Institute of Actuaries of Australia

# 2007 PART III EXAMINATIONS

## Subject Title: **Course 2B Life Insurance**

## Date: **Tuesday 30th October**

Time: **1:45 pm to 5:00 pm**

**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 | 17 |
| 4 | 18 |
| 5 | 18 |
| 6 | 15 |
| **Total** | **100** |

**Candidates are required to answer ALL questions.**

**This paper has 8 pages (excluding this page and the blank back page).**

**INSTITUTE OF ACTUARIES OF AUSTRALIA**

**COURSE 2B LIFE INSURANCE** **OCTOBER 2007 EXAMINATIONS**

**Answer all 6 questions.**

**QUESTION 1** **(16 Marks)**

Combo Life was established on 1 January 2007 from the merger of two medium-sized life insurance companies (the "former" companies) each with a broad range of participating and non-participating life insurance products. The financial reporting date for Combo Life (and the former companies) is 31 December each year.

The businesses of the two former companies have been managed separately to date but it is planned that the relevant statutory funds of the two companies will be merged with effect from 31 December 2007. At the same time Combo Life will introduce a new actuarial modelling system (known as "CLAS") for determining policy liabilities, capital requirements and appraisal values.

You have just been appointed to manage the actuarial department of Combo Life. Your brief is to migrate the existing actuarial systems from the systems of the two former companies to CLAS. It is planned that CLAS will be used for all 31 December 2007 calculations.

(a) List three (3) important sources of information that you would want to study before commencing your work and explain briefly the information you would hope to obtain from each. (3 marks)

(b) What checks would you make to ensure the completeness and accuracy of the policy data and new CLAS system output for the calculations at 31 December 2007? (6 marks)

(c) Describe the main steps you would take to calculate the MoS policy liabilities for a related product group consisting of non-participating policies, using the projection method. (For this part (c) you do not need to consider the issues arising from the merger). (4 marks)

(d) What additional issues would you expect to arise in calculating the MoS policy liabilities at 31 December 2007 for a proposed related product group that consists of participating policies from each of the former companies, and how would you deal with these issues? (3 marks)

**QUESTION 2** **(16 Marks)**

You are a share analyst employed by a major firm of stockbrokers, and you specialise in insurance companies.

You recently reviewed the published accounts of Listed Life Limited ("LLL") for the year ending 31 December 2006. LLL writes only retail risk insurance business (term life, TPD, trauma insurance and disability income insurance). You noticed that the Present Value of Future Profit Margins ("PVFPM") reduced during the year. You requested further information and the company provided the following for their two main Product Types:

| Value of Future Shareholder Profit Margins for all in force business ($ million) | | | |
|---|---|---|---|
| Valuation Date – 31 December | 2006 | 2006 | 2005 |
| Valuation Assumptions | 2006 Basis | 2005 Basis | 2005 Basis |
| Product Types | | | |
| Lump Sum (Term life, TPD & Trauma) | 90 | 90 | 110 |
| Disability Income | 10 | 0 | 0 |
| Total | 100 | 90 | 110 |

Note that in this presentation, the 2005 Basis and 2006 Basis is taken to incorporate all assumptions including Economic assumptions

(a) Explain the meaning of "Related Product Group" and explain with reasons the Related Product Groups you would expect LLL to maintain. (3 marks)

(b) Identify the most likely causes of the reduction in the PVFPM for the Lump Sum Related Product Groups and give your reasons for your choices. (4 marks)

(c) For each of the causes you have identified in Part (b) of this question, explain the consequences on the Margin on Services profit for the 2006 year and on the change in Appraisal Value for that year. (4 marks)

(d) Identify the most likely causes of the increase in PVFPM for the Disability Income Related Product Group and give your reasons for your choices. (3 marks)

(e) For each of the causes you have identified in Part (d) of this question, explain the consequences on the Margin on Services profit for the 2006 year and on the change in Appraisal Value for that year. (2 marks)

 

## QUESTION 3 (17 Marks)

You are the appointed actuary of Super Life Limited ("SLL") a company which specialises in superannuation investment and risk insurance products. SLL has a portfolio of group risk insurance policies including group life and TPD, and group salary continuance insurances.

The group risk business consists of a number of medium size (50 to 500 employees) employer group plans. Most plans have 3 year premium rate guarantees. Many plans include a profit share which is paid if the claims experience is favourable. Total premium income from the group risk business is $150 million per year.

