INSTITUTE OF ACTUARIES OF AUSTRALIA

COURSE 2B LIFE INSURANCE **OCTOBER 2010 EXAMINATIONS**

Marking Guide

Level of difficulty

Question	**Syllabus Performance Outcome**	**Units**	**Knowledge & Understanding**	**Straight-forward judgement**	**Complex judgement**	**Total Marks**
1 (a)	6	3	3			3
1 (b)	6	3		7		7
1 (c)	6, 11	3,5		3		3
1 (d)	6,8	3,4	2	3	2	7
2 (a)	5	3	3			3
2 (b)	5	3		5		5
2 (c)	5	3			6	6
2 (d)	5	3			3	3
2 (e)	5	3			4	4
3 (a)	13	6	5			5
3 (b)	1	1	3			3
3 (c)	3	2		3		3
3 (d) (i)	5	3	2			2
3 (d) (ii)	5	3			7	7
4 (a) (i)	2	1	3			3
4 (a) (ii)	2	1		1		1
4 (b)	2	1		4		4
4 (c)	1	1			5	5
4 (d) (i)	2	1		4		4
4 (d) (ii)	1,2	1			3	3
5 (a)	11	5		5		5
5 (b)	2,11	4,5		5		5
5 (c)	2	4			4	4
5 (d)	2	4			5	5
TOTAL			**21**	**40**	**39**	**100**

INSTITUTE OF ACTUARIES OF AUSTRALIA

COURSE 2B LIFE INSURANCE **OCTOBER 2010 EXAMINATIONS**

Answer all 5 questions

QUESTION 1 **(20 Marks)**

You are working for a long established medium sized Australian life office that sells mainly individual risk products which pay a 100% up front commission. You have been recently been appointed as the project actuary to redesign the financial planning process. Previously, the business plan was done using crude ratios and the method is now considered to be unsatisfactory by management Your role is to develop a business plan for the next 3 years for presentation to the Board.

a) **Identify the detailed information that you require in order to construct the business plan.** **(3 Marks)**

b) **You are given the following information as at the end of the last year:**

Balance Sheet	
<u>Assets</u>	$m
Fixed Interest Investment	300
<u>Liabilities</u>	
Projected Policy Liabilities	-890
IBNR (Undiscounted)	300
Outstanding Claims (Discounted)	100
Surplus	790
Details of Projected Policy Liabilities	$m
PV Claims	3,000
PV Future Commission	500
PV Future Expense	250
PV Future Premium	5,000
Best Estimate Liability	-1,250
PV Profit Margins	360
Projected Policy Liabilities	-890
Other information/assumptions	$m
In force Annual Premium	600
Expected New Business Annual Premium next year	100
Expected Claims next year from in force	300
Expected claims in a full year for next year's new business	50
Earned interest rate	5%
Tax Rate	30%
Profit Carrier is claims	

Assumptions:

- **New business enters half way through the year.**
- **The profitability of the new business is the same as that for the inforce business.**
- **Budgeted expenses are the same as those included in the projection model.**

Based on the above information, calculate the expected IFRS profit (net of tax) for next year's business plan, showing the detail of all calculations. (7 Marks)

c) You have provided the first draft of the plan to the marketing manager showing the projected IFRS profits for the next 3 years. The marketing manager has asked why the IFRS profit is only projected to increase marginally, despite a significant increase in new business volumes (about 50% p.a. for the next 3 years). Outline your reply. (3 Marks)

d) The CFO has noticed that another company has changed their business plan to be based on Appraisal Value Earnings rather than IFRS profit. Discuss the differences between Appraisal Value Earnings and IFRS profit as used for business planning. Amongst other issues, in particular address new business profitability, changes in assumptions and the treatment of expenses. (7 Marks)

QUESTION 1 SOLUTIONS

a)

- Previous year company balance sheet and income statement
- Previous year plans and budgets
- Financial Condition Report including Capital position
- Dividend policy from the CFO or Board

- In force Projection model (from the valuation area)
- Details of IBNR/RBNA calculations and past claim development data.
- New Business projection model
- Key statistics like number of policies, sum insured, inforce annual premium by major product groups
- Expected new business volumes from the marketing (or other) department
- Any large known wins or losses in respect of group business.
- Product notes for major lines (setting out premium rates and commission terms)

- Projected detailed expenses for next 3 years
- Projected investment income by asset classes with assumptions

- Business plans: intended new/discontinued products, business ventures/partnerships, restructuring, re-pricing, new distribution channels, changes to commission structures, special offers / incentive plans etc

- Input from the Appointed Actuary as to any adjustments to the impact of the above that they feel are necessary and why.

