

# EXAMINATION

7 April 2006 (am)

## 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 8 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.*

- 1** You are an actuary working in the financial projections team within a well-established insurer that writes both long and short-term classes of health insurance. A junior actuarial analyst in your team has identified that lapse rates for the organisation have deteriorated over the last five years.

List the factors by which you would analyse the data in order to investigate this apparent trend. [4]

- 2** State the reasons why a health and care insurer would analyse:

- (a) the surplus arising over a year on its supervisory basis
  - (b) the change over a year in the present value of the expected profit from its existing business
- [4]

- 3** A large health and care insurer writes a pre-funded long term care contract. You are a consulting actuary and you have been asked to carry out a morbidity experience analysis. State, with reasons, the information you would request from the insurer to complete this work. [7]

- 4** A health insurer writes individual income protection contracts with a deferred period of 3 months. All benefits are payable monthly in advance.

On 1 January 2005 the insurer purchased reinsurance cover under the following treaty terms:

- Quota share — 75% of each risk is ceded.
- Maximum retention — £1,000 benefit per annum per life.
- All risk prior to 1 January 2005 is to be retained by the insurer.
- Risk premium rates — Reinsurance rates are applied monthly to the sum at risk. The rate definition is “age next birthday at the previous policy anniversary”.

You are given the following extract of the premium rate table:

<i>Age next</i>	<i>Annual rate per £1,000 annual benefit</i>
39	1.2
40	1.3
41	1.4
42	1.5

On 1 January 2005 the insurer has 1000 policies aged 40 next birthday under the above rate definition with the following sum insured profile for each policy:

<i>Number of policies</i>	<i>Sum at risk for each policy</i>
800	£3,000 annual benefit
150	£4,000 annual benefit
50	£5,000 annual benefit

- (i) Calculate the reinsurance sum insured. [2]
- (ii) Assuming that 10% of the policies lapse uniformly during the year, estimate the reinsurance premium for 2005, stating any assumptions you use. [3]

You are given the following extract from the insurer's claims records:

<i>Claim</i>	<i>Date first sick</i>	<i>Date claim notified</i>	<i>Date claim accepted</i>	<i>Date of recovery</i>	<i>Annual Benefit</i>
A	5 November 2004	12 December 2004	5 January 2005	4 June 2005	£3,000
B	12 December 2004	17 January 2005	26 January 2005	11 July 2005	£4,000
C	7 January 2005	18 February 2005	9 March 2005	6 August 2005	£3,000
D	25 June 2005	13 August 2005	18 August 2005	24 August 2005	£3,000
E	21 November 2005	6 January 2006	12 January 2006	20 March 2006	£3,000

- (iii) State, with reasons, whether the reinsurer was required to make payments for each of the above claims. [2]
- (iv) Calculate the total amount of the claim payments made by the reinsurer in respect of these claims. [2]
- (v) State the other factors the reinsurer would need to consider in order to determine the profitability of this business? [2]

[Total 11]

- 5** (i) List the options available to health and care insurers when they receive an application which is deemed to represent a higher risk than that assumed in the pricing assumptions. [3]
- (ii) Suggest, with reasons, the most appropriate options for the following risks:
- (a) An applicant with a history of knee pain applying for income protection cover.
  - (b) A female applicant for a stand alone critical illness policy where there is a family history of breast cancer.
  - (c) An applicant for an accelerated critical illness contract who is a professional racing driver.
  - (d) An applicant for a pre-funded long term care insurance who is suffering from memory difficulties.
- [10]  
[Total 13]

- 6** You are the pricing actuary of a leading individual critical illness provider. Market research has identified that the critical illness product could be improved by the addition of the lump sum benefit being paid on the insured being diagnosed with any permanent mental health condition.
- (i) Discuss the advantages and disadvantages of adding the mental health condition to the contract and whether you would recommend this mental health benefit should be added to the contract. [8]
- (ii) You have been asked to develop the key morbidity and mortality assumptions to set a premium basis for this suggested addition. Indicate the likely key sources of data available and the adjustments that would be suitable to the data for this purpose. [5]
- [Total 13]

- 7** You are a product actuary within a health and care insurer, which is reviewing its income protection business.
- (i) Describe the ways that the insurer can tailor the level and timing of benefits provided by an individual income protection product to meet an individual customer's circumstances, including typical values for each and the broad impact of each feature on the price of the contract. [9]
- (ii) Describe how a policyholder's occupation may be relevant in an individual income protection contract. [5]
- (iii) Describe the types of guarantee that might be provided on individual income protection contracts. [5]
- [Total 19]

- 8** You are the risk management actuary working in a health and care insurer which writes income protection, critical illness and private medical insurance products.

Your organisation has just gained approval from your regulator to distribute its products through “Health and Care parties” where existing policyholders can hold annual gatherings of friends and family to sell your products. The party hosts will guide their guests as to the appropriate forms of cover and will be remunerated on a commission basis.

- (a) Describe the insurance and other business risks to the insurer associated with this proposal.
- (b) For each of the above risks, describe how they can be mitigated. You should include the monitoring mechanisms the insurer should put in place to enable these risks to be managed.

[29]

**END OF PAPER**