The portfolio has been in place for many years and has usually been profitable. Last year SLL made a profit from this portfolio of $7 million. This includes investment earnings on the assets supporting the MoS policy liabilities which are all secure short-term fixed interest securities. The MoS policy liabilities are calculated using the accumulation method.

SLL has been offered the group risk insurance contract for a large fund (annual group risk premiums of $50 million) and the prospect of other related business in future including a large investment mandate. There are some unusual benefit features of the group insurance and there is limited experience available to assist in the pricing. There is also an expectation that claims reporting will be slower than is generally the case for group risk business. On your analysis the expected profit on this portfolio is nil but the result could easily lie in the range profit of $5 million to loss of $5 million.

The management team of SLL wishes to write the contract.

(a) List the component parts of the policy liabilities for this product. (2 marks)

(b) The Capital Adequacy Requirements for SLL are set out in AS 3.04.
Outline the steps in the calculation of the Capital Adequacy Requirement for the existing group risk business (excluding the proposed new contract), and explain which elements of this calculation are most likely to give rise to a material capital requirement, with reference to the components identified in Part (a) above.
(6 marks)

(c) How is your answer to Part (b) of this question altered after the new contract is included in the portfolio? Please give your reasons. (3 marks)

(d) Draft the "Summary and Recommendations" section of your Section 116 report on the new contract (report to the directors of SLL under Section 116 of the Life Insurance Act), including your summary of the profitability and capital requirement implications for this contract, and any recommendations you would make to mitigate the risks of the new contract. (6 marks)

 

**QUESTION 4** **(18 Marks)**

You are the actuary for funds management company Celestial Fund Managers ("CFM"), which manages a series of investment portfolios for its retail customers. The customers access the investment portfolios by purchasing single premium investment linked contracts usually at the recommendation of financial planners.

You have been asked to develop the budget for CFM for the 2008 calendar year to enable management to monitor the performance of the company on a monthly basis. You have been provided with the following information for 2007:

| | Budget Results ($ million) | Actual Results ($ million) |
|---|---|---|
| Total assets boy | 4,150 | 4,150 |
| Customer liabilities boy | 4,050 | 4,050 |
| Shareholder funds boy | 100 | 100 |
| Single premium income | 420 | 420 |
| Fees paid to planners | 20 | 30 |
| Other expenses | 40 | 44 |
| Redemptions | 120 | 150 |
| Investment income on total assets | 364 | 227 |
| Total assets eoy | 4,754 | 4,573 |
| Customer liabilities eoy | 4,634 | 4,476 |
| Shareholder funds eoy | 120 | 97 |
| Shareholder Profit | 20 | -3 |

Where "boy" is beginning of the year and "eoy" is end of the year.

The 2007 Budget numbers were derived from your model of the business of CFM using your best estimate assumptions at the start of 2007. The policy liabilities at the start and end of the year are calculated according to the requirements of Australian equivalents to International Financial Reporting Standards.

In this question please assume:
1. All numbers are net of tax (that is, ignore tax).
2. Single premiums and planners fees are paid at the start of the year and other expenses and redemptions are paid at the end of the year.
3. Shareholders' funds are invested in the same proportions of CFM's investment portfolios as customers' funds.

(a) Begin the budgeting process by analysing the actual shareholder profit between investment income on the shareholders funds, the planned profit, and the experience profit and further analyse the experience profit between planners' fees, Other expenses and the residual profit. (7 marks)

(b) Suggest a likely cause for each of the three experience variance items from Part (a) and the effect of each on your 2008 budget. (6 marks)

 

(c) Having then updated your model for 2008, you proceed to prepare a budget for 2008. On the business volumes expected by management your model indicates Other expenses of $45.4 million. The chief accountant has also made an estimate of expenses for 2008 by estimating staff numbers, payrolls, and other expenses allowing for inflation increases in all cases. The result was total expenses of $41.8 million. Explain the steps you would take to reconcile the two estimates of expenses for 2008.

(5 marks)

 

**QUESTION 5** **(18 Marks)**

AP Life is an Australian life insurance company with a stated intention to expand into Asian markets by acquiring existing companies. You have just been appointed to the acquisition team at AP Life which is currently examining a potential target company ("Target").

Target sells mainly non-participating whole of life and endowment assurance policies. Their products are characterised by very high initial commissions paid to agents (150% of first year's premium) and the new business of Target has increased by 15% each year for the last 5 years as a result.

