Actuarial Society of India

EXAMINATION

30th October 2006

Subject ST1 — Health and Care Insurance
Specialist Technical

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. *You must not start writing your answers in the answersheet until instructed to do so by the supervisor.*

4. *Mark allocations are shown in brackets.*

5. *Attempt all questions, beginning your answer to each question on a separate sheet.*

6. *Candidates should show calculations where this is appropriate.*

7. *Fasten your answer sheets together in numerical order of questions. This, you may complete immediately after expiry of the examination time.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer sheets firmly attached, and this question paper to the supervisor.

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

Q.1)

(a) Explain the nature of the mortality, expense and investment risks in income protection contracts. (4)

(b) Explain how moral hazard may occur in a portfolio of income protection policies and state which transition probabilities are likely to be affected by moral hazard. (3)

(c) Describe the factors, in addition to pricing and reserving bases, that affect the capital requirements for individual income protection business and indicate the significance of each factor. (3)

[10]

Q.2) A health insurer is considering its reinsurance requirements for an established portfolio of group and individual private medical insurance policies.

(a) Describe the types of reinsurance arrangement that may be appropriate for this line of business and the advantages and disadvantages of each from the insurer's perspective. (6)

(b) Explain why the reinsurer is unlikely to be prepared to fix the level of the reinsurance premium rates for more than one policy year at a time. (3)

(c) Describe briefly the sources of data that the reinsurer might use to set assumptions of the expected claim costs. (5)

[14]

Q.3) "Hamesha Sukh Raho" is a well-established healthcare insurer. As at 31 March 2005, assets of the company are Rs.1500 crore and free assets are Rs.100 crore. The company has a policy portfolio giving a profit of 10 % per annum (of the freehold assets)for the next 5 years..

(a) Calculate the present value of future profits at 31 March 2005 at the company's risk discount rate of 10 % and the embedded value. (2)

(b) Calculate the present value of future profits and the embedded value at 31 March 2006, assuming that the experience has been in line with assumptions. (2)

(c) State the factors that contribute to the change in embedded value in the year to 31 March 2006. (2)

(d) Describe the impact on embedded value if experience is not in line with assumptions. (2)

(e) Describe the impact on embedded value of writing new business (2)

[10]

Q.4) You are the valuation actuary of a healthcare insurer. Your junior actuarial officer mentioned "the profit from an income protection product has been shown to be very sensitive to the withdrawal rates, particularly at early policy durations when the asset share is often negative".

(a) Discuss the importance of accounting for withdrawal decrements when pricing health products. (5)

(b) State with reasons whether you would use a stochastic or deterministic model for withdrawal rates to assess the future risks to the company from this cause. (3)

[8]

Q.5) "State Bank of Happiness (SBH)", a large bank currently has a defined-benefit occupational pension scheme. The scheme provides a variety of benefits to the bank's employees, in return for contributions paid by the employer and the employee.

One of the benefits is an ill-health retirement pension. This is paid to members of the scheme who are judged as being permanently unable to work again as a result of illness or injury. The amount of the pension is related to the member's salary at the data on which they were granted ill-health retirement. The pension is $1/60^{th}$ of salary at the date of ill-health retirement, for each year between the date of joining the pension scheme and the expected date of normal retirement at the age of 65.

Describe the factors that may affect the design of a group income protection insurance scheme that would be suitable for the employees of SBH, giving examples of the benefits that may be offered. **[12]**

Q.6) A ten-year term assurance policy with a critical illness acceleration rider benefit for 100% of the sum assured of Rs.1,00,000 is to be issued to a person aged 45. At the fifth policy anniversary, there is the option to increase the sum insured to Rs.2,00,000. On taking up the option, the additional premium is determined on the company's normal premium basis and is payable for the remaining 5 years of the policy. The office calculates its normal premium rates at 4% per annum interest, assuming that total claim incidence rates are equal to the mortality rates in the AM92 Select mortality table, but for ages 10 years older than the actual age. Benefits are payable at the end of the year of claim. Calculate:

(i) the basic premium for the original policy without the option (3)

(ii) the expected present value of the option benefits as at the option exercise date (3)

(iii) the additional amount that should be charged for the option, assuming that this is spread over the first 5 years of the policy. Assume annual premiums and ignore expenses and other loadings. (4)

[10]

Q.7)

(a) Briefly, explain the term "Burning Cost" (1)

(b) Estimate the cost of private medical insurance (PMI)_claims incurred for the year 2005, based on the following information:

	31/12/2005	*31/12/2004*
PMI claims paid during the year to date	5,000	4,000
Reserve for claims reported but not settled (RBNS)	500	400
Reserve for claims incurred but not reported (IBNR)	200	150

(3)

(c) Explain the rationale of your calculation (1)

[5]

Q.8)

(a) An insurer offers a group critical illness policy providing lump sum benefits to employees on critical illness diagnosis only. Under the policy, all insured employees are entitled to critical illness benefits equal to four times the rate of salary being earned at the time of diagnosis. Assume that the policy is not experience rated.

State a possible formula for the equation of value of the policy benefits, defining all terms used (3)

(b) A healthcare insurer offers private medical insurance and income protection benefits to group insurance schemes. The scheme rules define 'active' employees as those who are currently working (*i.e.* not absent from work through sickness or disability).

Discuss the relative levels of anti-selection that could result from the following alternative eligibility provisions in the scheme rules.

(i) Active employees can obtain free cover at any time during their employment.

(ii) Active employees can obtain free cover provided they apply within 3 years of taking up their employment.

(iii) All employees are automatically issued with free cover one year after taking up employment (provided they are then actively at work).

(iv) All employees are automatically issued with free cover on the day they start work. (4)

[7]

Q.9) A healthcare insurer offers policyholders the option to select at outset benefits that increase in a defined way at each policy anniversary throughout the term of the contract.

(a) Suggest with reasons an appropriate type of index for determining annual benefit indexation increases under each of the following contracts:

i) Income protection policies
ii) Critical illness policies
iii) Pre-funded long-term care insurance policies (3)

(b) Explain why annual increases of a fixed percentage of the sum assured and premiums may be problematic in practice. (3)

[6]

Q.10) You are reviewing the adequacy of premium rates for a range of contracts. Discuss the extent to which margins against adverse contingencies are required in the following cases. Where you think margins are required, state with reasons how and where in the basis the margins might be applied.

? Immediate needs long-term care annuity

? Private medical insurance

[10]

Q.11) A healthcare insurer offers individual, pre-funded long-term care and income protection policies. The insurer has the right to review premium rates annually after the 5^{th} policy anniversary, according to the overall claims experience of each type of contract.

(a) i. Explain why reviewable premium rates may be more problematic in practice for long-term care policies than for income protection policies. (2)

ii. Suggest possible modifications to the provisions for premium rate reviews for the long-term care polices to address the issues identified in (i). (2)

iii. Describe the risks to the insurer of guaranteeing the premium rates for long-term care and income protection policies throughout the policy term and how these risks can be managed by the insurer. (4)

[8]

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