Marking guide:

- **0.25 mark for each point above or other reasonable point.**

To a maximum of 3 marks (KU)

b)

Main components of projected profit for business plan		
1)Interest on Surplus, IBNR		
Interest	5%	
Surplus and IBNR	1090	
Total	54.5	=5%*1190
2) Release of Profit Margin on Inforce Block		
Profit Margin		
PV Profit Margin	360	
PV Claims	3000	
Profit Margin	12%	
Expected Claims	300	
Total Release from Inforce	36.0	=12%*300
3) Profit on New Business		
Profit Margin	12%	
Expected Claims	50	
NB sold half way through the year	0.5	
Total Release from New Business	3.0	=12%*50*0.5
4)Total Profit	93.5	=59.5+36.0+3.0
5) Tax	30%	
6) Total Profit net of tax	65.5	=93.5*0.7

Marking guide:

- **2 marks for Interest on surplus, IBNR**
- **2 marks for release of profit margin on inforce block**
- **2 marks for profit on new business**
- **1 mark for tax calculation**

To a maximum of 7 marks (SJ)

c)

- The bulk of the projected profit on the IFRS basis is from interest earnings on surplus and undiscounted reserves such as IBNR. (Gross profit of $54.5m)

- If the inforce book is sizable as in this case, then most of the remaining profit would come from the inforce (Gross Profit of $36m)

- Profit from new business under IFRS can only be released gradually. It is held back by setting up profit margin. In this case, only $3.0 for 6 month or $6.0m for 12 month. Thus a 50% increase in sales would only increase the profit of the order of around $3m p.a. This is small in comparison to a total gross profit of around $100m.

- Because claims is the carrier, the expected claims are very low in the first year due to action of the selection period.

Marking guide

- **1 mark for knowing the bulk of profit comes from interest earnings on surplus**
- **1 mark for sizable release from inforce block**
- **1 mark for small release from new business**
- **½ mark for claims carrier select period**

To a maximum of 3 marks (SJ)

d)

- Purpose: Appraisal Value estimates the true worth of the company which is probably a better guide to decision making than IFRS. Appraisal Value Earning reflects immediately the impact of decision. (0.5 mark SJ)

- Purpose: IFRS aim is to have smoother reporting earnings and is required for external reporting. It may be slow in showing the impact of good and poor decisions. (0.5 mark SJ)

- New Business Profitability (AV): Changes in new business volume and price will have a major impact on appraisal value earnings as it capitalises all future year profit in year 1. It will also have a multiplier effect as the appraisal value uses multiple tranches of new business value. Hence this provides management with clearer signals in term of sales. (1 mark CJ major point)

- New Business Profitability (IFRS): Changes in new business volume and price will only have a minor impact on IFRS profit (unless the company is writing loss making business) and the majority of the profit comes from the in force block. It may be slow in showing the impact of good and poor decisions. (0.5 mark SJ)

- Change in assumptions (AV): A change in assumptions will be fully capitalised. This leads to volatility in AV earnings. Again this provides more insight for management, however good analysis and commentaries are especially vital in communication. (0.5 mark SJ)

- Change in assumptions (IFRS): Change in assumptions have no immediate impact on profit. The change in BEL is offset by a corresponding change in the profit margin; provided the Related Product Group is not in loss recognition. (0.5 mark SJ)

- Expense assumptions (AV): best estimate assumptions but expense savings over the long term can be incorporated in the expense assumptions. (0.5 mark CJ)

- Expense assumptions (IFRS): expenses need to reflect the budget over the next year following the valuation date. Longer term expense saving cannot be allowed for until the year that they occur. (0.5 mark KU)

- Cost of Capital (AV): Appraisal Value also measures the cost of capital which makes it a more comprehensive measure than IFRS. For the companies which sell term products with an upfront commission, cost of capital is important. (1 mark CJ major point)

- Cost of Capital (IFRS): Does not reflect the cost of capital and doesn't take into account shareholder risks This is a shortcoming of IFRS in term of business planning (0.5 mark KU)

