EXAMINATION

1 November 2019 (am)

Subject F101 – Actuarial Practice in Health Fellowship Principles

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Follow log in and saving instructions issued to you at the exam venue.*
2. *Save your work throughout the exam.*
3. *You are required to submit your answers in Word format only using the template provided. You MAY NOT use any other computer program (e.g. Excel) during the examination.*
4. *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.
5. *You must not start typing your answers until instructed to do so by the supervisor.*
6. *Mark allocations are shown in brackets.*
7. *Attempt all seven (7) questions, beginning your answer to each question on a new page.*
8. *Show calculations where this is appropriate.*
9. *If answer booklets are used for any question(s) start each question IN A SEPARATE ANSWER BOOKLET, entering all candidate and examination details on EACH.*

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.

AT THE END OF THE EXAMINATION

Check that you have saved your work as per instructions given to you.
Hand in your question paper with any answer booklets firmly attached.

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

A small insurer, specialising in group PMI business, has been bought by a large insurance company that predominantly sells life and critical illness products to individuals.

The PMI insurer has historically made use of tied agents to sell its products. The large life insurance company has a well-established own sales force.

The large life insurer decides to use its own sales force to market the PMI products to the public.

i. Outline the benefits to the large insurance company of using its own sales force. [2]

The large insurer ended the contract with the tied agents upon take-over.

Six months after the acquisition of the small insurer, a full claims review of the PMI business has shown an increase in the claims (loss) ratios. The PMI product offering and underwriting has not changed following the acquisition.

ii. Explain how the new distribution arrangement could have impacted the claims experience of the PMI products. [5]

iii. List two other distribution channels commonly used for selling health insurance. [1]

[Total 8]

QUESTION 2

In order to increase its market share in the country of South Actuaria, a medium sized health insurer, Kritical Co, is planning to launch new innovative products in the market. South Actuaria currently have few health insurance companies which offer Critical Illness policies. However, the companies currently selling critical insurance products offer gender neutral premium rates only.

Kritical Co is currently working on a CI plan which would provide cancer cover for female lives only. The Marketing Manager of Kritical Co has observed that the premium rates under the proposed product appear to be significantly different from those of CI products currently available in the market.

i. Discuss the possible reasons for the differences in premium rates between the existing products in the market and the proposed product for female lives. [5]

ii. List the possible risk/rating factors that would be taken into account in pricing this product designed specifically for female lives. [4]

iii. Describe the challenges associated with the pricing of this product which is being introduced for the first time in this market. [7]

[Total 16]

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QUESTION 3

A Long Term Care insurer has entered into a payment arrangement with a group of frail care facilities where payments for healthcare services rendered are paid on the basis of a GLM-based formula for expected claims.

The formula is annually reviewable on the basis of the previous year's inflation adjusted claims experience.

The insurer and the frail care facilities have agreed to use the following explanatory variables:

- Patient age as a continuous variable
- Case mix as determined by Resource Utilisation Band (RUB), indicating the expected healthcare utilisation of a patient; ranging from 1-3.
- Diabetes indicator; showing whether the patient had pre-existing diabetes or not

An actuarial student at the insurer has fitted GLM with a Tweedie distribution for the response variable (expected claims per life per month (PLPM)).

Variable	Coefficient
Intercept	98.2
Age	15.5
RUB 1 - Healthy Users	139.26
RUB 2 - Moderate Users	325.8
RUB 3 - High Users	563.67
Diabetes indicator	85.00

i. Explain the rationale for choosing the Tweedie distribution for the response. [1]

ii. Discuss the difficulties associated with performing risk adjustment by case mix in this scenario. [2]

iii. Suggest and briefly explain measures that can be used to test the appropriateness of this model. [3]

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One facility has closed its books for the year having submitted claims totaling R 1 358 280 to the insurer for the previous year. The representative model points of patients at the facility are given in the table below:

Age	RUB 1	RUB 2	RUB 3	Diabetes	Exposure (Life Months)
55	1	0	0	0	330
63	0	0	1	1	550
74	0	1	0	0	88
85	0	1	0	1	20

iv. On the basis of the above expected claims formula calculate whether the facility should receive additional payments from the insurer.

[4]
[Total 10]

QUESTION 4

Zebra Airways offers a comprehensive PMI cover for its employees. The cover is provided by a health insurer, MoreHealth. The employer funds 60% of the premiums paid to MoreHealth and employees pay the balance from their salaries. The cover is a condition of employment. When employees leave Zebra Airways they have the option to continue their cover with MoreHealth and to pay standard rates for this cover.

i. Describe the risks to MoreHealth of offering this option and how these can be mitigated.

