Institute of Actuaries of Australia

2006 PART III EXAMINATIONS

Subject Title: **Course 2A Life Insurance**

Date: **Tuesday 31 October 2006**

Time**: 9:15am to 12:30pm**

Time allowed: Three (3) hours plus fifteen (15) minutes of reading time

Instructions: Each new question (but not each section of a question) must be commenced in a new answer book.

Number of Questions: Six (6)

Question	Marks
1	16
2	16
3	18
4	16
5	17
6	17
Total	**100**

Candidates are required to answer ALL questions.

This paper has 7 pages (excluding this page and the blank back page).

INSTITUTE OF ACTUARIES OF AUSTRALIA

COURSE 2A LIFE INSURANCE NOVEMBER 2006 EXAMINATIONS

QUESTION 1 (16 Marks)

You are a consulting actuary to Electric Capital Foundation (ECF), a medium sized Australian life insurance company selling only lifetime annuity business to people aged 55 or over.

The company has been in operation for more than 15 years. In its early years of operation the company gained market share through competitive pricing. It has now been in the position of market leader for the last 6 years, which allows it to set the price for the market to a large degree.

The business is split in the following manner:

Curtate duration	Present value of annuity liabilities	%
0	184,967	6%
1	246,623	8%
2	308,279	10%
3	308,279	10%
4	277,451	9%
5	246,623	8%
6	215,795	7%
7+	1,294,774	42%
Total	3,082,791	100%

Age next birthday	Present value of annuity liabilities	%
56-65	709,042	23%
66-75	1,048,149	34%
76-85	894,009	29%
86-95	369,935	12%
96+	61,656	2%
Total	3,082,791	100%

A small amount of surplus assets (7% of current liabilities) has accumulated in the fund in recent years.

The Board has asked you to provide a report in which you are to:

(a) Identify clearly the main risks faced by the company. (5 marks)

(b) Describe potentially suitable strategies to manage those risks. (5 marks)

(c) Discuss the considerations surrounding a suitable asset allocation for the fund. (6 marks)

Draft your report to the Board.

QUESTION 2 (16 Marks)

You are an actuary on the underwriting committee of Royal Life Assurance Group, an Asian company successfully writing whole of life and endowment business in a growing market.

Your company has decided to issue a new yearly renewable term (YRT) product with a total and permanent disablement (TPD) rider. These products are only available on adult lives and will be distributed using insurance advisers.

The underwriting committee has asked you to provide it with your comments on the following questions for its next meeting. Identify clearly the points you would raise.

(a) What are the additional non-financial underwriting risks raised by these new products? (4 marks)

(b) Why would financial underwriting be more important for these new products? (2 marks)

(c) What are the financial underwriting techniques that the underwriters would be expected to apply for these new products? (4 marks)

(d) What other methods could the company use to reduce or manage the insurance risks associated with these new products? (6 marks)

QUESTION 3 **(18 Marks)**

You are the product actuary of Xanadu Life Company. Your company is developing a regular premium investment account product for release into the Mongolian market. Premiums will generally be received on a fortnightly basis, as the product is intended to operate as a savings plan. This will be the first product of its kind in this market, however it is expected that competitors will arrive within the next 3 years.

Several aspects of the proposed product design are described below:

Fees		
Initial	25.0%	of contractual annual premium (the annualised total amount contracted to be paid into a policy each year), charged at a monthly equivalent rate over the first 12 months of that policy.
Management	5.0%	p.a. of all premiums paid, including those in the first 12 months as well as ongoing premiums paid, charged at a monthly equivalent rate over the life of a policy.
Asset	0.4%	p.a. of policyholder account balance, charged at a monthly equivalent rate, to cover the costs of asset management and investment.

Surrender value basis: Surrender value = Factor x account balance

where Factor is:

Curtate duration	Factor
0	0%
1	40%
2	60%
3	80%
4+	100%

Crediting rate policy:

The rate to be credited is at the discretion of the company. It is generally expected that the following formula will be used to determine the crediting rate in any given year:

Crediting rate = $1/3 \times \{R_t + R_{t-1} + R_{t-2}\}$

where R_t = the earning rate for the most recent year-end (Year t)
less 1.5%,
and the deduction of 1.5% consists of:
0.5% to be transferred to a crediting rate smoothing reserve, and
1.0% transferred to shareholders, to compensate for the cost of supporting the capital guarantee and to provide an allowance for profit.

(continued, over)

The appointed actuary has advised that a significant portion of this product's development costs will not be recovered by the proposed product design. The total amount of this shortfall has been quantified as 15% of the amount of premiums expected to be received in the product's first year of operation. The actuary also believes that there is little prospect of reducing costs or increasing planned sales to cover this shortfall.

You have been asked to participate in discussions on this issue at the next Product Committee meeting, and to review four different methods that have been suggested to handle this issue (itemised below).

