INSTITUTE OF ACTUARIES OF AUSTRALIA

LIFE INSURANCE **2004 EXAMINATIONS**
PAPER ONE

Answer all 5 questions.

QUESTION 1 (12 Marks)

You are a consulting actuary. Your client is a relatively new life insurance company in Australia. To date the company has only sold retail risk products, namely yearly renewable term and disability income insurance. Sales to date have been satisfactory but the company now believes it is an ideal time to diversify its product range with the launch of investment-linked products, for both non-superannuation and superannuation customers. The company is quite explicit in that it does not want to consider allocated pensions or allocated annuities.

The company is aware that many of its competitors sell their products from both within and outside a life insurance company structure.

They have asked for your advice on the following questions:

(a) What additional products could they consider selling? (4 marks)

(b) What factors should the company consider in determining which company structure they should use to sell these products and why? (8 marks)

Draft your report to the company.

QUESTION 2 (20 Marks)

You have just commenced a new role as the Investment Product Actuary of a life insurance company. The company has a significant and growing portfolio of investment-linked business. The majority of the company's new business and a large part of its surrenders are also attributable to investment-linked products.

As you start your new role, you soon discover that there have been recent and growing suspicions about the integrity of the company's unit pricing systems and processes. Increasing instances of problems and errors have been emerging, but a complete review of their causes and effects has not yet been undertaken. Part of your delegated responsibilities from the Appointed Actuary is to oversee the integrity of unit pricing within the company. In particular, your first priority is to lead a project that addresses key aspects of the unit pricing problems. This is obviously a significant project, being sponsored by an executive member of the Board Audit Committee.

(a) Explain the potential consequences of unit pricing errors that may give serious concern to a life insurance company. (4 marks)

(b) Give a broad outline of your project plan and comment on each of the major steps required. (5 marks)

(c) Describe the required characteristics of any system used to calculate unit prices. (5 marks)

(d) What further operational processes, checks and controls should be established in order to minimise the frequency and severity of errors within the unit pricing calculations? (6 marks)

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QUESTION 3 **(22 Marks)**

An Australian proprietary life insurance company has been writing a steadily increasing volume of yearly renewable term and disability income business in recent years. The company is about to review the premium rates for new business, generally with the aim of reducing premium rates, increasing minimum policy sizes and raising non-medical limits. It has also perceived that there is a new marketing opportunity for participating whole of life business and will launch a product for the first time.

The company expects a substantial increase in new business after the changes and is reviewing its reinsurance arrangements as part of the general review of its products. Whilst the ceding company has a preference for a 50% quota share coinsurance arrangement, the company has asked the reinsurance company to quote both coinsurance and risk premium rates and terms for the new yearly renewable term, disability income and participating whole of life products.

(Coinsurance may be interpreted to mean using the ceding company's premium rates reduced by a commission rate and risk premium reinsurance may be interpreted to mean using the reinsurance company's premium rates.)

You are the actuary of the reinsurance company.

(a) What information would you seek for each product? (6 marks)

(b) Describe the investigations and calculations you would make in setting the terms to be offered for each product. (6 marks)

(c) The ceding company has also requested that a share of the reinsurance profits be refunded to it. Define a basis for determining profits and giving reasons, define the profit share to be paid to the ceding company. Also include in your answer any other conditions typically associated with the profit share. (6 marks)

(d) What are the main implications for the reinsurance company of offering either coinsurance or risk premium terms to the ceding company? (4 marks)

QUESTION 4 **(22 Marks)**

For several years Topex Holdings has owned 100% of X-Life, an Australian life insurance company. In 2003 Topex purchased 100% of a second Australian life insurance company, ABC Life. Since that purchase, Topex has continued to operate ABC Life as a separate and independent entity from X-Life. However, it has now decided to merge these two life insurance companies in accordance with the provisions of Part 9 of the Life Insurance Act 1995. The merged company is to be known as Abex Life.

The scheme of arrangement under Part 9, as currently proposed, involves the transfer of business from the statutory funds of X-Life (the smaller of the two companies) into the statutory funds of the legal entity currently named ABC Life, which will then be re-named Abex Life.

You have recently been employed as the Appointed Actuary of X-Life, a position you will retain for Abex Life following the merger. You are currently drafting the sections of the report under Part 9 that deal with Individual Regular Premium Investment Account Surrender Values and Crediting Rates.

The following information has been extracted from the relevant policy documents:

For X-Life: <u>X-Plus Investment Account Policy</u>

- The account balance is guaranteed not to fall.
- The policy does not participate in the profit of the company.
- The surrender value will be the account balance, less a charge calculated as 120% of the Contractual Annual Premium.
- The directors, on the advice of the Appointed Actuary, will determine the crediting rate declared on an annual basis, at the end of each year.
- The crediting rate is guaranteed to be not less than 85% of the following calculation for the entire statutory fund in which the policy is held:

$$2 * I / (A + B - I)$$

Where:

A = Assets of the statutory fund at the start of the company year.
B = Assets of the statutory fund at the end of the company year.
I = Investment income (excluding unrealised gains and losses) of the statutory fund (net of appropriate tax).
= Income from interest, dividends and rents and realised gains and losses on the sale of assets.