Target has prepared an appraisal value ("AV") to assist potential buyers to value the company. The AV report provides the following information:

- Target is required to report its profit on a Statutory Reporting Basis ("SRB").
- The SRB requires assets to be held at market value and unrealised capital gains and losses on investments are included in the reported profit.
- The SRB reported profit also includes the change in the Statutory Reserve (for policy liabilities) during the year.
- The Statutory Reserve is set by a Gross Premium valuation method using assumptions, which are generally more conservative than Best Estimate assumptions.
- The capital requirement is set by the local regulator as 125% of the Statutory Reserve.

The AV has been calculated as follows:

- Net Worth is set as the Market Value of Assets less the Statutory Reserve.
- The Value of In-force is calculated as the present value of future profits from existing business on a Statutory Reserve basis using a risk discount rate of 15% pa.
- The Value of Future New Business is calculated as the present value of future profits from future new business on a Statutory Reserve basis using a risk discount rate of 15% pa and allowing for future new business growth of 10% pa in perpetuity.

The risk discount rate is the rate used in recent transactions of companies similar to Target in the same country. The assumptions used in calculating the AV are current best estimate assumptions for Target as a stand-alone entity.

(a) What two major aspects of the above AV calculation method (other than the selection of the risk discount rate) would you adjust in order to provide a more realistic valuation? Please provide your reasons. (4 marks)

(b) Considering the assumptions used in the AV calculations, which assumptions would you expect to change to reflect the new ownership of AP Life? AP Life has no other operations in the country in which Target is located and is planning to continue selling the same products through the same agents. (5 marks)

(c) The due diligence team has now completed its research on Target and has discovered new information not included in the AV. What is the effect of each of the following and how would you adjust the AV calculation to allow for them?

(i) Target owns an office building which the AP Life property experts believe is worth considerably more than the market value included in the accounts and the AV calculation. (3 marks)

(ii) Some new business has been written through a related company of Target and the acquisition costs for this business were absorbed by the related company and not passed through to Target. In future under the ownership of AP Life, Target will have to meet these acquisition costs itself. (3 marks)

(iii) A major agent for Target, which produces 15% of its new business, has stated that it intends to place its business with another company. (3 marks)

**QUESTION 6** **(15 Marks)**

Megabank Life ("ML") is an Australian life insurance company which is a wholly owned subsidiary of Megabank. Its business consists entirely of single premium investment-linked contracts and individual term life insurance policies. All business is written at the branches of Megabank by its salaried sales staff. There are no commission payments.

The assets supporting the investment-linked contracts are in accordance with the investment mandates of the various investment funds. All other assets of ML are invested in secure short-term fixed interest securities, often bank bills acquired through Megabank.

The senior executives at Megabank have expressed concern about the potential variability of reported profits of ML under the newly introduced Australian equivalents to International Financial Reporting Standards ("AIFRS"). As the Enterprise Risk Manager for ML you are asked to review this issue from a risk management perspective.

The notes to the financial statements of ML show the following transition effects (variations) from the previous reporting basis to AIFRS:

| | Previous Reporting Basis ($'000) | Effect of Transition to AIFRS ($'000) | AIFRS ($'000) |
|---|---|---|---|
| Life Insurance Contract Liabilities | (120) | (10) | (130) |
| Life Investment Contract Liabilities | 5,300 | 100 | 5,400 |
| Deferred Tax Liability | 0 | 20 | 20 |

(a) From your general knowledge of AIFRS, explain the most likely causes of each of the variations in the above table. (4 marks)

(b) In relation to the variations to the Life Insurance and Life Investment Contract Liabilities, explain how these changes might affect the variability of ML's reported profits in future. (3 marks)

(c) Due to adverse experience during the year, the level of retained profits has been reduced to the point where ML only just meets its capital adequacy requirement. The Chief Executive Officer of ML proposes to remedy this by reinsuring a quota share of the existing term life business with a life reinsurance company and by reinsuring a quota share of the existing investment business with the funds management subsidiary of Megabank. As the Risk Manager for ML, what do you see as the advantages, disadvantages and any issues arising from these suggestions, and their impact on the capital position of ML? (4 marks)

(d) In relation to the proposal to reinsure the existing term life business in Part (c) of this question, what perspectives do you think that each of the Appointed Actuary, auditor, and independent directors of ML would have on this proposal? (4 marks)

**END OF PAPER**