ACTUARIAL SOCIETY OF SOUTH AFRICA

EXAMINATION

10 November 2023 (am)

Subject F103 — *General Insurance* Fellowship Principles

Time allowed: *Three hours and twenty minutes (which includes five minutes for downloading and uploading your answer document)*

Total marks: *100*

INSTRUCTIONS TO THE CANDIDATE

1. *Ensure that you are logged in and authenticated through Examity before you attempt the examination.*
2. *The question paper is only available in the ASSA Exam Platform as a PDF download and may not be printed. Copy/paste of questions or parts thereof is allowed from the question paper to your Word answer document only.*
3. *Download the Word answer document template from the ASSA Exam Platform. Save this Word answer document on your desktop using your Candidate Number as filename. You are required to submit your answers in Word format ONLY using this document. No answers in any other format (e.g. handwritten) will be accepted. Save work regularly.*
4. *Ensure that your Candidate Number appears in the "header" of your Word answer document. [Double-click on the header at the top of the Word document, input your Candidate Number only in the header, then press "Esc" to close the header.]* ***Do not use your name or member number anywhere in your Word answer document.***
5. *You may not access any file from your computer, use any other computer app (e.g., Email or Excel) or open any other browser during the examination. Nor may you use Grammarly, Grammarly Premium or similar add-ins.*
6. *You may not use any other material (e.g., a Formulae and Tables book) during the examination. Any such information that may be required will be provided to you within the examination.*
7. *You are strongly encouraged to use the first 15 minutes as reading time only, however, you may start answering the paper whenever you are ready.*
8. *Mark allocations are shown in brackets.*
9. *Attempt all eight (8) questions, starting each on a new page (as provided for in the Word answer document).*
10. *Show calculations where appropriate. You may use blank paper to carry out rough work calculations. You may use a calculator from the approved list only.*
11. *Upload your Word answer document only into the ASSA Exam Platform. Once you have uploaded your document, you must click on* ***Finish Attempt*** *to save your document. You will still be allowed to go back and make changes (****Review Attempt****) if you have time.*
12. *Once you are satisfied with your uploaded document, click* ***Finish Attempt*** *and* ***Finish all and Submit****. Once you have submitted you will not be able to make any changes.*
13. ***You must submit your Word answer document BEFORE the end of the allotted examination time.*** *You should stop writing and start uploading during the last five minutes. Take this into account when planning your review and submission. There will be no time announcements.*

Note: The Actuarial Society of South Africa will not be held responsible for loss of data where candidates have not followed instructions as set out above.

END OF INSTRUCTIONS

QUESTION 1

i. Explain the impact to an insurer of underestimating the Expected Maximum Loss (EML) on a Surplus reinsurance contract with respect to the size of the recovery it will make.

[2]

ii. Explain why a Surplus reinsurer would be unhappy if an insurer regularly underestimates the EML on reinsured policies.

[2]

Company X is a general insurer which has the following reinsurance treaties. The treaties operate in the order given below.

- 20% Quota Share treaty with Reinsurer A.
- Surplus with Reinsurer B, with a maximum of 4 lines.
  Company X retains as little as possible on each risk, subject to the maximum and minimum retention limits stipulated in the treaty based on Expected Maximum Loss (EML).
- Risk Excess of Loss with Reinsurer C, providing cover of 90% of net claims in excess of $10m. This cover has a stability clause, with the initial value of the Stability Index being 110.
- Aggregate excess of loss with Reinsurer D, providing cover of 70% of net claims resulting from weather-related damage in excess of $133m.

You have been provided with the following extract of claims, which constitute all of the weather-related claims over the year:

Policy	Sums Insured	EML	No. of Surplus lines use	Recoveries from			Stability Index
				A	B	C	
1	$180m	$100m	1	$9m	(a)	(b)	99
2	$400m	$250m	(c)	$40m	(d)	$18m	(e)
Others	$1420m	$650m	(f)	$80m	0	0	Various

iii. Determine the minimum retention applicable to the Surplus treaty.

[1]

iv. Determine the values (a) – (f) in the above table.

[8]

v. Determine the recovery from Reinsurer D.

[1]

[Total 14]

QUESTION 2

i. Outline briefly 4 policy "movements" that a general insurer might be interested in monitoring for the purpose of actuarial investigations.

[2]

ii. Explain possible reasons for a general insurer wanting to monitor its policy movements.

[4]

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A local insurer selling extended warranty cover for washing machines experienced a sudden, larger than expected, increase in new business volumes in the last year.

iii. Suggest possible reasons for the sudden large volume growth.

[2]

iv. Outline the potential implications for the insurer of the larger-than-expected volume growth.

[3]

[Total 11]

QUESTION 3

i. Outline briefly 6 risks relating to an insurer's investment strategy that an asset-liability model (ALM) would aim to improve an understanding of.

[3]

You are an actuary working for a large insurer that writes various personal and commercial covers in several countries. You have been tasked with developing a stochastic ALM to assist the company in setting its investment strategy.

ii. List eight variables that are likely to be modelled by the stochastic economic scenario generator (ESG) component of the ALM.

[4]

iii. Outline briefly the main steps involved in performing a stochastic ALM exercise to derive an acceptable investment strategy.

[5]

iv. Outline 3 risks in the development and use of a stochastic ALM, and steps that can be taken to mitigate these risks.