For ABC: <u>Achieve Investment Account Policy</u>

- The account balance is guaranteed not to fall.
- The policy is entitled to participate in the profit of the company.

- The surrender value will be the account balance, less a charge calculated as the Contractual Monthly Charge multiplied by the number of months from the date of surrender to the end of the Contractual Charge Period.
- The directors, on the advice of the Appointed Actuary, will determine the crediting rate declared on an annual basis, at the end of each year.
- The crediting rate is guaranteed to be not less than 85% of the following calculation for the Achieve Asset Pool expressly established (within the No. 1 statutory fund of ABC Life) for supporting all Achieve policies:

$$2 * I / (A + B - I)$$

Where:

A = Assets of the Achieve Asset Pool at the start of the company year.
B = Assets of the Achieve Asset Pool at the end of the company year.
I = Investment income (net of tax) and net Transfers from the Achieve Investment Reserve.
= Income from interest, dividends and rents; plus
Realised gains and losses on the sale of assets; plus
Unrealised gains and losses; plus
Transfers from the Achieve Investment Reserve; less
Transfers to the Achieve Investment Reserve.

Transfers to and from the Achieve Investment Reserve are recommended by the Appointed Actuary and approved by the Directors.

Currently, a large Achieve Investment Reserve has built up for the Achieve policies. While the assets of the Achieve Asset Pool support this reserve, it is kept distinct from the current Achieve policy account balances.

(a) What are the general criteria that should be considered when assessing the suitability of a surrender value formula? Comment on how they relate to the individual regular premium investment account products for each of these two companies. (8 marks)

(b) What are the general criteria that should be considered when assessing the suitability of a method of surplus distribution? Comment on how they relate to the individual regular premium investment account products for each of these two companies. (5 marks)

(c) Prior to the merger the companies have the following structure:

	X-Life		**ABC Life**	
Statutory Fund	**Class**	**Products**	**Class**	**Products**
1	Ordinary	Par Traditional Non-Par Traditional Non-Par Investment Account Individual Risk	Ordinary & Super	Par Traditional Non-Par Traditional Par Investment Account Individual Risk
2	Super	Par Traditional Non-Par Investment Account	Ordinary	Investment-Linked
3	Ordinary	Investment-Linked	Super	Investment-Linked
4	Super	Investment-Linked	N/A	N/A

The current Appointed Actuary of ABC Life is proposing that the merger should be structured as follows (SF is used as an abbreviation of statutory fund):

- X-Life SF 1 & 2 excluding Investment Account business transfers to ABC Life SF 1, renamed Abex Life SF 1.
- X-Life SF 1 & 2 Investment Account business transfers to a new statutory fund, named Abex Life SF 4.
- X-Life SF 3 transfers to ABC Life SF 2, renamed Abex Life SF 2.
- X-Life SF 4 transfers to ABC Life SF 3, renamed Abex Life SF 3.

Discuss the merits and shortcomings of this proposal and suggest any possible improvements. (6 marks)

(d) The Managing Director of X-Life has expressed some concern that the policy conditions of the X-Plus Investment Account policy mean that interest rates credited will be forced by the guarantee to be higher than the net rates of return earned on the assets over the year due to significant amounts of unrealised capital losses in the No.1 and No.2 statutory funds. He believes this will result in a loss of around $4m from the Investment Account business alone. He is suggesting that this should be avoided by transferring all business of X-Life statutory funds No.1 & 2 into ABC Life statutory fund No.1, where this loss can be offset against the “Achieve Investment Reserve”.

Prepare a short note of points to discuss with the Managing Director on this matter. (3 marks)

Note: In answering part (d) you may assume that the loss quoted by the Managing Director is correct.

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QUESTION 5 **(24 Marks)**

The year is 2005. A recent review of the Anti-Discrimination Legislation has seen the government announce the removal of the current exemption for individual life insurance in Australia. As a result of the change, premium rates, underwriting standards and benefit design for all new individual life insurance policies (including disability income insurance) must be the same for both males and females.

You are a consulting actuary and have been approached by a life insurance company for your advice on the impacts and ways of minimising any negative impact of the proposed change.

To date the life insurance company has only sold individual yearly renewable term insurance (with optional crisis and TPD riders) and individual yearly renewable disability income insurance. It distributes all its new business through independent agents, who are remunerated through commission.

Draft the sections of your report to the company recommending:

(a) What changes would be necessary to the underwriting process and what particular problems associated with those changes have to be avoided. (5 marks)

(b) What changes could be made to the benefit design (including the premium rate structure) to reduce the impact on the company from the legislative change. Include a brief discussion of any associated risks with your recommendations. (10 marks)

(c) What changes could be made to the company's product range to reduce the impact on the company from the legislative change. Include a brief discussion of any associated risks with your recommendations. (4 marks)

(d) Any other changes that could be made to the company's operations to lessen the impact of the legislative change on the company's profitability. (5 marks)

END OF PAPER ONE