[4]

ii. Describe how MoreHealth would price the option.

[5]
[Total 9]

PLEASE TURN OVER

QUESTION 5

You are the pricing actuary at a medium-sized PMI insurer. Over the past couple of years you have noticed an increasing trend in diabetes prevalence as well as an increase in hospital admissions for diabetes-related conditions. With your help, the insurer has implemented a Diabetes Management Programme. The programme identifies beneficiaries with diabetes or those who are at high risk of developing diabetes and provides them with care plans (such as extra doctor visits, medication, etc.) to help them effectively manage their diabetes or their risk of developing diabetes

i. List the main objectives of managed care interventions. [2]

The Head of Disease Management has asked you to review the Diabetes Management Programme from a cost point of view. You decide to perform a cost-benefit analysis.

ii. Explain how you would perform this analysis and how you would determine the success, or otherwise, of the programme. [6]

iii. List four measures that can be used to assess the quality of care provided under the programme. [2]

The Head of Disease Management has suggested that it might be useful to implement a formulary for this programme.

iv. Explain what a formulary is and how its implementation may lead to potential cost savings for the insurer. [2]

v. Describe the main risks to the insurer of implementing a formulary for this programme. [2]

vi. Outline briefly three additional managed care interventions that can be implemented to reduce the costs associated with diabetes care. [3]

[Total 17]

PLEASE TURN OVER

QUESTION 6

An established, medium-sized health and care insurer sells predominantly PMI business. It is currently designing a new CI product line aimed at employer groups. The insurer is looking to reinsure the new product line and has obtained quotes from two large reinsurers in the market.

i. Outline the reasons for which this insurer may be seeking reinsurance on its new product line. [5]

The insurer expects to write a total of R500 000 000 in premiums next year. All the policies have sums assured expected of less than R1 000 000, except the following 3 large group policies expected to be written:

	Sum assured
Policy 1	R25 000 000
Policy 2	R75 000 000
Policy 3	R150 000 000

The quotes from the two reinsurers are as follows:

Reinsurer A

Treaty 1: 40% Original terms (OT) quota share

Treaty 2: Individual surplus with a retention amount of R25m per policy

Treaty 3: Aggregate risk Excess of Loss (XoL) on 'large' policies (sum assured > R1 000 000), covering 90% of claims in excess of R40 000 000.

The reinsurance premiums for the surplus and XoL treaties are 10% of the maximum amount recoverable under these treaties.

These treaties operate in the order given.

Reinsurer B

Treaty 1: 20% OT quota share

Treaty 2: Individual surplus with a retention amount of R15m

The reinsurance premiums for the surplus treaty is 10% of the maximum amount recoverable under this treaty.

These treaties operate in the order given.

i. Calculate the reinsurance premiums expected for the reinsurance cover provided by Reinsurer A and B respectively. [7]

ii. Discuss the factors the insurer needs to consider before deciding which quote, if any, to accept. [5]

[Total 17]

PLEASE TURN OVER

QUESTION 7

Recovery Health is the largest health insurer in Actuaria and accounts for approximately 40% of the market for PMI products.

i. Describe how the pricing actuary would go about reviewing the premiums for the following year, including detailing the pricing process and setting out other considerations in finalising the rates. [15]

Recovery Health has just acquired the second largest health insurer in Actuaria, Veritas Health, and plans to consolidate the two risk pools. The merger was ordered by the regulator as Veritas Health was unable to meet the statutory reserving requirements for the past 8 years. The new, consolidated risk pool of Recovery Health has 5 years to meet the statutory reserving requirements.

For each Recovery Health product there was a similar Veritas product in terms of benefits and premium levels. The Veritas options products have fallen away under the merger, and their policyholders will be offered the corresponding Recovery Health product.

Veritas Health accounts for 26% of the market for PMI products and has a similar average beneficiary age relative to Recovery Health. However, Veritas Health had more comprehensive chronic disease benefits than Recovery Health has, and as a result, its beneficiaries have a higher chronic disease prevalence when compared to Recovery Health.

All PMI business in Actuaria is sold by independent intermediaries.

The pricing actuary has been asked to update the pricing assumptions for the coming years to allow for the consequences of the merger.

ii. Discuss the specific issues that the pricing actuary should consider when updating the pricing assumptions for the coming years. [8]

[Total 23]

END OF PAPER