[3]

[Total 15]

QUESTION 4

You are a broker that has been approached by a logistics business about its insurance needs. The company transports goods over land via trucks and delivery vehicles. It has around 100 employees, including delivery drivers, warehouse workers, administration staff and financial executives. The company is a publicly traded company, and currently is uninsured.

Suggest, with reasons, 7 liability and property products that could be proposed to the business.

[7]

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QUESTION 5

Several short-term insurers have recently been placed under curatorship or gone insolvent. This has prompted market commentators to suggest that the insurance market is currently soft.

i. Explain the "insurance cycle" and what is meant by a "soft" market.

[3]

An insurer selling mobile phone insurance is exploring options to improve the viability of its product in the current soft market conditions. The policy is sold with the mobile phone to which it applies, and indemnifies policyholders against loss or theft of their mobile phone. The policy terminates after 5 years or the earlier loss or disposal of the phone. Monthly premiums are paid for the duration of the policy.

ii. Discuss the effects that each of the following proposed changes may have on the profitability and lapse rates for this product:

   a. Offering free airtime for the first 6 months of a new policy.
   b. Offering a cash reward for policyholders that don't claim for 5 years.
   c. Introducing an exclusion that will allow the insurer to reject claims for any phone that is lost or stolen while the policyholder is intoxicated.

[6]

[Total 9]

QUESTION 6

Crop-Inc is a large insurance company specialising in crop insurance. After performing its due diligence, it has decided to purchase several smaller crop insurers located around the country. Crop-Inc is aiming to use the data from these insurers to improve the pricing of its crop insurance product.

i. List 4 sources of heterogeneity in policyholder data that may exist between Crop-Inc's data and that of the acquired insurers' data.

[2]

ii. Discuss whether the insurance and operational risk capital requirements for Crop-Inc post acquisitions will be higher, lower or similar to the sum of the corresponding capital requirements of the stand-alone entities prior to the acquisitions.

[8]

iii. List 8 uses of policy and claims data, other than for capital modelling, for a general insurer.

[4]

[Total 14]

PLEASE TURN OVER

QUESTION 7

i. State 4 techniques that can be used by a general insurer to calculate risk premiums.

[2]

An insurance company is reviewing its risk premiums for its marine and aviation insurance business.

ii. Discuss the factors that should be considered in choosing the most appropriate technique(s) for calculating risk premiums for this class of business.

[7]

The profitability of the insurer's marine and aviation insurance business has been inadequate for a number of years.

iii. Discuss briefly the factors, other than those relating to determining the risk premium, that should be reviewed in assessing the final office premium.

[6]

[Total 15]

QUESTION 8

Your company is a local South African based reinsurer which is part of a large international reinsurance group. You are calculating the IBNR reserve as at 31 December 2022 for the local company.

i. List 4 factors that you should consider when grouping the data to calculate the claims reserve for the entire inwards reinsurance book of your company.

[2]

ii. Outline additional data issues that you should be aware of when reserving for inwards proportional reinsurance business compared to a non-reinsurer reserving for insurance business.

[2]

You have been provided with the following information for the engineering proportional treaty reinsurance line of business that your company started writing three years ago:

Underwriting Year	Written Premium (R million)	Cumulative Claims Incurred as at 31/12/2022 (R million)	Percentage of claims incurred developed as at 31/12/2022
2020	800	540	90%
2021	1 500	720	60%
2022	1 500	300	25%

PLEASE TURN OVER

You have also been provided with the following additional information:

- The reinsurance treaties were written on a risks-attaching basis.
- The above figures are gross of any applicable retrocessions.
- All of the underlying engineering insurance policies were single premium policies which commenced on 1 January and provide cover for 3 years on average.
- The percentages of claims incurred developed were calculated from the underwriting year claims development triangles using the basic chain ladder method. These percentages were provided by a European colleague for reinsurance business sold in Northern Europe.
- Your company's reserving policy calculates the IBNR for reinsurance business by underwriting year ("UY") using the following formula:

$$\text{IBNR}_{\text{UY}} = \text{Earned Premium}_{\text{UY}} \times \text{Ultimate Loss Ratio}_{\text{UY}} - \text{Claims Incurred}_{\text{UY}}$$

where:

  - $\text{Earned Premium}_{\text{UY}}$ is the premium earned, as at the calculation date, for business written in the underwriting year "UY".
  - $\text{Ultimate Loss Ratio}_{\text{UY}}$ is the ratio of ultimate claims to written premiums by underwriting year.
  - $\text{Claims Incurred}_{\text{UY}}$ are the cumulative paid claims plus outstanding reported claims as at the date of calculation, for underwriting year "UY".

iii. Explain the difference between the ultimate claims estimated using the chain ladder method applied to accident year claims triangles versus underwriting year claims triangles.

[2]

iv. Explain why earned premium ($\text{Earned Premium}_{\text{UY}}$) and not written premium is used to calculate the IBNR reserve in the formula above for the 2022 underwriting year.

[2]

v. Calculate the aggregated IBNR reserve for the three underwriting years 2020 to 2022 based on your company's reserving policy explained above.

[5]

vi. Outline issues you should consider before finalising the IBNR reserve for the local engineering proportional treaty reinsurance book.

[2]

[Total 15]

END OF PAPER