EXAMINATION

9 November 2016 (am)

Subject F103 — *General Insurance*
Fellowship Principles

Time allowed: 3 hours

INSTRUCTIONS TO THE CANDIDATE

1.   *Enter all the candidate and examination details as requested on the front of EACH OF your answer booklets.*

2.   *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.

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 seven (7) questions, beginning your answer to each question <u>IN A SEPARATE BOOKLET</u>.*

6.   *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in your answer booklets, with any additional sheets firmly attached to the correct booklet, 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.

QUESTION 1

Company X is a recently-established commercial property insurer. It is considering implementing one of the following reinsurance arrangements:

A. Quota Share with reciprocity, with Company Y (a recently-established commercial property insurer).
B. Surplus with Company Z (a well-established pure reinsurer).

i. Outline 5 advantages to Company X of arrangement B relative to arrangement A.

[5]

Company X has set up reinsurance treaties with Company Z which operate in the order given below:

- Surplus, having 5 lines.
  Company X retains as little risk as possible on each policy reinsured, but must retain at least $1m (based on the Expected Maximum Loss (EML)) on each risk reinsured.

- Risk Excess of Loss, which covers 80% of losses in excess of $1m.
  A Stability Clause operates on the excess point. The value of the index is 110 at outset.

You have been provided with the following extract of claim recoveries:

Policy	Sum Insured	EML	Claim	Reins. Recoveries		Stability Index
				Surplus	XL	
1	$15m	$9m	$12m	(a)	$0.88m	(c)
2	$7m	$3m	$3.6m	(b)	$0	(d)

ii. Determine the Surplus recoveries (a) and (b) in the above table.

[3]

iii. Determine the possible values of the stability index (c) and (d) in the above table.

[4]

[Total 12]

QUESTION 2

A large established general insurance company currently only writes personal lines property insurance in Country A. The company is considering providing personal lines property insurance in Country B.

i. Explain the effect that inadequate data could have on the insurer in terms of pricing and business acquisition.

[5]

ii. Discuss the data sources the company could use to price policies appropriately.

[6]

iii. Outline briefly measures the company could take to mitigate the effects of using inadequate data or poor quality data.

[4]

[Total 15]

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QUESTION 3

A medium-sized general insurance company which writes mainly personal and commercial motor business is in the process of its annual reinsurance treaty renewal. The actuary has been asked to investigate the impact on the economic capital requirements of the company of increasing the excess points on its Risk Excess of Loss and Catastrophe Excess of Loss treaties.

i.   Indicate why there would be an effect and describe the analysis that the actuary will undertake in formulating a response given that the company sets its economic capital on a 99.5th percentile value-at-risk.

[7]

ii. Outline briefly 3 other types of investigation that the actuarial team could undertake to assist the company in formulating an optimal reinsurance structure.

[3]
[Total 10]

QUESTION 4

A relatively new (3-year old) local insurer specialises in providing insurance for construction projects. Policies are single premium and have term (set at outset) equal to the expected duration of the project.

i.   Outline briefly 4 perils covered by construction and engineering policies.

[2]

A summary of the policies issued by the insurer is shown below:

Policy	Date of issue	Premium paid	Policy term	Estimated incidence of risk
A	1 January 2013	R7 million	10 years	Evenly over the 10 years
B	1 October 2014	R20 million	6 years, 10 months	First 12 months: 2% per month Next 12 months: 1.5% per month Next 58 months:1% per month
C	1 March 2015	R15 million	2 years	1/3% first month, increasing linearly by 1/3% each month

ii. Calculate the UPR for this insurer at 31 December 2014 and 31 December 2015.

[4]

You are given the following additional information about the insurer:

- The only claim submitted to this insurer was one under Policy B on 1 October 2015 for an estimated loss of R4m, of which 10% was paid during 2015.
- IBNR is calculated as the proportion of the premiums (net of acquisition costs) relating to the risk incidence estimate for the prior month.
- Total acquisition costs are 15% of premiums written.
- Other expenses for 2015 amounted to R0.5m.
- Accounting rules permit only commission to be included in DAC, not other acquisition costs.
- Commission was 10% for Policies A and C, and 12% for Policy B.
- Investment income was 8% of average insurance funds over 2015.

