2010 Examinations

SPECIMEN EXAMINATION

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 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 (i) Explain briefly the two types of variable which GLMs require in order to be defined. [3]

(ii) Define the term categorical factor in the context of GLMs, giving an example. [3]

(iii) Explain the expression "interaction term" in the context of GLMs. [2]
[Total 8]

2 You are an actuary working for a newly established general insurance company. It commences writing household contents insurance on 1 September 2009 writing annual policies only. The company sells the following number of policies per month in 2009:

Month	*Policies sold*
September	1,000
October	1,500
November	2,000
December	2,500

(i) Describe the claims characteristics of household contents insurance. [4]

(ii) Calculate the average accident date for accidents occurring during 2009 by considering the company's exposure profile. Assume that policies incept on the first day of the month in which they are sold. State any other assumptions that you use. [4]
[Total 8]

3 Explain the five key modules of a catastrophe model. [10]

4 Discuss the key reasons for monitoring general insurance business written. [10]

5 For a number of years a reinsurer has written a working layer per event risk XL treaty with unlimited reinstatements. The cedant places this treaty to protect the liability element of a large book of private motor vehicle insurance. The reinsurer has recently introduced a stability clause and an aggregate deductible to the layer.

(i) Define each of these new features and explain the impact of their introduction on the expected cost of claims to the layer. [5]

(ii) State the advantages and disadvantages to both the reinsurer and the cedant of the addition of each of these new features to the layer. [6]
[Total 11]

6 You are the actuary of a large general insurance company. You have been asked to price a "cross-class" deal for a customer. The policy will cover the customer's motor fleet and public liability requirements. Another general insurance company has written the public liability cover in the past.

The proposed structure for the policy is as follows:

> Motor: the general insurance company will provide unlimited cover for any individual loss.
>
> Public liability: the limit of indemnity on any one individual loss is £250m.
>
> The customer retains a deductible of £0.5m on each and every loss for the complete programme subject to an annual aggregate deductible of £15m.

(i) Outline the concerns you would have with this proposed structure. [3]

The customer has provided you with a large database of their individual claims data, as well as relevant exposure measures, for the past 10 years.

(ii) Explain how you would calculate a risk premium for this product using the information on this database. [10]

[Total 13]

7 A motor underwriter has approached you for assistance with a new business premium quote on a fleet of 100 heavy goods vehicles commencing 1 January 2010. She has supplied you with the following unprojected historical claims data from the existing insurer as at 31 October 2009.

Incurred Claim amounts in £000's

Accident Year	*Own Damage Incurred Costs*	*Third Party Damage Incurred Costs*	*Third Party Personal Injury Incurred Costs*	*Earned Vehicle Years*
2005	44	30	55	80
2006	56	32	61	88
2007	42	35	51	90
2008	70	50	35	92
2009	40	30	20	98

The following additional information is available:

The prospective insured has always renewed the policy on 1 January each year.

Damage inflation has been 4% p.a. for many years.

Personal Injury inflation has been 7% p.a. in each of the calendar years 2005 to 2007, then 9% p.a. from calendar year 2008.

Incurred Claims as a percentage of Annual Ultimate Projected Claims are estimated from internal data to be:

	As at development month				
	10	22	34	46	58
Own Damage	70%	95%	105%	102%	100%
Third Party Damage	45%	80%	95%	100%	100%
Third Party Injury	30%	55%	75%	85%	95%

Commission is 15%. Expenses are £100 per policy, £10 per vehicle and 7% of claims costs. Insurance Premium Tax can be ignored.

Profit and contingency loading is 5% of the overall gross written premium.

(i) Estimate the annual premium to charge the prospective client, using the data provided, stating any assumptions you make. [11]

You have predicted that the average annual premium charged per vehicle during January 2010 on your company's existing account of 25,000 heavy goods vehicles will be £3,750. You decide to recalculate the premium using a credibility approach.

(ii) Recalculate the annual premium assuming you use a credibility factor for the fleet's own experience as:

$$Z = \text{minimum}\,(1, 1 - \sigma/\mu)$$

where

σ = the standard deviation of the yearly projected burning cost per vehicle observed from the five year data

μ = the average of the yearly projected burning cost per vehicle observed from the five year data [4]

(iii) Explain why the premium charged in practice may not equal the premiums calculated in parts (i) or (ii). [5]

[Total 20]

8 You are the actuary of a large general insurance company that only sells insurance to large international companies. The underwriters are considering entering the smaller end of the commercial market through the creation of a new product that covers the insurance needs of construction and engineering tradesmen who are either sole traders, partnerships or limited companies with up to five employees.

(i) Describe the distribution channels through which this new product could be sold. [8]

(ii) Compare the marketing methods in part (i) to those which would be used for the insurer's existing business. [2]

(iii) Describe the types of commercial insurance that these tradesmen may wish to purchase. [10]

[Total 20]

END OF PAPER