INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

30 April 2014 (am)

Subject ST8 – General Insurance: Pricing
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 before 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 12 questions, beginning your answer to each question on a new page.

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.*

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1   In a pricing exercise many adjustments are required to the exposure and claims data from the base period to the period in which the rates will be in force.

State the causes of delays that could lead to adjustments being made.   [3]

2   Outline the regulatory restrictions that may be faced by a general insurance company, excluding those relating directly to investments.   [5]

3   The operator of a ski centre requires business interruption cover to insure against financial losses resulting from low numbers of visitors. The insurance policy will pay a fixed benefit if the number of visitors on any one day is lower than a predefined level.

Suggest terms and conditions that the insurer may include in the insurance contract to manage the cost of claims.   [4]

4   A reinsurance company is assessing the expected losses from a proposed inwards reinsurance treaty covering liability insurance.

The cedant has supplied the following information about the policies that it expects to write, summarised into bands of excesses and layer sizes.

Band	Excess (€m)	Size of layer (€m)	Written premium (€)	Expected loss ratio
A	1	1	37,000	40%
B	1	9	14,000	45%
C	10	5	48,100	35%
D	10	10	8,700	30%

The following increased limit factors (ILFs) are available.

Limit (€m)	ILF
1	1.000
2	1.585
3	1.992
4	2.298
5	2.539
10	3.263
15	3.635
20	3.863

The proposed reinsurance treaty covers 100% of total losses in the layer €10m in excess of €5m for each risk individually.

Calculate the cedant's expected recoveries under the treaty for each of Bands A to D, showing all workings.   [6]

5 A modelling exercise, using a large batch of travel insurance policies, has resulted in two generalised linear models being built to predict claims cost.

The following information and statistics have been produced for the two models:

	Model 1	Model 2
Factors included in model	Policyholder age	Policyholder age
	Number of travellers	Number of travellers
	Length of holiday	Length of holiday
		Country of destination
Deviance	365,128	362,144
Number of parameters	15	24
Number of observations	3,156,582	3,156,582
Akaike information criterion	365,158	362,192
Scale parameter	1.15567	1.15958

Explain, using the information in the table above, which model is preferred. [7]

6 A general insurance company underwrites two different household insurance products. One is only available in bank branches, and the other is only available over the telephone.

The product sold through bank branches includes additional policy sections, and provides more cover in all other policy sections, than the telephone product. After the initial sale the administration and claims processes are identical for the two products.

The Sales Director has obtained a quotation for each product on the same day using identical answers to the questions on the proposal. The price for the telephone product is higher than the price for the branch product, and the Sales Director wishes to know the reasons for this.

Describe the different types of investigation and analysis that should be carried out to answer the Sales Director's query. [8]

7 A general insurance company is considering changing the level of compulsory excess on the private motor insurance policy that it sells. The existing level of £250 has been in place since the policy was launched. A voluntary excess is not available on this policy.

(i) Outline the adjustments required to the insurer's data, in order to set the correct risk premiums for a new compulsory excess level of £300. [3]

(ii) Explain the difficulties that could arise in determining the risk premiums if the company instead reduces the excess to £200, suggesting how these difficulties may be overcome. [3]

[Total 6]

8 (i) Describe the main features of professional indemnity insurance. [5]

A general insurance company is assessing the premium for professional indemnity cover for one of its clients.

Analysis of past data shows that the compound frequency-severity loss distribution for a single employee has the following properties:

Mean   500
Standard deviation   200
Coefficient of skewness 2

(ii) Determine the parameters of the translated gamma distribution that should be used to approximate the compound distribution. [3]

The client has 40 employees. The insurance company prices the cover so that there is a 1% probability of claims exceeding the gross premium, assuming that losses for different employees are independent.

(iii) Calculate, using a Normal approximation to the compound distribution, the gross premium that the insurance company would quote. [3]

[Total 11]

9 (i) Outline the fundamental concepts of credibility theory. [3]

(ii) Outline the key differences between the Classical and Bayesian credibility models. [3]

(iii) State the principles that should be considered when choosing the complement of credibility. [6]

[Total 12]

10 The regulatory body of a developed insurance market is considering making flood insurance a compulsory component of household insurance policies for the first time.

(i) Suggest the data items that would be required by insurers operating in the market to price the claims risk of this component of the insurance contract. [4]

As a consequence of making flood insurance compulsory, it has been agreed that the government of the country will pay all flood claims from insured domestic properties that have been determined as being at an extreme risk of flooding.

To meet the cost of these claims, all insurers will pay a fixed levy into a central fund for each household insurance policy that they write, regardless of the insured property's level of flood risk.

(ii) Suggest the factors that the government will need to consider, in order to determine the amount of this levy. [6]

[Total 10]

11 A general insurance company uses a proprietary earthquake catastrophe model to price the earthquake element for commercial property. The model was last updated ten years ago.

    (i)   Suggest the features of the event, hazard and vulnerability modules of the catastrophe model that are likely to have become outdated since the last update.   [7]

The company receives an updated version of the earthquake catastrophe model.

    (ii)   Outline how the company should use the model to help to estimate the claims cost of the earthquake cover.   [5]
    [Total 12]

12 A general insurance company is planning to use a frequency/severity approach to price an all-risks policy that covers the sales outlets of a large retail group. The company has provided this insurance to the retail group for many years.

The following table shows an incomplete extract from the available data concerning the insured as at 1 March 2013. The data values are for illustration only.

Sales outlet Code	Policy year	Days on risk	Turnover (£)	Employees	Deductible (£)	Sum insured (£)	Policy limit for liability section (£)
…							
9001	2009	365	365,509	4	1,000	700,000	5m
9001	2010	365	367,881	4	1,200	840,000	10m
…							
9002	2012	181	436,000	6	2,000	1m	10m
…							

Outlet	Loss date	Claim status	Paid (£)	Outstanding case estimate (£)	Policy section
…					
9001	5/9/2009	Closed	93,008	0	Stock
…					
9002	21/1/2013	Open	3,000	2,000	Public liability
9002	20/2/2013	Open	0	Unknown	Employers' liability
…					

The policy will include an aggregate deductible and limit.

Describe, without performing any calculations, how the company should use the available data to build a frequency/severity model for the purpose of pricing. Details of how to carry out statistical tests are not required.   [16]

END OF PAPER