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iii.   Construct the Revenue Account for the insurer for 2015.

[6]

iv.   Calculate the profit margin for 2015, and comment on the figure.

[4]

[Total 16]

QUESTION 5

A well-established computer software company (CSC) has developed a personal assistant robot which is intended to help individuals with household chores. You are the actuary for a large insurance company, responsible for developing an insurance product to indemnify the software company against liability claims (for damage to users' property or personal injury) which may arise from the use of robotic technology. There is no past experience in the market for such a product.

i.   Discuss whether the above satisfies the criteria for an insurable risk.

[8]

ii.   Explain the likely basis for the insurance cover.

[2]

iii.   Identify and outline an appropriate exposure measure and possible rating factors.

[5]

[Total 15]

QUESTION 6

Notaloan Insurance Company (NIC) provides insurance to banks against default on unsecured variable interest rate student loans. Loans are granted to university students if they achieve a pre-defined average for their matric marks. Repayment commences five years after students take out the loan at the beginning of their first year at university, or earlier at the students' discretion. Thereafter, the loan must be repaid within five years of the first repayment. Insurance premiums are calculated as a percentage of the total loan amount outstanding and are paid by the banks to the insurer monthly. Premiums are calculated separately for different bands of "student grade" (related to average matric marks), with lower premiums being paid for students with higher matric marks.

i.   Define "moral hazard" and outline circumstances in which it could arise in the above scenario.

[3]

ii.   Suggest, with reason, whether you feel this type of insurance contributes positively or negatively to society as a whole.

[2]

iii.   Outline six key risks faced by NIC in offering this type of insurance.

[6]

iv.   Outline whether, and if so how, NIC's internal capital model should be updated following an unexpected interest rate increase.

[6]

[Total 17]

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QUESTION 7

Your client is a reinsurance subsidiary of a large international reinsurance company ("group"). You are in the process of reviewing your client's claims reserves at 31 December 2015.

You have been given the following data for a certain class of proportional inwards reinsurance business:

(Amounts in R'000s)

Underwriting Year	Written Premium	Paid claims to date	Incurred claims to date	Underwriters Loss Ratio	Ceded %
2011	53 123	32 936	33 243	60%	85%
2012	76 373	58 112	59 094	70%	85%
2013	78 440	50 415	51 750	60%	80%
2014	128 646	53 453	63 453	57%	70%
2015	180 267	29 913	48 879	65%	55%

Selected Factors	Development Year			
	1-ult	*2-ult*	*3-ult*	*4-ult*
Paid	3.62	1.32	1.05	1.04
Incurred	2.35	1.18	1.04	1.03

You have also gathered the following additional information:

- The ceded percentage is the proportional share of the risks in each underwriting year that is ceded to the group. There are no other retrocession arrangements on this class.
- Reinsurance policies are sold on a risks attaching basis with all the underlying insurance policies being of annual duration.
- The 2015 underwriting year combined ratio has been estimated at 60%.

The reserving actuary's methodology and assumptions are outlined below:

- If paid claims development is more than 75% developed then the actuary uses the Basic Chain Ladder applied to paid data, otherwise the actuary uses the Bornhuetter-Ferguson (BF) method on paid data.
- The actuary's prior loss ratios underlying the BF method are the underwriters' Loss Ratios without any adjustments.
- The actuary assumes that premiums are written on average half way through the year and that risk is spread uniformly across the underlying policies.

i.   Calculate the net of retrocession IBNR reserves at 31 December 2015 based on the actuary's selected methodology. State any assumptions you make.

[5]

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ii. Critically analyse the actuary's selected IBNR reserving methodology and any additional assumptions you made in part (i).

[5]

iii. Describe the additional data challenges, compared to insurers, that reinsurers face when calculating IBNR reserves for inwards reinsurance business.

[5]
[Total 15]

END OF PAPER