

EXAMINATIONS

13 September 2000 (am)

Subject 302 — Life Insurance

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *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.*
2. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
3. *Write your surname in full, the initials of your other names and your Candidate's Number on the front of the answer booklet.*
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 and this question paper.

*In addition to this paper you should have available
Actuarial Tables and an electronic calculator.*

- 1** Discuss the principles a life insurance company should follow when setting the lump sum discontinuance terms for with profits endowment assurance policies. [9]
- 2** A life insurance company proposes to launch a new single premium unit-linked whole of life product with the following features:
- 99% of the single premium is allocated to units at the offer price.
 - Sum assured is payable on death or on diagnosis of one of a list of serious illnesses.
 - Before age 60, sum assured is equal to the greater of:
 - the value of units; and
 - $x\%$ of the single premium paid, where $x\%$ is chosen by the policyholder at outset, with a minimum of 100% and a maximum of 300%.
 - From age 60 onwards, the sum assured is equal to the value of units.
 - No medical underwriting if $x\%$ is 100%.
 - A monthly management charge of 1% of the value of units and monthly deductions from the value of units for the cost of life and serious illness cover. The charges and deductions are variable in certain circumstances.
 - A guaranteed minimum surrender value on surrender after age 60.
- (i) State the principal elements of the experience which would be analysed for this product. [4]
- (ii) Describe the main experience-related risks that the company will bear on this product. [5]
- [Total 9]
- 3** (i) State what is meant by dynamic solvency testing. [2]
- (ii) Discuss the main assumptions which need to be made when carrying out dynamic solvency testing for a proprietary life insurance company which has recently closed to new business and has written only unit-linked business. [8]
- [Total 10]

- 4**
- (i) State the investment principles which should be followed by a life insurance company. [3]
 - (ii) Describe how a company's investment strategy may be affected by the regulatory framework in which it operates. [3]
 - (iii) Describe how a cash flow model can be used to assess the suitability of a company's investment strategy. [4]
- [Total 10]

5 A life insurance company with substantial free assets writes a significant volume of without profit term assurance business. Each year the company carries out a mortality investigation for this class of business. Over recent years, the mortality experience has gradually improved, but neither the pricing nor the valuation mortality assumptions have been altered.

The latest investigation has shown a further significant improvement in the mortality experience.

Discuss:

- (i) how the results of these investigations could be used when setting the premium rates and the supervisory valuation basis; and [8]
 - (ii) how any decisions made would affect the emergence of mortality profit. [5]
- [Total 13]

6 A life insurance company adopts a strict underwriting approach under a particular class of business.

- (i) Explain why it may also wish to use reinsurance to manage the mortality risk under the business. [4]
 - (ii) Explain why, having entered into a reinsurance treaty, it would still wish to underwrite the business. [4]
 - (iii) Describe the main features of original terms reinsurance and describe the main features of risk premium reinsurance. [7]
- [Total 15]

7 A life insurance company is setting the pricing bases for some of its products.

Discuss the importance of the assumptions for the investment return, expenses and withdrawal rates, when setting the pricing bases for the following products:

- (i) A without profit term insurance. [5]
- (ii) A without profit immediate annuity. [4]
- (iii) A large unit-linked group endowment assurance where the only charge levied is a monthly percentage of each member's fund and all contributions are made by the employer. The scheme provides a cash fund for each member, equal to the value of the units purchased by premiums paid by the employer on their behalf, which is used to purchase a pension at retirement. [7]

[Total 16]

8 A proprietary life insurance company has access to significant additional capital funding provided that it can secure sufficiently high returns on this. The company is proposing to launch a unit-linked regular premium whole of life product with better surrender terms than are normally available under comparable products from other companies.

Under this contract the company will deduct mortality charges, in respect of the difference between the selected level of cover and the value of the units allocated, by cancelling units. If insufficient units are available to meet the mortality charge at any time the level of cover may be reduced, additional premiums may be payable or the contract may lapse.

- (i) Discuss the factors which should be considered when determining the suitability of a contract design. [8]
- (ii) List the possible elements of a charging structure for the product and specify, with reasons, the structure you consider most appropriate in the circumstances of this company. Numerical values are not required. [8]
- (iii) State, with reasons, the profit objectives which might be used. [2]

[Total 18]