EXAMINATION

7 November 2012 (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 IN A SEPARATE BOOKLET.*

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.

© Actuarial Society of South Africa

QUESTION 1

A general insurance company has a surplus reinsurance treaty on its commercial fire business with a maximum retention limit of R (based on EML) and a maximum of N lines.

    i.   Define what is meant by "EML".

[1]

    ii.   Derive an expression, based on the retention limit, for the maximum EML which the general insurer can accept on any policy to be placed on the treaty.

[1]

The insurer pays a claim of C on a policy with a sum insured of S and an EML of E (where $C < S$) which had been placed on the surplus treaty.

    iii.   Derive expressions for:

        a.   The minimum reinsurance recovery the insurer could make.
        b.   The maximum reinsurance recovery the insurer could make.

[3]

    iv.   Outline briefly why a reinsurer might be concerned about the situation where claims on reinsured policies exceed the EML.

[1]

The insurer also has in place an excess of loss treaty, which operates on the net amounts remaining after the operation of the surplus treaty. The excess point (retention limit) on the excess of loss reinsurance is also set at R (which is the same as the surplus retention limit), with no upper limit.

A recently employed actuarial student has remarked that the excess of loss arrangement is ridiculous because the excess point and the surplus retention limit are set at the same level and thus no recovery will ever be made on the excess of loss treaty.

    v.   Derive expressions for the size of the claim required to trigger an excess of loss recovery under each of the two scenarios in (iii) above, and hence comment on the student's remark.

[4]
[Total 10]

PLEASE TURN OVER

QUESTION 2

i. Define and explain (using formulae where necessary) what is meant by "the standard for full credibility" and outline the factors that need to be considered when selecting the standard for full credibility.

[3]

ii. Discuss the issues that need to be considered if the standard for full credibility is not met when calculating the pure risk premium.

[4]

iii. Assume that the aggregate claims for a particular motor insurance portfolio has a compound Poisson distribution, where the distribution for the size of individual motor claims (in thousands of Rands) has a mean and standard deviation of 150 and 35 respectively. The standard for full credibility requires that the observed claim frequency lies within 5% of the expected population claim frequency 95% of the time.

Derive the number of claims which should have been observed in order to assign full credibility to the data. State all assumptions clearly.

[5]

[Total 12]

QUESTION 3

The new owner of a cargo shipping company is considering how best to insure against marine risks.

i. Define what is meant by a "P&I Club", and discuss the advantages and disadvantages to the shipping company of using P&I Clubs instead of insurance companies and Lloyd's syndicates to insure its marine risks.

[5]

A P&I Club, covering all types of marine risks, is based in a jurisdiction where the regulator expects insurance companies to calculate their capital requirements based on a risk-based model.

ii. When measuring underwriting risk for the purpose of calculating capital requirements, explain the considerations in modelling attritional claims, large claims and catastrophe claims for the P&I Club, giving an example of each type of claim.

[8]

[Total 13]

PLEASE TURN OVER

QUESTION 4

A medium-sized general insurance company has just completed a claims experience investigation on its internal data for its employers' liability insurance business.

i. Describe the cover provided by an employers' liability insurance policy.

[2]

ii. Define what is meant by a "discovery period".

[1]

iii. Outline briefly the claim characteristics of employers' liability insurance.

[4]

iv. Outline briefly reasons why the results from this investigation may not directly give the actual premiums that the insurance company will charge for the coming period.

[8]
[Total 15]

QUESTION 5

You are the pricing actuary for a large reinsurance company. One of your clients (a short-term insurer) has requested you to provide a quote for reinsuring the property risk for a very large forestry company. The forestry company owns a number of separate plantations in a single region of the country.

The cover for each plantation will be placed on a facultative basis, with the direct writer retaining a relatively small amount of the risk. Each contract structure will allow for deductibles and limits, as well as a deposit and adjustment premium.

The direct writer would like your company to reinsure all of the forestry company's plantations.

i. List six key perils covered and state two likely exclusions.

[2]

ii. Outline briefly the two key claim-related risks faced by the reinsurer associated with this particular business, and suggest ways the reinsurer could manage each of these risks.

[4]

iii. Describe how you might use a simulation approach to calculate the reinsurer's risk premium.

[6]
[Total 12]

PLEASE TURN OVER

© Actuarial Society of South Africa

QUESTION 6

ExtendIt is a niche insurer specialising in providing extended warranty cover on new motor vehicles with a sale price in excess of R1million. The product offers a one-year extension to the standard manufacturers' warranty that comes with these motor vehicles and which presently runs for six months. The cover is purchased, by a single premium, at the same time as the car.

ExtendIt has been operating since 2005, but in 2010 started writing business on a different insurance licence. The gross written premium figures on the new licence are as follows: R130 million for 2010 and R156 million in 2011.

You have been asked to construct the 2011 accounts for ExtendIt on an accruals basis. The financial year runs from 1 January to 31 December.

For purposes of the calculations, you have been instructed to make the following assumptions:

1. Car sales are spread uniformly throughout the year.
2. Sales are only made on the last day of each month.
3. The premium is earned evenly over the period that the insurer is exposed to the risk of claims.

i.   Draw a timeline illustrating the time that the insurer is exposed to the risk of claims for a single policy. On your timeline include the following:

   - time at which vehicle, and hence insurance policy, is sold;
   - time at which risk exposure starts; and
   - time at which risk exposure ends.

[1]

ii. Explain why it may not be suitable for ExtendIt to construct accounts on an accruals basis and suggest an alternative to this approach.

[2]

iii. Comment on the reasonableness of assumption 3 above.

[2]

iv. Calculate the premium for 2011 on the accruals basis, using the assumptions above as required. State any other assumptions you make.

[6]

v.   Car manufacturing companies are, increasingly, offering warranties of longer than six months.

   Explain the potential impact of this on ExtendIt.

[4]
[Total 15]

QUESTION 7

You are an actuary working for a general insurance company in a country in which the claim payments to persons who are injured in motor accidents are determined according to a fixed scale of benefits, related to the severity of their injuries. The courts may be needed to decide on allocation of blame, but the claim amount is fixed based on the severity of injury.

Your company offers a motor third-party liability product with the benefit amount being paid to the injured party if and when it is determined that the insured party is liable for the damage.

You have been given the task of calculating the level of reserves to hold, which you plan to do using a method based on run-off triangles.

    i.   Explain why it is necessary to hold claims reserves.

[1]

    ii.   Describe, using an example, what a run-off triangle used to determine claims reserves consists of. Define briefly all terminology you use.

[3]

    iii.   Describe the data required to construct a run-off triangle for determining claims reserves.

[2]

    iv.   List four possible data errors that may distort a run-off triangle and, for each, outline briefly one way to avoid, and one way to check for, the error.

[6]

    v.   Discuss the reasons for not discounting claims reserves and the appropriateness of this for the company.

[5]

    vi.   After discussing the issue of discounting with a senior actuary, you decide that it is necessary to discount the reserves and that the discount rate to be used will be the rate corresponding to the return on a portfolio replicating the liabilities in both timing and amount.

           Outline the potential challenges that may be experienced in determining the return on the replicating portfolio.

[4]

    vii.   The return earned on the actual investments held in the last year was higher than that suggested by the replicating portfolio.

           Explain whether or not it would be more appropriate to discount using the higher return expected on the actual assets held.

[2]
[Total 23]

END OF PAPER