THE INSTITUTE OF ACTUARIES OF AUSTRALIA

LIFE INSURANCE **1998 EXAMINATIONS**
SPECIALIST LEVEL PAPER TWO

Answer all 6 Questions

QUESTION 1 10 MARKS

You are the Actuary to Fortunate Life Ltd, a small company which has begun an expansion program by joining forces with a direct marketing organization. The principal product is a new style term risk & disability income cover with some unusual features and sales are booming. The company is reluctant to turn down any proposals and has set no limit on the sum which can be insured.

(a) You have been asked for a paper on the reinsurance requirements for the product. Identify and discuss the nature of the risks to which the company is exposed and recommend the types of reinsurance arrangement best suited to these risks.

(5 marks)

(b) In what other ways can you as the actuary contribute to managing the profitability of the product?

(5 marks)

QUESTION 2 12 MARKS

You are the assistant actuary in a medium-sized Australian Life Office. The Appointed Actuary has directed you to determine the best estimate assumptions for the annual valuation, and also the corresponding parameters for solvency and capital adequacy, for:

I. Trauma incidence rates
II. Immediate annuity mortality

(a) Describe the internal and external investigations you would make, with reference to any published statistics.

(8 marks)

(b) Identify stages in the process where judgement should be applied, with reasons.

(4 marks)

QUESTION 3 19 MARKS

You are an actuary working for a stock broker and you wish to analyse the performance of two listed life insurance companies.

Both the companies sell only exactly the same investment account policies for exactly the same cost to the policyholder. However, Company A records all the business as participating and splits all product profit 80% to policyholders and 20% to shareholder while company B records all of their business as non participating.

You have previously analysed the products that these two companies sell and you are confident that the profitability to the shareholder, assuming the same pricing assumptions, is the same for each product.

QUESTION 3 (cont)

(a) What are the factors that affect the size of the shareholder profit margin released in a particular year? (3 marks)

(b) Why is it possible for a company to have a higher shareholder profit margin released but a lower underlying shareholder profitability? (3 marks)

(c) What are the factors that affect the experience profit? (3 marks)

(d) Why is it possible for a company to have a higher experience profit but still have worse experience than another company? (3 marks)

(e) What are the factors that affect the size of earnings on retained profit and capital? (3 marks)

(f) From the Note "Analysis of Profit" in the Commissioner's Rules 21 Report, you obtain the following information

Company	**A**	**B**
Profit Margins Released		
Shareholders	25	20
Policyholder	100	-
Experience Profits	100	15
Earnings on Retained Profits and Capital	180	50
Total Profit	405	85
Policyholder Profit	270	-
Shareholder Profit	135	85

From the Balance Sheet , you have obtained the following information.

Company	**A**	**B**
Shareholder retained Profits		
Start of year	500	160
End of year	500	160
Policyholder Retained Profit		
Start of year	600	-
End of year	690	-
Shareholder Capital		
Start of year	100	100
End of year	100	100

At the end of the year, the companies paid the following dividend and bonuses

Question 3 continues over page

Company	**A**	**B**
Shareholder Dividend	135	85
Policyholder Bonuses	180	-

Company A has a profit of $405m compared to Company B with a profit of $85m. What additional information would you require before commenting on the relative profitability of the two companies? Which of this information is publicly available?

(4 marks)

QUESTION 4 13 MARKS

Explain how an investment bond written by a life insurance company differs from a non-life investment such as a unit trust.

(i) By describing the unique aspects of the regulatory environment, including regulation of sales practices.

References to specific pieces of legislation should include a brief statement (one or two sentences) describing the main purpose of that legislation.

(10 marks)

(ii) By describing the taxation regime which applies.

(3 marks)

QUESTION 5 20 MARKS

You are an actuary of a well established medium sized life insurance company. You have just calculated your company's capital adequacy requirement:

	Fund 1 Non Investment Linked	Fund 2 Investment Linked	Shareholder's Fund
Policy Liabilities			
Risk Business	-100		
Investment Business	1070	500	
Other Liabilities			
Creditors	100	-	60
Dividends Provided for	100	10	-
Retained Profit			
Shareholders	360	20	10
Policyholders	10	-	-
Capital	-	-	200
Total Liabilities	1540	530	270
Investments			

Cash	150	20	80
Property	450	170	100
Equity	350	170	60
Fixed Interest	550	100	
Other Assets			
Debtors	40	70	30
Total Assets	1540	530	270
Capital Adequacy Liability	1200	505	
Other Liabilities	70	10	
Resilience Reserves	250	5	
Inadmissible Asset Reserve	50	-	
New Business Reserves	50	-	
Total Capital Adequacy Requirement	1620	520	

(a) Comment on the current financial position of the company and any of its implications for the future.

(7 marks)

(b) What methods are available to your company to improve its capital adequacy position?

(5 marks)

(c) Comment on the long term and short term costs associated with each method.

(8 marks)

QUESTION 6 26 MARKS

(a) Explain the Appointed actuary's responsibilities with respect to investment management of a statutory fund. Include both legislative and business management issues.

(4 marks)

(b) Discuss the particular concerns associated with a portfolio of assets supporting:

- Investment account business
- Immediate life annuities

(4 marks)

For a statutory fund you are given the following asset value data ($,000):

Interest rate	9.5%	9.75%	10.0%	10.25%	10.5%
Asset type 1	720	660	600	560	520
Asset type 2	470	430	400	380	360
Asset type 3	330	315	300	290	280

Liability	1,150	1,075	1,000	950	925

You, as the actuary, have been asked to examine whether a portfolio which immunises the liabilities at 10.0% can be constructed from a mix of the above assets.

(c) Specify the conditions required to be satisfied for immunisation;

(3 marks)

(d) Using differences to approximate to first and second derivatives, express these conditions as formulae for the statutory fund and show whether a suitable mix of the given asset types will immunise the portfolio at 10% .

(10 marks)

Note: Rate of interest, i, and force of interest, δ, are related by: $i = \exp(\delta) - 1$
Hence for a function, f(i), it follows that derivatives with respect to δ are

$$\frac{df(i)}{d\delta} = \frac{df(i)}{di} * (1 + i) \qquad \frac{d^2f(i)}{d\delta^2} = \frac{d^2f(i)}{di^2} * (1 + i) + \frac{df(i)}{di}$$

(e) Comment on the following statement:
"If a liability portfolio is immunised at a specific valuation discount rate, then resilience rates should be small for that particular liability."

(5 marks)

END OF PAPER TWO