contract. [8]

5 (i) List four perils that are modelled by a catastrophe model. [2]

An insurance company has been writing a large book of business across various classes for many years. A recent global pandemic in the previous year resulted in the company suffering huge losses. An Actuary has been asked to build a model to help the insurance company understand its exposure to such events in the future.

(ii) Describe the modules the Actuary may develop in a catastrophe model for pandemics. [8]

[Total 10]

6 An insurance company writes a large portfolio of construction risks in a central European country. The company has extracted the following windstorm losses observed over the past 10 years. The losses have been adjusted for changes in exposure and claims inflation.

Loss year	*Adjusted loss (€ million)*
2010	0.5
2011	0.1
2015	3.5

A windstorm catastrophe model was applied on the company's current portfolio resulting in the following occurrence exceedance probabilities:

Probability (%)	*Loss (€ million)*
0.1	9.0
0.2	7.0
0.4	6.0
0.5	5.0
1.0	4.0
2.0	2.5
4.0	1.8
10.0	0.7
20.0	0.3
Expected loss	0.35

(i) Comment on the catastrophe model results. [6]

An underwriter has suggested scaling the catastrophe model results to the company's business in a neighbouring country based on total exposures.

(ii) Discuss this approach for a small portfolio of construction risks in the neighbouring country. [4]

[Total 10]

7 A general insurance company writes personal lines household insurance. It captures property value (the amount the property would sell for on the market) and wants to use it as a rating factor. The pricing actuary has fitted two models, one which includes the property value factor (Model A), and one which does not include the property value factor (Model B). The two models are otherwise the same.

The modelling software has produced the following output:

	Model A	*Model B*
Fitted parameters	380	351
Deviance	307,394.0	307,431.3
Scale parameter	1.09395	
Akaike Information Criterion (AIC)	340,758.8	340,653.1

(i) State the number of levels in the property value factor. [1]

(ii) Describe how the deviance is an important measure in statistical modelling. [2]

(iii) Determine whether property value is a statistically significant factor. [5]

Property value does not directly measure the true risk that ultimately affects the claims cost of providing the household insurance.

(iv) Discuss the effectiveness of using property value as a proxy risk factor. [3]

[Total 11]

8 An online travel agency stores significant amounts of information, including customer details on its server. It is reviewing its insurance cover and the Risk Officer has suggested that cyber insurance should be purchased.

(i) Suggest why the travel agency may purchase cyber insurance. [4]

(ii) Outline the factors that an insurance company would take into account in assessing the risk premium for a company seeking cyber insurance cover. [5]

(iii) Outline the areas of uncertainty associated with deriving a risk premium for cyber insurance. [3]

[Total 12]

9 An insurance company has been provided with data relating to a global firm of architects. The firm is seeking a quotation for professional indemnity (PI) cover. In addition to the claims and turnover data below, the broker acting for the firm has made the insurance company aware of the following:

- The firm is opening two new offices and turnover is expected to grow by 5% next year.
- PI claims have inflated at 3% per annum over the period for which the data has been provided.
- In 2017 there was a large loss of $5million, and in 2019 a large loss of $4million.
- There are no excesses on the policy.

	Turnover ($ million)	*Claims incurred in year ($ million)*
2016	3,966	2.86
2017	4,150	8.04
2018	4,467	3.31
2019	5,701	7.43
2020	6,343	3.50

Age of claim (years)	*Proportion of incurred to ultimate (%)*
1	67
2	76
3	96
4 or more	100

(i) Estimate the risk premium for 2021 based on the data and information provided. [7]

(ii) Suggest further information the pricing actuary may request from the firm to refine the estimated risk premium. [3]

The insurance company uses the following basis to calculate the quoted premium:

Expenses	25% of expected loss cost
Capital required	72% of net premium
Required return on capital	12.5% of capital
Broker commission	20% of gross premium

(iii) Calculate the gross premium to be quoted by the insurance company, showing all workings and stating any assumptions you make. [3]

[Total 13]

10 An entrepreneur with experience in the insurance industry has recently set up a new specialty insurance company. The insurance market is currently in the soft stage of the underwriting cycle.

(i) Suggest why this entrepreneur would have launched a business in soft market conditions. [5]

The entrepreneur is considering setting up a separate company to insure the newly set up specialty insurance company.

(ii) Outline why the entrepreneur may choose to do this. [4]

The new specialty insurance company is using new technologies and innovations in a bid to gain competitive advantage.

(iii) Suggest how new technologies and innovations could be used to improve the combined loss ratio. [5]

[Total 14]

END OF PAPER