EXAMINATIONS

September 1999

Subject 402 — UK Fellowship Life Insurance

Paper One

**You must answer this subject only,
you may not attempt another subject in the 400 series.**

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 7 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 A UK life insurance company writes two types of ten year endowment assurance products:

- a non-linked with profits policy with compound reversionary bonuses and non-guaranteed terminal bonus;

- a unit-linked policy with a maturity benefit equal to the bid value of units and a minimum death benefit of 75% of the total premiums payable. The charges are as follows:

  - a front-end load via a reduced allocation in the early months, followed by 100% allocation thereafter;

  - a 5% bid / offer spread;

  - a policy fee, linked to the RPI, deducted from units monthly;

  - an annual management charge reflected in the unit price;

  - a mortality charge based on the sum at risk, deducted from units.

  Units are invested in internal linked funds, which have no guarantees. A bonus addition of units is granted on the eighth policy anniversary.

Describe the way future cash flows are used in the valuation of these contracts, and comment on the similarities between the two methods. [9]

2 (i) Discuss the possible profit criteria that a life insurance company may use when pricing unit-linked contracts using cash flow techniques. [5]

(ii) Discuss the reasons why the following items are normally included in such cash flow when deriving the profitability of a new product:

(a) withdrawals
(b) statutory reserves and solvency margins [7]

(iii) It has been suggested that withdrawals need not be included in cash flow profit testing on a particular product because the surrender value will not exceed the statutory reserve and thus profits will emerge on surrender.

Discuss this suggestion. [4]
[Total 16]

3 (i) Describe the principal features of the regulations governing the statutory valuation of the non-linked long term liabilities of a UK life insurance company. [14]

(ii) Calculate the required solvency margin in respect of a portfolio of ten-year conventional term assurance contracts with a total sum assured of £50m and total gross mathematical reserves of £5m. 50% of each policy is reassured on an original terms basis. This is the only business written by the company concerned. You should include full details of your workings. [4]
[Total 18]

4 A life insurance company writes all types of non-linked with profits business. Following an internal investigation, it has been decided to distribute part of the company's free estate to its with profits policyholders.

Describe the advantages and disadvantages of each of the following methods of making the distribution:

- reversionary bonus;
- special reversionary bonus;
- terminal bonus. [9]

5 (i) Define the appropriation price of units in an internal linked fund and explain how the appropriation price is calculated. [5]

(ii) Describe the principal sources of risk for an insurance company which are associated with the pricing units in an internal linked fund. [4]
[Total 9]

6 A UK life insurance company writes individual pensions contracts on a unitised with profits basis. The retirement age is chosen at outset and may be between 50 and 70. Policyholders may pay single premiums, monthly premiums, or both, and may vary the level of monthly premiums at any time.

Describe how the actuarial design and pricing of the product could be amended to minimise the cost to the company of each of the following features of the current product design:

(i) There is a guaranteed minimum rate at which units can be converted into annuity benefits at retirement, the annuity rate being calculated using current annuitant mortality rates, current expense loadings, and 4% per annum interest. [6]

(ii) Waiver of premium benefit may be chosen at outset, for an additional charge. With this benefit, if the policyholder is unable to follow his/her usual occupation for more than six months, monthly premiums will not be collected, but units will still be credited as if the premiums had been received. [5]

(iii) Retirement may be deferred for up to five years from the chosen retirement date. The policyholder may choose to retire and vest the policy immediately at any time within the five year period. No market value adjuster will be applied on vesting in the five year period. [4]

[Total 15]

7 A UK life insurance company writes only unit-linked business. The company transacts all types of individual life assurance, permanent health insurance and personal pensions policies.

Each year the embedded value of the company is calculated, and the change in embedded value over the year is reported as profit in the group accounts of its parent company. The company is about to begin the annual calculation of the embedded value for this purpose.

(i) Describe the steps that should be taken to prepare the policy data and to ensure that the data is suitable for the calculation process. [6]

(ii) Explain why the company would want to analyse the change in the embedded value. [5]

(iii) A director of the parent company has asked why the embedded value of the company has grown at around 12% per annum over the last year when the investment return on assets has only been on average 9% per annum.

Draft a short response to the director to explain possible reasons for this.

[2 marks are available for drafting]

[8]

(iv) A second director has noticed that it is assumed in the embedded value calculation that the gross rate of return on the unit linked funds will be 10% per annum gross whereas the current yield on long term gilts is only 5% per annum. Discuss the points you would make to explain this difference to the director. [5]

[Total 24]