

EXAMINATION

4 October 2010 (pm)

Subject ST2 — Life Insurance Specialist Technical

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 before 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 six questions, beginning your answer to each question on a separate sheet.*
6. *Candidates should show calculations where this is appropriate.*

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 the 2002 edition of the Formulae and Tables and your own electronic calculator from the approved list.

1 A life insurance company operates a number of internal unit-linked funds. Unit prices are calculated daily. All the funds are expanding, and therefore are priced on an offer basis.

- (i) Explain the basic equity principle as it applies to the pricing of an internal unit-linked fund. [3]
- (ii) Describe how this principle is applied when determining the appropriation and expropriation prices for a fund. [3]

The following details are for the Equity Fund as at the end of 31 March 2010.

Market value of assets (excluding cash) within the fund = £50,000

Cash balance in the fund = £750

Number of units = 10,000

Selling costs of assets in the fund = £1,376

Purchasing costs of assets in the fund = £1,152

The market value and cash balances allow for current assets and liabilities of the fund, and any accrued income or tax adjustments.

There is an initial charge of 3% and all offer and bid prices are rounded to three decimal places.

Prices are calculated at the end of 31 March 2010, and applied to new requests for investments or disinvestments received during that day.

- (iii) Calculate the following in relation to this fund, stating any assumptions:
 - (a) Appropriation Price
 - (b) Expropriation Price
 - (c) Offer Price
 - (d) Bid Price
 - (e) Number of units purchased by a new investment of £1,500 received on 31 March 2010

[6]

[Total 12]

- 2** A life insurance company has recently started selling a regular premium unit-linked endowment assurance product. The death benefit is the maximum of the total premiums payable over the lifetime of the policy and the bid value of units. This benefit is charged for by a monthly deduction of units based on the sum at risk each month.

In the past a similar contract was offered, with the exception that the death benefit was the bid value of units. It is proposed that policyholders with this older version should be offered the opportunity to add the same minimum life cover to their policy as is provided under the new version of the product.

Discuss the factors that the company would need to consider before adopting this proposal. [9]

- 3** A life insurance company has written unit-linked single premium bonds for a number of years.

The company is expanding into the unitised with profits bond market. Regular bonuses would be added annually and may be zero but never negative.

- (i) Describe the alternative approaches for applying the regular bonuses to the unitised with profits bond. [4]

- (ii) Discuss the product features and assumptions which the company would need to consider for the launch of the new bond. [10]

[Total 14]

- 4** A life insurance company has sold a wide range of life insurance products through independent intermediaries for many years. A proposed change in legislation means that it will no longer be attractive to sell solely through this channel. The life insurance company is considering setting up a direct sales force.

Discuss the issues that the company should consider in setting up a direct sales force. [15]

- 5** A life insurance company sells non-reviewable conventional without profits term assurances and individual unit-linked endowment assurances.

- (i) Outline the features of these products. [8]

- (ii) Describe the main risks to the policyholder of purchasing each of these products. [6]

- (iii) Discuss the risks to the life insurance company of selling these products. [14]
[Total 28]

- 6 A life insurance company sells conventional with profits endowment assurance policies. It has 15,000 of these policies in-force at the very start of the year and sells a further 2,000 new policies on the first day of the year. The features of the business are as follows:

<i>Cohort</i>	<i>Number of policies</i>	<i>Average individual asset share at the start of the year</i>	<i>Average per policy sum assured plus attaching reversionary bonus</i>	<i>Average per policy terminal bonus payable on death</i>	<i>Expected death rates based on 100% mortality table X</i>	<i>Average premium per policy (annually in advance)</i>	<i>Number of deaths occurring at the end of the year</i>
A	10,000	\$5,000	\$5,000	\$1,000	0.020	\$600	150
B	5,000	\$4,000	\$4,500	\$1,000	0.010	\$600	60
C (New business)	2,000	\$0	\$3,500	\$500	0.007	\$700	5

All premiums are received on the first day of the year.

During the year the investment income (net of investment expenses) on the assets backing the asset shares totalled \$4.3 million.

Total acquisition expenses incurred in the year were \$1.5 million.

Total maintenance expenses were \$510,000 payable annually in advance and allocated to both in-force and new business.

Commission is 2% of every premium.

Deaths occur at the end of the year but before the declaration of any regular bonuses. There were no surrenders or maturities during the year. The company pays no tax.

The company pays shareholder transfers at the end of the year of one ninth of any terminal bonuses paid during the year plus one ninth of the cost of the declared bonuses added to policies in-force at the end of the year (after any deaths that occur). The company declared a regular reversionary bonus at the year end at a rate such that the cost, before any shareholder transfers, was 4% of the existing sum assured plus attaching reversionary bonus.

- (i) Calculate the total aggregate asset shares at the year end for the whole portfolio, explaining your approach.

[5]

The company calculates individual policy asset shares using actual death rates applied to the asset shares, where the death rates are taken from mortality table X and multiplied by a factor F. The factor F is based on total actual deaths divided by total expected deaths assuming 100% of mortality table X.

(ii) Show that factor F is equal to 0.81439. [2]

(iii) Calculate the individual asset share for an average policy within cohorts A and C, explaining your approach. [8]

The individual asset share for an average policy within cohort B is \$4,782.

(iv) Discuss the difference between the aggregate asset shares and the sum of the individual asset shares. [7]

[Total 22]

END OF PAPER