

EXAMINATION

31 May 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

- i. List the cashflows that would form part of a pricing model. [3]
- ii. List the drawbacks of the formula approach when pricing health insurance product [4]
[Total 7]

QUESTION 2

The Apple Company offers its employees the following health-related benefits

- PMI cover with a choice of a basic or a comprehensive benefit package;
- Critical Illness cover with a choice of sum assured of either 1 times or 2 times annual salary

Employees are required to select their level of cover at the date of employment. They must select at least one level of cover for each of the PMI and Critical Illness cover and may change their level of cover on an annual basis. For the PMI cover employees are charged a monetary amount by family size while the cost for employees for the Critical Illness cover is defined as a percentage of salary. These costs (which are subsidized by the employer) vary only by level of cover.

The financial director of the Apple Company is concerned about the escalating cost of this cover and has approached you for advice on how the cost of the cover can be contained.

Discuss some amendments to the benefits and terms that could help contain the cost of cover.
[Total 8]

QUESTION 3

A small insurer currently sells a Hospital Cash product via their website. The benefit is a fixed payment per day spent in hospital. No underwriting is performed at the sales stage, but the product does have a deferred period of 48 hours (i.e. the benefit is only payable if the claimant has been hospitalised for longer than 48 hours). The Sales Manager has asked you, the Product Actuary, to look into two product enhancements to increase sales:

- Either reduce the deferred period to 24 hours; or
 - Include a Critical Illness (CI) rider to this product which will pay a lump sum benefit equal to a fixed multiple of the daily benefit on the occurrence of a defined set of CI events
- i. Discuss the likely impact on the premium rates if the deferred period were to be reduced. [8]
 - ii. Discuss the underwriting measures that can be put in place if the CI rider is offered. [4]
[Total 12]

PLEASE TURN OVER

QUESTION 4

You are a pricing actuary at a health and care insurer in a country with a well-established insurance market. You are developing a group core-condition critical illness product.

The core conditions covered by this product are: Heart attacks (HA), Strokes (S) and Cancers (C).

The insurer has significant experience in the PMI market, but has to date not sold critical illness products.

The following is an extract of the incidence rates (i_x^k) by age (x) for the core conditions (k), based on your recent research.

Age (x)	i_x^{HA}	i_x^S	i_x^C
25	0.0001	0.0002	0.001
35	0.0002	0.0003	0.002
45	0.0005	0.0004	0.007
55	0.001	0.0009	0.01

The benefits will be a multiple of annual salary, dependent on age. An employer with the following staff profile has requested a quote for your group critical illness product:

Age (x)	Average monthly salary	Multiple of salary	Number of employees
25	R20 000	5	100
35	R30 000	4	80
45	R40 000	3	50
55	R60 000	2	20

- i. Calculate the annual risk premium for this employer for this critical illness product.
Show all workings [5]
- ii. List the additional items and considerations required to determine the final premium to charge this group. [4]

A colleague has commented that the premiums are notably higher than that charged by some competitors who sell group critical illness products.

- iii. Outline reasons why your product may still be attractive to the market. [6]

[Total 15]

PLEASE TURN OVER

QUESTION 5

Bluebird is a health insurer that operates in a country that has no significant state healthcare benefits. Bluebird writes private medical insurance, long-term care and critical illness business.

The following medical advances have taken place:

- A new scan that detects heart attack risk
- Medication for the treatment of cancer that reduces annual mortality by 50%.
- Medication that provides protection against Alzheimer's and arthritis.

Discuss the potential effects that the introduction of these new drugs would have:

- on the insurer's policy reserves for its existing business and
- on the volume and premium rates for new business

for each of the following products (stating any assumptions you make):

i. Private Medical Insurance [7]

ii. Critical Illness [6]

iii. Long-term care [4]

[Total 17]

QUESTION 6

In the developing country of Westeros, the State plays a significant role in the provision of healthcare to the population. Private healthcare insurance can be purchased on an optional basis. Those with private health insurance only utilise private facilities and private providers. This makes private insurance an 'optional alternative' to State healthcare cover. The economy of Westeros has a large informal sector and a small, but well-established private sector.

i. Outline the key objectives of State healthcare provision. [4]

ii. Outline the other bases on which private healthcare provision can co-exist with State provision. [3]

Recently, the State has been criticised about the quality of the healthcare it provides and the level of comprehensiveness of its healthcare offering.

iii. Identify and comment on the challenges the State may be facing with respect to providing healthcare to its citizens. [8]

PLEASE TURN OVER

The State has decided to review its healthcare offering to allocate its limited resources more efficiently. The aim is to improve the healthcare delivery system and healthcare outcomes.

- iv. Describe the various approaches to resource allocation that the state can consider in evaluating alternative systems, interventions and/or benefits. [5]

[Total 20]

QUESTION 7

The country of Actuarial offers long term care benefits to its citizens. Those that meet the eligibility requirements are enrolled in state-approved facilities. The cost of the benefit is funded from social security contributions and the state-approved facilities are privately owned. The benefit has previously been funded on a pay as you go basis. The Minister of Finance wants to understand the current liability to Actuarial associated with this benefit.

- i. Describe how you would quantify this liability. [8]

The Government of Actuarial is considering amending the level of the benefits provided such that the eligibility requirements are strengthened to exclude less severe cases and the amount of cover is reduced to 75% of the cost of enrollment in state-approved facilities with the alternative of receiving the benefit as a home care allowance.

- ii. Discuss how the implication of these changes for the citizens of Actuarial. [4]

ABC Life is an insurer in Actuarial who is now considering offering long-term care products to address the gap in cover associated with the above changes.

- iii. What are the risks to ABC Life in offering this cover? [6]

- iv. Describe how ABC Life is likely to underwrite this cover. [3]

[Total 21]

[Grand Total 100]

END OF EXAMINATION