Prepare your assessment of the features of each method, for presentation to the Product Committee meeting, as input to the discussions.

(a) Increasing the Initial Fee from 25.0% to 40.0%. (5 marks)

(b) Increasing the Initial Fee from 25.0% to 30.0%. (4 marks)

(c) Increasing the Management Fee from 5.0% to 6.5% over all policy years. (5 marks)

(d) Introducing a discretionary expense recovery term in the calculation of $R_{t,}$ thus reducing the crediting rate. (4 marks)

QUESTION 4 (16 Marks)

You are an actuary working in the product area of a large Australian life insurance company. The Australian Federal Budget of May 2006 announced changes to the taxation of superannuation benefits, specifically that recipients will no longer be taxed on benefits paid from superannuation funds, which will make superannuation a very attractive savings vehicle for Australians.

Your company would like to take advantage of these changes by launching a new unit linked superannuation product. The product design that the marketing department has developed is as follows:

Product name	Capital Guaranteed Deferred Annuity
Benefits payable	A lump sum of accumulated superannuation monies upon retirement. Benefits may be transferred to another superannuation fund prior to retirement.
Premiums	Single amounts transferred from other superannuation plans at the discretion of the investor.
Investment options	Three investment options are available: Equity – predominantly invested in shares Balanced – invested in a broad mix of assets Capital Stable – predominantly invested in fixed interest
Guarantee	The excess (if greater than zero) of the original dollar value of premiums, less the dollar value of any transfers out of the product, is guaranteed as a minimum amount payable upon retirement.
Pricing	Unit prices will be calculated and issued on a daily basis for each investment option.

(a) Identify the possible drawbacks that arise with this product design.
(8 marks)

(b) Explain whether each of the following methods would be suitable for managing the guarantee being provided for this product, as related to the Equity option:

(i) Portfolio insurance provided by the investment manager. (2 marks)

(ii) Asset-Liability matching, using modelling tools. (2 marks)

(iii) A series of 3-month duration Exchange Traded Options purchased by the company on the equity market index, with the floor value (exercise price or guaranteed amount) of the option determined as:

[(Total value guaranteed under the contract) / (total asset value at the beginning of the quarter)] x (value of the market index at the beginning of the quarter).
(4 marks)

QUESTION 5 (17 Marks)

You are an actuary working in the individual risk product division of a very large life insurance company operating in an industrialised country.

You are in the process of profit testing a new series of the current YRT product. This product covers death from any cause up to age 70. The profit testing results have been reproduced below, and represent the profit margin expressed as a percentage of the present value of premiums received:

	Sum Insured range				
Age band	≤200,000	200,001 – 400,000	400,001 – 750,000	750,001+	Weighted average
≤30	8%	6%	5%	2%	6%
31 – 40	11%	18%	18%	16%	16%
41 – 50	13%	20%	19%	16%	19%
51+	12%	16%	16%	14%	16%
Weighted average	11%	17%	18%	15%	17%

The company has sufficiently large experience that a separate pricing basis could be set for each cell in the table above, although the product has not been priced this way to date.

The company's required minimum overall profit margin is 16.5%.

(a) Analyse the results of the ≤30 cohort, giving possible reasons for the results.
(6 marks)

(b) Analyse the overall results, giving possible reasons for the results.
(6 marks)

(c) Identify the sales and marketing issues raised by these profit-testing results.
(5 marks)

QUESTION 6 (17 Marks)

You are the pricing actuary for Any Way Life, a life company that sells a range of individual risk insurance products including Disability Income Insurance (DII).

You are about to re-price your DII product and therefore need to reset the morbidity basis. No significant changes have occurred to the product or its terms and conditions.

The valuation results have been provided to you. These are as follows:

Morbidity Results	Actual/ Expected (A/E)	A/E as a %
Incidence (claim numbers)	58/57.9	100.17
Termination (claim numbers)	51/53.2	95.86
Claim payments ($'000)	1,909/2,291	83.32

In view of the nature of these results, you have made further investigations into the morbidity experience and found that in the final 2 months of the year the company made no actual claim payments, even though the actual number of claims recorded as "active claims in the course of payment" was within 5% of the expected number over that period, and indeed over the whole year.

The actual experience has been very close to that expected from the pricing assumptions (including profit margin) over the 3 years prior to this event occurring.

(a) Allowing for the actual incidence and termination results above, what would you have expected the approximate claim payment amount to be for the year? (2 marks)

(b) What other reasons (apart from any non-payment of claims) might have contributed to the low level of claim payments in the table above? (2 marks)

(c) What possible consequences would the company be exposed to if it is discovered that company errors have caused significant non-payment of claims? (5 marks)

(d) Suggest mitigation and management strategies that would help prevent such an event from occurring in the future. (4 marks)

(e) Considering the past 3 years of experience, why may you wish to re-price this product? (4 marks)

END OF PAPER