- Discount rate (AV): Use bond rate + Beta * Equity risk premium (about 5% in Aust) to discount the cost of capital and value of inforce. (0.5 mark SJ)

- Discount rate (IFRS): Use risk free rate as defined in LPS 1.04 (0.5 mark KU)

- Premium rate changes: (AV) Can include future premium rate changes if these have been approved by the board. (0.5 mark CJ)

- Premium rate changes: (IFRS) Will only reflect new premium rates when they are reflected in the administration data. (0.5 mark KU)

Marking guide
To a maximum of 7 marks (2CJ, 3SJ, 2KU)

Overall Marking Guide for Question 1:
- **Part a) 3 marks (3 marks KU)**
- **Part b) 7 marks (7 marks SJ)**
- **Part c) 3 marks (3 marks SJ)**
- **Part d) 7 marks (2 marks KU, 3 marks SJ, 2 marks CJ)**

20 marks overall (5 marks KU, 13 marks SJ, 2 marks CJ).

QUESTION 2 **(21 Marks)**

Internationally owned Australian Life Insurer BLY Australia Limited specializes in selling Yearly Renewable risk business including Term, Rider and Stand Alone Trauma, Rider and Stand Alone Total and Permanent Disability (TPD) and Disability Income/Income Protection business. BLY does not use any reinsurance on its risk business.

You are the Senior Financial Reporting Actuary performing the 2010 valuation. You are currently looking at the Analysis of Profit for the Disability Income business. The key components of the analysis of profit (ignoring new business during the year) are set out in the following table. There has been no change to the valuation basis.

ANALYSIS OF PROFIT	**$m**
Planned Profit	**20.5**
Expected less Actual Morbidity Impact on in force business	**(1.4)**
Expected Impact of Morbidity on in force business	**1.6**
Expected gross morbidity claims	1.4
less Expected gross reserve release on claims terminating/continuing	(1.0)
plus expected gross CICP reserve set up on expected new claims	1.2
Actual Impact of Morbidity on in force business	**3.0**
Actual gross morbidity claims	1.9
DII Gross Reserve Released on Continuing Claims	1.5
DII Gross Reserve Released on Claim Terminations	(2.8)
DII Gross Reserve Created on New Claims	1.6
plus increase / decrease in IBNR Reserve Over Period	0.8
Expected less Actual Lapse Impact on in force business	**0.8**
Expected release of policy liability on lapse	7.8
Actual release of policy liability on lapse	7.0
Expected less Actual Maintenance Expenses on in force business	**(0.4)**
Expected maintenance expenses	2.1
Actual maintenance expenses	2.5
Actual less Expected Interest Incurred on in force business	**0.0**
Actual interest incurred on beginning policy reserve	(15.4)
Expected interest incurred on beginning policy reserve	(15.4)
Actual less Expected premiums received on in force business	**(0.5)**
Expected Premiums paid on in force Business	45.6
Actual Premiums paid on in force Business	45.1
Unexplained Profit	**(0.4)**
ACTUAL PROFIT	**18.6**

a) Explain why an analysis of profit is performed. **(3 Marks)**

b) Based on the above analysis, you have been asked to write a commentary to the Head of Life Risk on the profit of the DII business, with a particular reference to the morbidity and lapse experience profit. He would also like to understand what the drivers are for these components of the profit with an overview of how the reserving impacts on the profit. Draft your commentary. (5 Marks)

c) Suggest possible reasons for

- **the difference between actual and expected premiums, and**
- **the unexplained profit.**

What investigations could you perform to identify the reasons for the unexplained profit? (6 Marks)

d) The Head of Life Risk has raised the concern that lapse experience is different from the discontinuance reporting he is receiving from his team. Suggest reasons why they may be different. (3 Marks)

e) The number of disability income claims in payment has actually fallen from 362 to 350 claimants over the course of the year, yet your analysis of profit shows a morbidity loss during the year. Suggest reasons why this might be the case. (4 Marks)

QUESTION 2: SOLUTIONS

a)

- To provide some comfort over the valuation results. In particular, the auditors are very interested in the AOP as this gives them comfort that the policy liabilities are correct.

- To identify errors in the valuation which may be modelling or accounting errors.

