

# EXAMINATION

*1 June 2018 (am)*

## **Subject F101 — Health & Care Fellowship Principles**

*Time allowed: Three hours*

### **INSTRUCTIONS TO THE CANDIDATE**

1. *Use the instructions and password provided at the examination center to log in.*
2. *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.*
3. *Save your work regularly throughout the examination on the supplied computer's hard drive.*
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 six (6) 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**

*Save your answers on the hard drive AND hand in this question paper.*

<p><i>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.</i></p>
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## QUESTION 1

A health insurance company has a portfolio of reviewable unit-linked standalone critical illness insurance policies. Each policy has a sum assured that is selected by the policyholder and payable on a valid claim. The policyholder is also able to select from a range of unit-linked funds.

- i. What charges are likely to be applied to these policies? [2]
- ii. Describe the investigations the company is likely to undertake to determine whether these charges should be reviewed. [6]

[Total 8]

## QUESTION 2

You are the pricing actuary at Actuarial Life, a medium-sized insurer, which holds a large book of standalone Critical Illness policies in the country of Actuarial. The recent Listeriosis outbreak, as well as a concerning increase in cancer trends, have caused the marketing manager to investigate revising the product offering. She has requested that Listeriosis and early cancers be added to the list of conditions covered under the policy.

Your research into Listeriosis reveals the following:

- Symptoms are flu-like in nature and the bacteria has a short incubation period with a definitive test for the bacteria needed for diagnosis
- Listeriosis can be deadly to people with vulnerable or compromised immune systems
- Most people make full recoveries
- Other than the recent outbreak, the cases of Listeriosis are rare

- i. Outline criteria for inclusion in the conditions list for a critical illness product and comment on whether it is appropriate to include Listeriosis or early cancers. [8]

You have decided to include early cancers in your product offering. At the same time, the government of Actuarial has launched a free screening campaign for all cancers.

- ii. Describe the impact this could have on the incidence rates for both early cancers and cancers in general. [4]

[Total 12]

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### QUESTION 3

A health insurer offers cover for three major medical operations (A, B and C) and has contracted with a large hospital network to perform these operations for their policyholders. The network has a large geographic footprint in the country. The insurer reimburses individual hospitals in the network on a fee-for-service basis. The frequency of the three operations is uniform overall.

You are conducting research into the relative performance and efficiency of the hospitals in the network providing these operations. The average cost per operation across the network is as follows:

<u>Operation</u>	<u>Average cost</u>
A	R10 000
B	R50 000
C	R100 000

In particular, two hospitals in the network have shown interesting results and you decide to investigate further.

<u>Operation</u>	<u>Hospital 1</u>		<u>Hospital 2</u>	
	<u>Number of cases</u>	<u>Average cost per case</u>	<u>Number of Cases</u>	<u>Average cost per case</u>
A	250	R8 914	115	R10 910
B	88	R55 000	300	R 45 000
C	47	R106 000	206	R 99 000
<b>Total</b>	<b>385</b>	<b>R31 300</b>	<b>621</b>	<b>R 56 600</b>

- i. Calculate the case mix adjusted average cost per claim for these hospitals and determine the relative efficiency of these hospitals. [6]
- ii. Comment on the results of your investigation. [4]
- iii. Explain the rationale behind risk adjustment and the considerations you should take into account when performing any risk adjustment exercise. [5]

[Total 15]

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## QUESTION 4

- i. List the drawbacks of the formula approach when pricing health insurance products. [4]

Fitsure is the leading health insurer in Actuarial with approximately 50% of the PMI market. The regulatory environment mandates community rating but allows the insurer to offer discounts for good claims experience. Fitsure has been successful in appealing to the younger demographic, and currently does not offer any no-claims discounts.

- ii. Outline the advantages and disadvantages to the insurer of No Claims Discounts (NCDs) with regards to PMI products. [3]

New entrants to the PMI market with better offerings than Fitsure, which include NCDs, have been winning market share from Fitsure. Fitsure's product development actuary has proposed that they start offering premium discounts based on the level of physical activity of the insured beneficiary.

Emerging research has indicated that increased physical activity results in a decreased need for healthcare, and the emergence of wearable smart technology has enabled the accurate measurement of physical activity.

Following this research, the below discount structure has been proposed:

<u>Level of Activity</u>	<u>Annual Premium Discount</u>
Tier 1 (Most Active)	15%
Tier 2	10%
Tier 3	5%
Tier 4 (Least Active)	0%

- iii. Describe the data sources the pricing actuary would use for pricing. [5]
- iv. Describe how the pricing actuary would go about reviewing the premiums for the next year, taking into account the proposed discount structure. [13]

[Total 25]

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## QUESTION 5

You are a consulting actuary advising a start-up health and care insurer which is in the process of purchasing a portfolio of individual critical illness and long term care business written by a competitor.

- i. Outline the assumptions that you would need to assess the profitability of the portfolio and the data sources that you would use to derive those assumptions. [6]
- ii. Outline how you would evaluate the statistical risk associated with your assumptions. [2]
- iii. Discuss other critical factors that should be considered in determining the final purchase price of the critical illness and long-term care portfolios. [7]

[Total 15]

## QUESTION 6

A health insurer operates in a country where the State provides health care services for the unemployed and lower income earners. Those who can afford it purchase private health insurance. A neighbouring country has historically had all health provision covered by the State but with low levels of coverage and quality of care. A recent change in the political leadership of the neighbouring country has led to the expectation of significant economic growth. The new government of the neighbouring country is encouraging private sector firms to expand and improve the range of available health services. Consequently, a number of health care service providers (in the country in which the health insurer operates) are establishing healthcare facilities in this neighbouring country. The health insurer is considering developing a medical expense product to launch in the neighbouring country.

- i. Discuss whether health insurance can play a role in improving access to quality health care services in the neighbouring country. [5]
- ii. Describe the financial, operational and other risks for the health insurer that would be associated with such a product. [14]
- iii. Explain how the expansion is likely to affect the capital requirements and the required return on capital of the health insurer. [6]

[Total 25]

[Grand Total 100]

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**END OF EXAMINATION**