

EXAMINATION

23 September 2008 (pm)

Subject ST1 — Health and Care Specialist Technical

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
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 7 questions, beginning your answer to each question on a separate sheet.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, 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.

- 1** The standard benefit of an income protection product is to provide the insured with regular short- or long-term payments during periods of incapacity.
- (i) List the additional benefits that may be added to standard income protection covers. [2]
- (ii) Explain the reasons behind offering benefits in addition to the standard income protection covers. [4]
- [Total 6]

- 2** You are the valuation actuary of a small company writing only Term Assurance (TA) and Accelerated Critical Illness (ACI) business. As part of the year end statutory reporting requirement, you are required to calculate the Capital Requirement for Long Term Insurance (CRLTI).

For the long-term insurance business, CRLTI is calculated as the sum of the following components:

Insurance expense risk capital component =
1% of the “Adjusted Mathematical Reserves”

Insurance market risk capital component =
3% of the “Adjusted Mathematical Reserves”

Insurance mortality risk capital component =
0.3% of the “Adjusted Capital at Risk”

where

“Capital At Risk” is calculated as:
Total Sum Assured minus Mathematical Reserves

“Adjusted Mathematical Reserves” is calculated as:
Gross Mathematical Reserves * Reinsurance factor for reserves

“Reinsurance factor for reserves” is calculated as:
Net (of reinsurance) Mathematical Reserves / Gross Mathematical Reserves
(subject to a minimum of 85%)

“Adjusted Capital At Risk” is calculated as:
Gross Capital At Risk * Reinsurance factor for capital at risk

“Reinsurance factor for capital at risk” is calculated as:
Net (of reinsurance) Capital At Risk / Gross Capital At Risk
(subject to a minimum of 50%)

At the most recent valuation, you have the following information.

Term Assurance

Gross Sum Assured = £20,000m

Gross Mathematical Reserves (excluding Expense & Miscellaneous Reserves) =
£500m

Reinsurance arrangement: 60% Quota Share

Accelerated Critical Illness

Gross Sum Assured = £10,000m

Gross Mathematical Reserves (excluding Expense & Miscellaneous Reserves) =
£350m

Reinsurance arrangement: 80% Quota Share

Global Expense & Miscellaneous Reserves

= £20m

- (i) Calculate the total CRLTI for your company based on the above information, stating all the assumptions you make. (For this purpose, the ACI business will not be split and is considered to have death risk only.) [6]

Your company has recently purchased the life insurance subsidiary of a bancassurer. The block consists of ACI business only and there is no reinsurance arrangement. At the most recent valuation, the total sum assured is £12,000m and the mathematical reserves are £360m.

- (ii) Calculate the CRLTI for this company on its own. [2]
- (iii) Assuming that you have decided to hold the same amount of £360m as reserve for your valuation, calculate the CRLTI for the merged company. [4]
- (iv) Explain why your answer in part (iii) is less than the sum of your answer in part (i) and part (ii). [2]
- (v) Apart from the benefits in part (iv), suggest other possible synergies that could be achieved through this acquisition. [6]

[Total 20]

- 3** (i) Define the terms gross and net replacement ratio and indicate their impact for insurance companies writing income protection business. [3]

In Actuarial, the company XYZ provides its working directors and senior staff with the following health benefits during incapacity.

- (a) an income protection benefit of 70% of gross pre-disability salary, plus
- (b) an income protection benefit of 15% of gross pre-disability salary in respect of employees' contributions to the XYZ Pension Fund

The scheme is insured with the incapacity definition being based on "own occupation".

All income protection benefits are paid direct to the employee during claim and are not subject to tax.

Normal retirement age for XYZ is age 65. Benefits increase at an annual rate of 10% during claim payment.

- (ii) Discuss the effect of the benefit structure on the scheme's claims experience. [4]

It has been suggested to XYZ that the benefit structure should stay the same but that benefits should be paid during incapacity for five years. At that time the income payments will cease, the employee will leave service and a lump sum of five times the annual income benefit currently being claimed should be paid to the employee.

