

INSTITUTE AND FACULTY OF ACTUARIES



EXAMINATION

19 September 2019 (pm)

Subject SP8 – General Insurance: Pricing 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** (i) Write down the key considerations when selecting an appropriate table of increased limit factors (ILFs). [3]

A pricing actuary has been provided with the following table of ILFs.

<i>Limit (€000)</i>	<i>ILF</i>
100	1.000
200	1.240
300	1.373
400	1.800
500	2.030
1,000	2.205
1,500	2.448
2,000	2.621
3,000	2.755

The pricing actuary has estimated the loss cost at the €100,000 limit to be €24,000.

- (ii) Calculate the loss cost to the layer €1,000,000 XS €1,000,000. [2]
[Total 5]

- 2** (i) Outline the advantages and disadvantages of annual mileage as a rating factor for private motor insurance. [3]

A general insurance company has been writing private motor business through brokers for several years. The sales director has proposed selling the product on price comparison websites, where customers complete applications on the website which generates several quotes from different insurance companies. The sales director has said that as the cover provided will be exactly the same, the premium quoted to customers will be the same whether they buy from a broker or via the price comparison website.

- (ii) Suggest reasons why the quotes from price comparison websites may not necessarily be the same as those from brokers. [5]
[Total 8]

- 3** A general insurance company that writes property business has used the same external flood catastrophe model for several years. The actuary who uses the model to determine the flood risk premium is considering replacing the model with one from another provider.

Outline the factors the actuary should consider when evaluating models from other providers. [8]

- 4** (i) Compare the two main forms of spatial smoothing. [5]

The sales manager at a personal lines insurance company has compared new business sales volumes against geographic rating area allocation over the previous month. The geographic rating area allocation separates the country into 20 levels and is used as a rating factor. The higher the rating area the greater the perceived risk.

The sales manager finds that the number of sales reduces as rating area increases, and has concluded that the rating area allocation is wrong.

- (ii) Discuss the conclusion that the sales manager has drawn. [3]
[Total 8]

- 5** (i) Describe the process of pricing surplus treaty reinsurance. [3]

An insurance company has entered into a surplus treaty arrangement which has ten lines and a maximum retention of £1,000,000 per line. The treaty is on a sum insured basis.

The insurance company insures a risk with sum insured of £20,000,000.

- (ii) Outline the options available to the insurance company for ceding this risk. [3]

Over the years, the reinsurer has observed that its loss ratio for policies ceded under the surplus treaty is much higher than the insurer's gross loss ratio.

- (iii) Suggest why this has happened. [1]

- (iv) Explain how the reinsurer can overcome this problem. [2]
[Total 9]

- 6 An actuary working for a reinsurance company is pricing a risk excess of loss treaty to cover an insurance company that writes commercial property business. The cedant has provided the following risk profile for its book of business in the form of a table of total original premiums by sum insured band.

<i>Sum insured band (\$000)</i>	<i>Original premium (\$000)</i>
0–50	22,500
50–100	2,000
100–200	2,500
200–300	750
300–400	300
400–500	200
500–750	100
750–1,000	400

The cedant has also advised that the original loss ratio is 55%, and that all figures have been adjusted for inflation trends.

The pricing actuary has selected the following exposure curve.

<i>Limit as a % of sum insured</i>	<i>% of loss cost relating to ground-up layer with given limit</i>
100	100
80	97
67	92
57	87
40	72
29	59
22	50
16	41
11	34

- (i) Calculate the loss cost rate for a \$400,000 XS \$100,000 treaty for the above book of business. [8]
- (ii) Discuss the assumptions required to calculate the loss cost rate in part (i). [3]
[Total 11]

- 7 (i) Define burning cost in the context of pricing. [1]

A reinsurance company uses the burning cost approach to price the following risk excess of loss contract:

Inception date	1 Jan 2020
Expiry date	31 Dec 2020
Limit	£500,000
Deductible	£1,000,000
Reinstatements	None

The cedant has provided details of individual ground-up claims from the past ten years with incurred amounts greater than £700,000 as follows:

<i>Loss year</i>	<i>Incurred claims</i>
2010	£880,000
2014	£720,000
2017	£1,400,000
2017	£900,000

Claims, on average, have been observed to inflate at 5% per annum. The reinsurer wishes to maintain a profit loading of 20% to account for cost of capital and other expenses.

