

INSTITUTE AND FACULTY OF ACTUARIES



EXAMINATION

21 April 2016 (pm)

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 10 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.

- 1**
- (i) Define the term “policy endorsement”. [1]
 - (ii) Write down four examples of a policy endorsement. [2]
- [Total 3]
- 2** Moral hazard is an important concept in general insurance.
- (i) Define the term “moral hazard”. [1]
 - (ii) Write down two distinct examples of how moral hazard might arise in commercial lines insurance contracts. [1]
 - (iii) Outline ways in which an insurance company could seek to reduce the risks of moral hazard. [2]
- [Total 4]
- 3** A commercial motor insurer has been insuring a large fleet of vehicles for a number of years. Recent experience has been poor and the policy has made significant losses. However, the policyholder does not want its insurance premium to increase.
- Suggest solutions the insurance company could propose in order to reduce the cost of claims. [6]
- 4**
- (i) Describe an Occurrence Exceedance Probability file and an Aggregate Exceedance Probability file as used in reinsurance pricing. [2]
 - (ii) Describe how these files can be used in the process of setting reinsurance rates. [4]
- [Total 6]
- 5** The Claims Director of a general insurance company has reviewed the output of the latest household insurance rating exercise. He has stated that the allowance made for claims inflation should not be necessary, due to the short period of time between receipt of premiums and payment of claims for this product.
- Discuss the Claims Director’s statement. [6]
- 6**
- (i) Describe the features of excess of loss reinsurance. [5]
 - (ii) Explain the term “working layer”. [2]
- A large shareholder-owned general insurance company writing multiple lines of business has been writing comprehensive motor insurance for a number of years.
- It currently has a risk excess of loss reinsurance programme in place with an attachment point of \$1m. The Finance Director has suggested increasing the attachment point to \$20m for all new motor business.
- (iii) Explain possible reasons for this suggestion. [5]
- [Total 12]

7 (i) Define the terms:

- (a) claim frequency
- (b) credibility

[1]

A general insurance company specialises in insuring fleets of motorcycles. Analysis of past performance of the account gives the following summary:

<i>Year</i>	<i>Exposure (Policy Years)</i>	<i>Number of Claims</i>
2010	55,505	8,420
2011	52,257	7,750
2012	54,928	8,450
2013	56,124	8,400
2014	55,053	8,060
2015	50,000 (estimate)	

The claim frequency of this portfolio of policies follows a Poisson process.

(ii) Calculate, showing all workings:

- (a) the mean claim frequency for the period 2010 to 2014
- (b) the probability of experiencing more than 7,600 claims in 2015, using a Normal approximation

[4]

A decision has been taken to start using a model based on classical credibility theory when pricing new fleets. The model applies a credibility factor to the past experience of the new fleet and the complement of credibility to the past experience of the existing portfolio.

The standard used by the insurance company for full credibility is to be within $\pm 5\%$ of the mean with probability 0.95.

(iii) Calculate, showing all workings, the number of claims that a new fleet would need to have experienced in order that credibility in excess of 75% would be assigned to its claim frequency. [5]

(iv) Suggest influences on the value of the complement of credibility, other than those relating to mathematical calculations of credibility factors. [2]

[Total 12]

8 A company owns and operates a fleet of cruise ships.

Outline:

- (a) four key types of general insurance products that the company may wish to purchase in relation to the running of its ships, and
- (b) the perils that are likely to be covered by each of these products. [12]

9 The Marketing Manager of a personal lines insurance company wants to understand how the difference between the premium offered at renewal and the premium paid last year affects the probability of renewal. She has taken all policies invited to renew over a four week period and divided them into ten groups according to the size of their renewal premium. She has found that the proportion of policies that renew increases with the size of renewal premium.

- (i) Assess the suitability of the Marketing Manager's analysis. [6]
- (ii) Describe a statistical approach that may be used to answer the Marketing Manager's query. [6]
- (iii) State the main uses of policy and claims data by a general insurance company, other than for marketing investigations. [3]

[Total 15]

10 (i) Describe the considerations required when splitting data into risk cells for the purpose of determining the pure risk premium. [5]

A general insurance company that writes personal lines motor and household business currently uses four rating areas. The four areas correspond to divisions of the country into: inner cities, city suburbs, towns or villages, rural.

The Pricing Manager wants to increase the number of rating areas to 50 by dividing the country according to population density. The same 50 rating areas are to be used for both household and motor business.

- (ii) Discuss the Pricing Manager's suggestion. [10]

The Pricing Manager intends to use spatial smoothing when creating the 50 new rating areas.

- (iii) Describe the two main forms of spatial smoothing that are typically used. [7]
- (iv) Describe how the level of spatial smoothing could distort the pricing model. [2]

[Total 24]

END OF PAPER