- (iii) Discuss the effect of the revised benefit structure on the scheme's claims experience and the additional considerations for the insurer if they introduce these changes. [5]
[Total 12]

- 4** (i) State three ways in which a life insurance company can obtain underwriting information about a person making an application for a health insurance contract, and state the information obtained in each case. [6]

- (ii) Explain why all three sources of information given in part (i) are not necessarily obtained for all applicants and how the company will decide upon which of the three to obtain, both for a particular individual and for its applicants in general. [3]

- (iii) Suggest the underwriting decisions that the insurance company could take on the basis of the information obtained in (i). [3]
[Total 12]

- 5** Outline two methods used to provide dental insurance and briefly explain how dental insurance might be underwritten. [5]

6 Arcadia, a middle income country has a population that comprises:

- (a) a small wealthy elite
- (b) a growing and prosperous middle class predominantly involved in government service, the professions and business, and
- (c) a large poorer working class predominately involved in agriculture

In recent years Arcadia has become increasingly prosperous with the traditional healthy Arcadian diet being pushed aside in favour of imported expensive western fast foods. At the same time, the incidence of bowel cancer has started to increase. The Arcadian government has accepted a proposal from an international agency that the population should be tested in a substantial pilot study using a modern test for preliminary signs of bowel cancer. It is hoped to determine whether the increase in bowel cancer is linked to the change in diet.

The Arcadian Life and Health Insurance Company (ALH) is the market leader in the Arcadian long-term life and health business in Arcadia. ALH has sold two types of critical illness products in recent years:

Type A: a high sum assured product to the wealthy and the middle classes, and
Type B: a low sum assured product to the working class.

You are a consulting actuary working for an international actuarial consulting group with responsibilities that include actuarial support for ALH. The actuary of ALH has written to you requesting a report to be presented to the ALH board of directors outlining the expected effects of the pilot study on the existing critical illness portfolio.

- (i) Describe the information that:
 - (a) you would like the actuary of ALH to send you and
 - (b) you would expect to be able to extract from other data sourcesso that you can provide the report. [11]
- (ii) Describe the likely effects of the pilot study on the claims experience of the existing portfolio. [2]
- (iii) Describe the likely effects of the pilot study results on the future pricing of new business of ALH. [2]

In addition, the head of your world-wide actuarial division has written to you asking for a report of the effect of these new diagnostic tests for bowel cancer on the reinsurance portfolios of companies reinsuring critical illness written in Arcadia.

- (iv) Outline the points you would make in your reply to the head of your world-wide actuarial division. [2]
- [Total 17]

- 7**
- (i) State the reasons why a health insurance company may want to analyse the surplus arising on its supervisory basis over a year. [2]
 - (ii) State the reasons why the insurer may also analyse the change over a year in its embedded value. [2]

An actuary could make use of the results of analysing the experience, the surplus arising and the change in the embedded value to reassess his or her view of the future with regard to the company.

- (iii) Suggest the areas in which the various risks faced by a health insurer could be controlled as a result of the actuary's reassessment of his or her view. [6]

You are the pricing actuary of a large health insurer, which provides a wide range of critical illness, income protection and private medical insurance products. You are in the process of setting the pricing assumptions for the most recent premium-rating exercise. You are about to start an analysis of expenses in order to allocate expense costs correctly between the different classes and rating groups in the portfolio.

Your operations manager suggests that, in place of an expensive in-house analysis, the company should simply calculate its expense loadings from an average of expenses published in the accounts for companies writing similar products in your country.

- (iv) Discuss the pitfalls of following this approach. [10]
- (v) Describe the approach you would adopt in dealing with the following main items of expense:
 - (a) salaries and salary related expenses
 - (b) property costs (rent, property taxes, heating, lighting and cleaning)
 - (c) one-off capital costs

[8]

[Total 28]

END OF PAPER