- To provide management and the business with some information around the areas of profit and loss, and thus help guide the direction of the business. For example, poor lapse experience may lead to additional work on initiatives to help retain business.

- To provide information around experience to help determine which best estimate assumptions may need to be reviewed.

- To provide information around experience that would suggest changes to premium rates or policy conditions.

- An analysis of profit at year-end is required in the notes to the financial statements (AASB 1038).

- An analysis of profit is required for APRA Form LRF 430.

Marking Guide

- **0.5 marks per point plus any other valid explanation**

To a maximum of 3 marks (KU)

b)

To Head of Life Risk

The actual profit generated on the DII business in 2010 is $18.6m. This is made up of Planned Profits of $20.5m offset by experience losses of ($1.9m). This experience profit includes $1.4m Claims experience loss and $0.8m Lapse experience profit as well as a Maintenance expense loss of 0.4m, Premiums being less than expected by 0.5m, Interest exactly in line with expected and a total loss from other sources of 0.4m.

The Claims experience loss and the Lapse experience profit are expanded on below.

Claims Experience

For DII business, when there is a new claim, we are required to set up a reserve for the expected future claim payments until the insured recovers. When a claim terminates due to death or recovery, we release this reserve. For continuing claims with longer benefit periods this reserve will increase over time due to the fact that assumptions are set to reflect that the longer a claim has been in force, the longer it is likely to last. We also need to hold a reserve for "IBNR" claims or claims that have been incurred but have not yet reported to the company. This includes claims that have been notified but for which adequate information has not yet been received (no claim form etc).

The analysis of profit we have undertaken indicates that the expected gross reserve on new claims in course of payment is \$1.2m but the actual gross reserve created on new claims is \$1.6m, therefore impact of new claims is higher than expected. Our analysis suggests that we have closed more claims than expected. However actual claims paid during the year were \$0.5m higher than expected. As a result the overall impact is a (\$1.4m) claims experience loss.

Lapse Experience
Losses occur on lapses due to the high upfront expenses and commissions paid on selling new business which take time to recover from future premiums. We set up a negative reserve (an asset) to offset these large upfront expenses which is written off over time. When a policy lapses in early durations before we have written off the reserve set up to cover the initial expenses, we lose this asset. Losses are higher on lower duration policies.

We expect lapses at a certain level each year. In 2010, we expected to incur a loss of \$7.8m due to policy liabilities being released because of lapses. The actual policy liabilities released due to lapses was \$7.0m. This means that we have experienced lower lapse rates than assumed leading to a \$0.8m lapse experience profit.

Please let me know if you have any questions on this.

Kind regards,

An Actuary

Marking Guide
- **Drafting mark – language (0.5 marks)**
- **Drafting mark – format (0.5 marks)**
- **Good introduction with calculation of total profit (0.5 marks)**
- **Claims Experience – (maximum 3 marks)**
- **Lapse Experience – (maximum 3 marks)**
- **Upfront expenses mean setting up negative reserve (1 mark)**
- **Impact on lapse (0.5 marks)**
- **Lower duration policies (0.5 marks)**
- **Experience lower lapse rates than assumed (1 mark)**
- **Any other good points (0.5 marks)**

To a maximum of 5 marks (SJ).

c)
Possible reasons for premiums difference include:

- Grace period – policies normally allow a period of time where the premium has not been paid but the policy has not yet lapsed. The expected premiums may not take this into account. This will impact policies that go on to lapse and also policies that do not if this occurred near the end of the year.

- CPI rate - The rate of CPI increases to the monthly benefit (and therefore premium) could differ than that assumed in the valuation basis.

- CPI take-up rate – the rate of take-up of CPI increases to the monthly benefit (and therefore premium) could differ from that assumed in the valuation basis.

- Loyalty/Multiple Policy Discounts – there may be a discount available on existing business if a person takes out an additional policy. A certain rate of this happening may be assumed in the valuation basis but the actual experience may differ from that assumption.

- Sum Insured decreases – there may be reductions to the sum insured on some policies thus reducing the premium. The valuation basis may have an assumption around this or may totally ignore this. Experience may differ from that assumed.

- Higher than expected claims experience would cause less people to be paying premiums hence this could explain why premiums are lower. This is on the assumption that this impact is not included in the morbidity experience item.

