

INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

13th May 2008

Subject ST1 — Health and Care Insurance

Time allowed: Three hours (14.15* pm – 17.30 pm)

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer sheet.*
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. *The answers are not expected to be any country or jurisdiction specific However, if Examples/illustrations are required for any answer, the country or jurisdiction from which they are drawn should be mentioned.*
4. *You must not start writing your answers in the answer sheet until instructed to do so by the supervisor.*
5. *Mark allocations are shown in brackets.*
6. *Attempt all questions, beginning your answer to each question on a separate sheet.*
7. *Candidates should show calculations where this is appropriate.*
8. *Fasten your answer sheets together in numerical order of questions. This, you may complete immediately after expiry of the examination time.*

Professional Conduct:

It is brought to your notice that in accordance with provisions contained in the Professional Conduct Standards, If any candidate is found copying or involved in any other form of malpractice, during or in connection with the examination, disciplinary action will be taken against the candidate which may include expulsion or suspension from the membership of IAI

Candidates are advised that a reasonable standard of handwriting legibility is expected by the examiners and that candidates may be penalized if undue effort is required by the examiners to interpret scripts.

AT THE END OF THE EXAMINATION

Please return your answersheets and this question paper to the supervisor separately.

<p>In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator.</p>

- Q1)** You are the valuation actuary of a health and care insurer.
- (i) Describe your principal concerns in the design and pricing of a new health insurance product. (5)
- (ii) Outline the different ways in which reinsurance can affect the pricing of a health insurance product. (6)
[11]
- Q2)** Government regulations covering health and care insurance business may, inter alia, prescribe minimum levels of supervisory reserves.
- (i) Explain, by giving examples, how such regulations might influence the design of health and care insurance products. (6)
- The country of Actuarialia is proposing to introduce new regulations making it illegal for insurance companies to discriminate on grounds of gender and age, when offering for sale health insurance products.
- (ii) Discuss the different ways in which this will impact insurers from the point of view of short-term individual health insurance. (9)
[15]
- Q3)** An insurance company offers a conventional regular premium income protection plan, terminating at an age not exceeding 70. Both benefits and premium are inflation linked. The premiums are waived whenever sickness benefits are paid.
- (i) List the items of data to be held for each policy for the purpose of calculating a statutory valuation of benefits and premiums. You can assume that multiple-state methodology will be used for this purpose and that you will be able to estimate all the transition probabilities. (4)
- (ii) Describe the multiple state modelling approach for estimating the expected claims cost for income protection insurance, with a deferred period, setting out the assumptions to be made. (6)
- (iii) Outline the advantages of multiple state methodology, compared with alternative methods of valuing income protection benefits, for the purpose of calculating supervisory reserves. (2)
[12]
- Q4)** On 1 January 2007 an insurer has 1000 lives aged 40 last birthday with typical stand-alone critical illness policies. The average sum assured is Rs 425,000.

You are given the following extract from a mortality/morbidity table:

Age Exact	(1)	(2)	(3)	(4)	(5)
40	2.6	0.1	2.0	0.35	0.1
41	2.9	0.1	2.2	0.38	0.1
42	3.3	0.1	2.5	0.40	0.1

where:

- (1) Annual incidence rate for critical illness per 1,000.
- (2) 30-day mortality rate following critical illness, per 1,000.
- (3) Annual mortality rate from all causes per 1,000.
- (4) Proportion of all deaths from critical illness events.
- (5) Proportion of policies lapsing per annum.

All the decrements are assumed to operate uniformly over a year. No initial waiting period shall apply.

You are given the following claims information:

	Claim Amount	Date of critical illness event	Date of death	Date of claim notification	Date of settlement
1	Rs 200,000	03.03.2007		20.04.2007	03.02.2008
2	Rs 220,000		01.11.2007	05.11.2007	01.08.2007
3	Rs 350,000	04.05.2007	29.05.2007	21.06.2007	03.07.2007
4	Rs 450,000	12.12.2006	14.03.2007	01.05.2007	01.08.2007
5	Rs 460,000	01.07.2006		20.09.2007	05.12.2007
6	Rs 575,000	02.02.2007	27.11.2007	03.09.2007	07.11.2007

- (i) Using the life table information above, calculate the expected claim cost for 2007. (5)
 - (ii) Calculate the actual to expected claim ratio on an amounts basis for 2007. (2)
 - (iii) Explain why the result calculated above may give an incomplete view of the claim ratio. (1)
 - (iv) If all of the policies had been typical accelerated critical illness contracts indicate, with reasons, whether the experience would be better or worse. (5)
- [13]

Q5) The underwriter has a number of choices when an application for a private medical insurance policy is deemed to represent a higher risk than that assumed by the pricing assumptions as well as the company's underwriting philosophy.

- (i) List five possible options that the underwriter has. (5)
 - (ii) Explain what makes the underwriting process for an income protection cover more difficult than for a term insurance policy. (6)
- [11]

Q6) The benefits for a pre-funded long-term care insurance policy are typically triggered by the failure of a specified number of ADLs. A company is proposing to introduce a policy in which 50% of the benefit would be payable upon the failure of two out of six ADLs, 75% of the benefit would be payable upon the failure of three out of six ADLs and 100% of the benefit would be payable on the failure of four or more out of six ADLs.

Discuss the advantages and disadvantages of this design, under which benefit levels vary with the number of ADLs failed. [8]

- Q7)** It is argued that certain key characteristics need to be satisfied before an illness or a condition makes it appropriate for inclusion in a critical illness (CI) product.
- (i) List and explain these characteristics. (3)
 - (ii) Discuss whether and how “Malaria” does or does not satisfy each of these characteristics and recommend – with reason – whether you would add Malaria to the list of covered conditions. (5)
In some countries, the insurance market uses agreed industry-wide wording for definitions of the diseases and clinical procedures.
 - (iii) Describe the advantages of such agreed definitions to the health and care insurance industry. (6)
 - (iv) Explain Terminal Illness cover and describe its impact as an additional benefit to:
 - a) CI cover provided as acceleration rider to a term insurance contract
 - b) CI cover on a stand-alone basis. (4)
- Q8)** A health insurer is reviewing the adequacy of its premium rates for the following two products:
- a) 20-year critical illness insurance
 - b) Private medical insurance
- Discuss the extent to which margins are required in these products against adverse contingencies, identifying the elements of the basis where margins are required and specifying appropriate ways in which they can be included in the costing. [12]