- (ii) Calculate the rate on line the reinsurer should quote for this contract using the burning cost approach, stating any assumptions made. [7]
- (iii) Suggest why the premium rate calculated in part (ii) might be understated. [4]
- [Total 12]

8 An insurance company writes commercial insurance for motor fleets.

- (i) (a) List four data items the insurer should record in its policy system.
(b) Explain how each data item listed in (i)(a) may be useful in actuarial analysis. [6]
- (ii) (a) List four data items the insurer should record in its claims system.
(b) Explain how each data item listed in (ii)(a) may be useful in actuarial analysis. [6]
- [Total 12]

9 An insurance company writes both personal and commercial business. One of its property underwriters has received a proposal to cover a warehouse in a single location.

(i) Describe two possible exposure measures relating to this risk. [2]

(ii) Describe the challenges associated with using the exposure measures in part (i). [6]

The company has a set of underwriting guidelines in place. The underwriting guidelines outline the risk acceptance criteria that properties need to satisfy in order to be underwritten by the company.

The market is softening.

(iii) Describe the circumstances under which the underwriter may modify the risk acceptance criteria in a soft market. [3]

Due to the softening market, the insurance company is proposing to reduce its exposure in the property line of business.

(iv) Set out the key advantages and disadvantages of this proposal. [2]

[Total 13]

10 An actuary is carrying out a pricing exercise for private motor insurance. The actuary is building a generalised linear model (GLM) for third party property damage claim frequency which will be used to generate quotes.

- (i) List the likely sources of data that the actuary will use to build the model. [3]

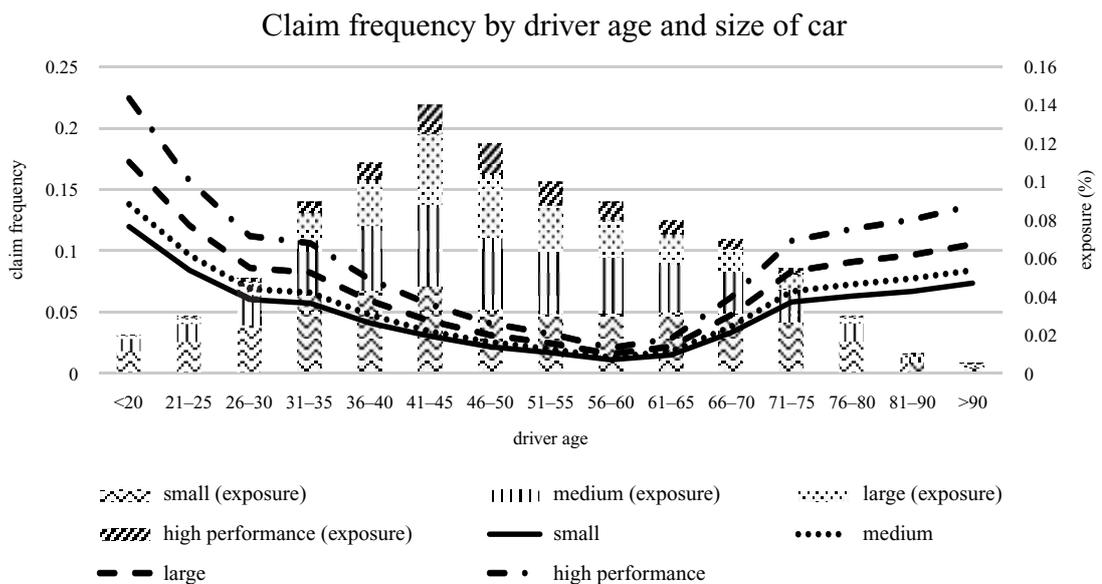
The actuary has obtained more than 200 factors that could be fitted in the GLM and believes it would be better to reduce the number of factors to a more manageable subset before attempting to fit the model.

- (ii) Outline what the actuary needs to consider in selecting a smaller number of factors. [5]

A colleague reviewing the model has suggested fitting interactions into the model.

- (iii) Explain what is meant by an interaction in this context. [1]

In the following chart, the lines show the predicted claim frequencies against driver age, for four different sizes of car, with the values of all other factors in the model being the same. The bars show the proportion of exposure within each size of car/driver age combination.



- (iv) Discuss whether the above chart indicates that an interaction exists between engine size and driver age. [5]

[Total 14]

END OF PAPER