Faculty of Actuaries **Institute of Actuaries**

EXAMINATIONS

22 April 2004 (am)

Subject 302 — Life Insurance

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.*

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 Actuarial Tables and your own electronic calculator.

1 (i) Discuss the typical relationships between the strength of the pricing basis, the reserving bases, and the solvency capital requirements for without profits life insurance business. [3]

(ii) In a country where reserves are calculated on a prudent basis, a life insurance company uses the movement in its embedded value as a measure of profitability.

Describe how a strengthening of the mortality assumption in each of:

(a) the reserving basis
(b) the experience basis used in the embedded value calculation

affects this measure of profitability. [4]
[Total 7]

2 A life insurance company currently sells without profits whole life assurance contracts through insurance intermediaries. It now additionally intends to market this business through a series of advertisements in a national newspaper.

Discuss the factors that might cause the premium rates for policies sold through this new sales channel to differ from those for similar contracts sold through insurance intermediaries. [8]

3 A life insurance company sells immediate annuities purchased with the proceeds of pension policies at retirement. It offers two sets of annuity rates, depending on whether the client is a smoker or not.

(i) Explain why the annuity would be underwritten. [2]

(ii) List the methods of underwriting that might be used for this product. [2]

(iii) Describe the steps necessary to review the effectiveness of the underwriting process. [4]
[Total 8]

4 (i) Outline the principal features of risk premium reassurance. [4]

A mutual life insurance company writes conventional term assurances. It reassures 80% of the sum at risk using risk premium reassurance. The reinsurer has just given three months notice that the reassurance treaty will be cancelled for new business, although existing policies will continue to be reassured.

(ii) Discuss the impact this decision may have on the company, if the reassurance protection cannot be replaced. [6]
[Total 10]

5 A life insurance company has written a wide range of unit-linked business for many years. Two years ago it launched a non-linked regular premium term assurance product. The contract has a sum assured payable on death, or on the earlier diagnosis of one of a specified list of critical illnesses.

The company is reviewing the premium rates and profitability of this contract.

(i) Describe the factors that would be taken into account in this review for each key assumption used in determining the premium rates. [8]

(ii) Describe the process by which the profitability of the revised premium rates would be assessed. [4]
[Total 12]

6 A life insurance company is going to investigate its current solvency position.

(i) Discuss why it might use a stochastic model for this. [6]

(ii) Describe how the company would carry out the investigation, using a stochastic model. You do not need to describe how the experience bases would be determined. [7]
[Total 13]

7 A life insurance company is considering launching a group term assurance contract. The contract will be purchased by employers for their employees. It will provide a benefit to the dependants of an employee, payable on the death of the employee whilst in employment. The death benefit will be defined as a fixed multiple of each employee's salary, where the multiple is determined by the employer when the scheme is set up, and is not chosen by the employee. The premium is expressed as a single rate for each scheme, irrespective of age and sex, multiplied by the total sum at risk.

(i) Discuss the mortality risks associated with this contract and how they can be managed. [10]

(ii) Describe the other risks to the company in launching this product and the actions it can take to reduce those risks. [11]
[Total 21]

8 (i) State the principles of investment that apply to a life insurance company. [2]

A proprietary life insurance company has, in the past, only sold unit-linked contracts, and has a low level of free assets. It is about to enter the market for single premium conventional with profits endowment assurances with a fixed term of ten years. Surplus will be distributed by the additions to benefits method, through a combination of reversionary and terminal bonus.

(ii) Discuss the factors that the company should take into account when deciding on the types of assets to use to back the new contracts, and how these affect the types of asset that would be chosen. [14]

(iii) Discuss the impact the choice of assets might have on the potential new business volumes for this company's product. [5]
[Total 21]

END OF PAPER