- Claims under the premium waiver for involuntary unemployment may not be showing up as claims but just as unpaid premiums

- There could be delays in some of the accounting / credit card runs resulting in some amounts not showing up or an incorrect accrual could have been made.

- It could be noted that the deficiency in premiums is all the more surprising given that lapses were lower than expected.

0.5 marks per reason plus any other valid reasons plus 0.5 marks for observing that difference is surprising given lapse experience to a maximum of 2 marks.

Possible reasons for the unexplained item include:

- Errors in the policy liability calculations.
- Errors in the expected items in the AOP (modelling errors)
- Errors in the accounting records.
- Additional sources of profit/missing items in the AOP
- Mis-calculated items in the AOP

0.5 marks per reason plus any other valid reasons to a maximum of 2 marks.

Investigations on the unexplained item that could be performed include:

- Cross check the Actual items in the companies Profit and Loss statement to the Actual items in the AOP to make sure they are all included and have the correct value.

- Similarly, add together all the expected items in the AOP and compare this with the expected change in the best estimate liability.

- Compare with other sources – e.g. compare lapse profit with management reporting of exits, compare mortality profit with experience investigations work.

- Compare the actual and expected items to previous years numbers for reasonableness, allowing for changes in the business and assumptions over the period.

0.5 marks per well explained investigation to a maximum of 2 marks.

Marking Guide
Maximum of 6 Marks (CJ)

d)

- AOP lapses will be based on release of policy liability on lapse since this represents the loss on lapse. Exits information will probably be based on policy count or annualised premiums. There may be a large number of low duration lapses which have a proportionately larger impact on a policy liability basis than a count or premiums basis.

- Definition of a lapse may differ between AOP lapses and exits information. For example, the treatment of reinstatements or policies that lapse and become new business (replacement business), perhaps due to new premiums rates introduced for new business only. Another example might be cancellations from outset.

- Timing of lapses may differ, for example where the policy has stopped paying premium but is in the grace period. The AOP will probably not call this a lapse whereas management exits info may do so.

- There may be errors in either the AOP or management lapse information. This would require further investigation.

Marking Guide
- **1 mark per well explained point as above**
- **any other valid point.**

To a maximum of 3 Marks (CJ)

e)
Reasons for a morbidity loss yet drop in claims in course of payment include:

- Though the number of claims in payment has dropped, there may have been increases in claims cost due to:
  - increase in average claim amount
  - increase in benefit periods claiming (e.g. more to age 65 claims)
  - more claims have increasing claims benefit
  - more smokers
  - more females
  - older claimants
  - longer durations on claim

0.5 marks for the point, plus 0.25 marks per example

- A large number of short term claims that commenced during the year that have since terminated hence not included in the end of year claims in payment number

- Errors in the AOP (the morbidity profit has been calculated incorrectly), errors in the actual profit (due to policy liability calculation errors or accounting errors), errors in the number of claims in payment number.

- A change in the definition of a claim (e.g. include reported but not admitted claims at the start of the year, but exclude these at the end of the year).

- The increase in the IBNR reserve has contributed to the morbidity loss yet will not be included in the end of year claim numbers.

- There may be reserves for claims that are not in the list of current open claims (for example claims that have been declined but now gone to litigation).

Marking Guide
- **0.5 marks per point**
- **0.5 marks for any other valid reason**

To a maximum of 4 marks (CJ).

Overall Marking Guide for Question 2:
- **Part a) 3 marks (3 marks KU)**
- **Part b) 5 marks (5 marks SJ)**
- **Part c) 6 marks (6 marks CJ)**
- **Part d) 3 marks (3 marks CJ)**
- **Part e) 4 marks (4 marks CJ)**

21 marks overall (3 marks KU, 5 marks SJ, 13 marks CJ).

QUESTION 3 **(20 Marks)**

You work for an international financial services company which operates on a regional basis across life insurance, superannuation/pensions, fund management and banking. Having had a successful career across a variety of actuarial and business areas within the Australian life insurance operations you have recently accepted an actuarial role in another region of the company working in establishing a new line of business.

Upon taking up your new role your initial assignment is to support the establishment of a traditional with-profits/participating line of business. This is one of the growth areas in your region, although your company does not currently have any substantial business in this product line. Being a developing area there is no uniform product design, however most providers offer a stable terminal bonus and look to distribute profits via an annual bonus.

