Faculty of Actuaries **Institute of Actuaries**

EXAMINATIONS

15 September 2000 (am)

Subject 403 — UK Fellowship General Insurance

Paper One

You must answer this subject only,
you may not attempt another subject in the 400 series.

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *You have 15 minutes at 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.*

2. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*

3. *Write your surname in full, the initials of your other names and your Candidate's Number on the front of the answer booklet.*

4. *Mark allocations are shown in brackets.*

5. *Attempt all 5 questions, beginning your answer to each question on a separate sheet.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet and this question paper.

In addition to this paper you should have available Actuarial Tables and an electronic calculator.

1 State the advantages and disadvantages of using the Statutory Minimum Solvency Margin and Risk Based Capital approaches in assessing the financial strength of a United Kingdom general insurance company. [6]

2 As part of an asset-liability modelling exercise for a general insurance company you are required to estimate the income in future time periods. Discuss this, in relation to the income arising from fixed interest stocks and equities. [8]

3 Company X, a motor insurance company in a developing country wishes to restructure its main product. Currently all the Company's business is flat rated on a per vehicle basis, and the cover is third party bodily injury and property damage, fire and theft. The minimum legal requirement in this country is third party bodily injury unlimited cover. The only information Company X collects on its insured population is the name and address of the main driver, and the type of vehicle insured.

You are an actuary working for the parent company of Company X, which writes all lines of business including motor portfolios with well-segmented risks in a number of other countries. You have been asked to help Company X in this restructuring exercise.

Company X has experienced unsatisfactory results over the past few years and wants to introduce some rating factors to help differentiate its risks.

(i) Outline the information you would require about the market in which Company X operates, and the data you are able to analyse from Company X's own internal records in order to help the Company review its rates for this product and to introduce some rating factors. [12]

(ii) Draft a memorandum to the Managing Director of Company X detailing:

- the types of cover Company X could offer in the future
- the rating factors Company X might wish to consider
- the sources of information Company X could use to assess the relativities to use for each rating factor
- any potential problems of following this course of action, and
- the steps Company X might want to follow in moving from the current position to a fully segmented product

[Including 2 for drafting, 15]
[Total 27]

4 You are the actuary of a general insurance company. It is April 2000, and you have been asked to investigate the experience of the company, as its management has concerns about the adequacy of its premium rates. The insurer writes two categories of personal lines business, writing directly to the public and paying no commission. You have been given the following figures from the company's records.

Year ending 31 December	*1998*	*1999*
Written premium	£15 million	£18 million
Earned premium	£12.5 million	£16 million
Number of policies in force at 31 December	80,000	107,000
Claims paid in year	£8 million	£11 million
Claims incurred in year	£10 million	£15.2 million
Expenses paid	£3.2 million	£4.1 million

Premium rates were increased in June 1999 by an average of 5%, at a time when market rates increased on average by 4%.

All figures are net of reinsurance.

Both lines of business have renewals spread evenly throughout the year.

(i) Comment on these figures. [9]

(ii) Describe the analyses of claims and portfolio movements that you would want to carry out in order to gain a better understanding of the experience of this business. [20]

[Total 29]

5 (i) Explain what is meant by:

(a) Catastrophe reinsurance
(b) Reinstatement premium
(c) Aggregate deductible
(d) Stability clause [6]

(ii) Outline the reasons why an insurer might buy reinsurance. [4]

You are the actuary for a small United Kingdom reinsurance company, writing catastrophe excess of loss reinsurance business. You have been given the following information about possible loss events. Note that the return period is the expected length of time between successive occurrences of a catastrophe of a certain size.

US earthquake

Return period (years)	10	50	100	250	1000
Loss as % of sum insured	1%	3%	5%	10%	15%

US hurricane

Return period (years)	10	50	100	250	1000
Loss as % of sum insured	1%	3%	5%	10%	15%

You may ignore the possibility of other claims events, and assume that the perils of earthquake and hurricane are independent. The company currently has a portfolio of $100 million of US earthquake business. It intends to add a further $50 million sum insured to its portfolio, and is considering whether this should be earthquake or hurricane. It calculates its required office premium as the mean expected loss, plus 20% of the increase in the standard deviation of the loss from its portfolio. You may assume that the market premiums for earthquake and for hurricane exposure are the same.

(iii) Calculate the means and standard deviations of the current and potential portfolios, and recommend which exposure the company should write. [11]

(iv) Comment on the company's method of determining the office premium. [5]

(v) Another reinsurer has offered you a $100,000 annual aggregate cover on your original book of $100 million of business for a premium of $50,000. One of your underwriters has stated that you should purchase this cover, as the price is less than the $100,000 recovery. Comment on this statement. [4]

[Total 30]