You are working in a multi-disciplined team looking at developing this product line in your region.

a) **For the purposes of developing and establishing this new line of business, what areas would you investigate/research to familiarise yourself with this region, including the internal business areas you would consult?** **(5 Marks)**

b) **Being a developing line of business, the Regional Finance Director wishes to understand more fully the derivation of profits for internal management purposes, which is done on a Margin on Services basis. Noting your previous experience in Australia, he has asked you to outline the key features of the Margin on Services method of profit reporting in respect to this line of business.**

   Outline the purpose and characteristics (including benefits and limitations) of the MoS method. Also specify, with reasons, an appropriate profit carrier for the participating business line. **(3 Marks)**

c) **The initial investment policy established and managed by the regional fund management operations has the following benchmark asset allocation:**

Regional Shares	**25%**
International Shares	**15%**
Property	**10%**
Regional Government Bonds	**30%**
Regional Corporate Bonds	**10%**
Cash & Deposits	**10%**

   The Regional Finance director has suggested that using market value as the basis for the asset valuation for the purpose of the annual statutory financial reporting would be appropriate and not cause significant profit distortions. In general, what assumptions are the Finance Director making and what reservations might you express including specific suggestions in respect of each asset class above? **(3 Marks)**

d) In formulating the overall product design, you have been asked to set out the bonus policy for this new class of business.

(i) What are the key principles for the establishment of a bonus policy for this line of business? (2 Marks)

(ii) The regional Sales & Marketing Director for the company wishes to maintain constant bonus levels for the first 5 years, as a point of differentiation which he believes will establish the product in a growing market.

Outline the likely pros and cons of this approach. What further consequences may arise for the company in adopting this bonus structure? (7 Marks)

QUESTION 3 SOLUTIONS

a)
Areas to be familiar with:
- Local or regional taxation legislation/ regulations
- Local or regional insurance, financial services legislation /regulations
- Professional standards and operations in the region
- Financial services/life insurance industry including other companies in the industry
- Industry operations: commission structures and distribution methods,
- Other companies' products: pricing bases, features, trends

Consult with:
- Other actuaries in company and where possible outside the company (potentially via the local professional body) – being aware of confidentiality and competition requirements
- Sales operations and teams
- Marketing team
- Senior management group
- Risk team
- Actuarial valuation
- Finance team (including tax)
- Product development team, IT department
- Distributors. Direct Marketers / Banks / Sales people etc. Who is selling what and how and what are the needs?
- Investment team/Fund managers
- Reinsurers

Candidates should be aware that they should consult with both the actuarial community as well as the wider business areas in order to demonstrate that they have an understanding of the different operational position which may exist in overseas jurisdictions – for example that the actuarial profession may not enjoy regulatory status as occurs in Australia.

Marking Guide
- **0.5 marks for each area of research/investigate up to a maximum of 2 marks**
- **0.5 marks for each business area up to a maximum of 3 marks**
- **0.5 marks for any other valid points**

To a maximum of 5 marks (KU)

b)
- Objectives of the MoS approach to reporting profits are to recognise profits as they are earned with a degree of smoothing over periods.
- Valuation method changes the timing of the release of profits not the quantum. The quantum of profit depends upon the income, expenses and claims over the life of the policies not what is assumed in the valuation basis.
- Profit margin will be expressed in terms of a profit carrier.

- If a product group becomes loss making then the future losses are capitalized at once.
- Changes in assumptions are not (other than market related changes in economic assumptions or for a product group in loss recognition) capitalized but are spread over the future by adjusting the profit margin (so that the policy liability remains unchanged).
- Smoothing of MoS profits may mean that substantial changes in the business may not be immediately apparent such as an increase in sales levels may have an immaterial impact on the MoS profits recorded. This could delay management taking timely actions to arrest a change in the profit position in the longer term especially with a new line of business.
- The profit determined may not necessarily be identical to that available to be distributed (as the local regulations may specify a different approach to be used)
- Profit carrier: annual bonus distribution. This is an appropriate carrier because it is smooth over time and broadly represents the service provided to the policyowners.

Marking Guide
- **0.5 marks for each of valid point.**

For profit carrier, 0.5 marks for specifying, 0.5 marks for reasons.
- **Candidate must nominate a relevant profit carrier to score the maximum of 3 marks as well as providing both the limitations and upsides of MoS**

To a maximum of 3 marks (KU)

c)
Assumptions :
- That the local legislative/reporting requirements allow market value to be used.
- That the method for valuing the liabilities that is being used will be consistent with a market value approach to asset valuation (e.g. MoS principles)
- That the asset mix and terms will be adjusted if necessary to ensure that they are broadly matched to the liabilities otherwise there may be significant mis-matching profits or losses.
- That market values are available for all the asset classes.

Reservations :
- Reliable market values may be difficult to establish for certain assets.
- Profit volatility may be significantly increased if valuation methods are not in sympathy with market value, or the assets and liabilities mis-matched. Even if the valuation method is in sympathy with market values, certain possible future products could be a problem e.g. term insurance where the liability may be negative and market related asset movement will cause profit volatility.

Regarding particular asset classes:
- Reasonable to assume that regional shares, international shares and regional government bonds have listed prices so could use Market Value.
- Consider that regional corporate bonds may not be a completely liquid market so market values may not always be available. Consider the credit ratings and whether the intention is to hold the assets to maturity.
- For property assets consult with property experts – may use either appraisal value or discounted cash flow methodology
- Cash & deposits: MV of holdings could be used

Marking Guide

- **0.5 marks for each valid point**
- **Candidate can nominate a different asset valuation method for different asset classes as there is no certainty that Market prices will be available for all asset classes.**
- **Markers should give due consideration to the responses of candidates who merely specify that they would use MV because that is what the Australian rules say they should use or indicate that they would do the valuation in isolation themselves (as they would not have the expertise) - preferably not providing full marks for such responses.**

To a maximum of 3 marks (SJ)

d)

i)

- Equitable distribution between generations of policyowners
- Sustainability/financial responsibility to maintain solvency of the entity
- Consistent with reasonable policyholder expectations
- Ease of understanding by distributors and customers
- Meets any regulatory requirements, including in relation to capital adequacy
- Whether the approach is consistent with the approach used by other players in this market.

Marking Guide

- **0.5 marks for each valid point.**

To a maximum of 2 marks (KU)

ii)

- Pros
  - Marketing advantage in entering a new market
  - Will be easier to explain to distributors
  - Simple to establish product design

- Cons
  - Depending upon the size of the bonus the capital adequacy requirements will most likely be high
  - No immediate link between investment performance and distribution to clients which could impact persistency – if bonuses are above the competition due to poor returns persistency will be good, while if bonuses are below the competition due to good returns persistency could be bad
  - Providing guaranteed performance to clients during the first 5-years - resultant cost compared with allowance in pricing of business
  - Difficulty in establishing equity between different generations of clients.
  - Difficulty in establishing reasonable policyholder expectations
  - Legality in terms of regional regulations, including description of the line of business as 'with-profits'

- Further consequences
  - Marketing material will need to be very clear
  - Investment policy may need to be adjusted
  - Practicality of altering the rates at the end of the 5-year period
  - Depending upon the investment market conditions there could be large (unrealised) investment profits or losses in the early years
  - Surrender experience during at and the end of the 5-year period will be highly dependent upon underlying investment performance
  - Difficulty in establishing and demonstrating a fair surrender value during the early years.
  - Consider the capital implications of a constant bonus level
  - Distribution remuneration and approach should be reviewed to remove the incentive to churn in 5 years' time.

    - The solution can be easily copied if successful so there needs to be further refinements down the track if the competitive edge is to be maintained.

Marking Guide

- **0.5 marks for each valid point raised in pros and cons up to a maximum of 3 marks.**
- **0.5 marks for each valid point in relation to the flow-on effects up to a maximum of 4 marks**

To a maximum of 7 marks (CJ).

Overall Marking Guide for Question 3:

- **Part a) 5 marks (5 marks KU)**
- **Part b) 3 marks (3 marks KU)**
- **Part c) 3 marks (3 marks SJ)**
- **Part d) i) 2 marks (2 marks KU)**
- **Part d) ii) 7 marks (7 marks CJ)**

20 marks overall (10 marks KU, 3 marks SJ, 7 marks CJ).

QUESTION 4 **(20 Marks)**

You are the Chief Valuation Actuary for a medium sized Australian Life Insurance Company which launched a new unitised investment product 12 months ago, and has had a successful year of sales. The product specifications are as follows:

- **Product is single premium**
- **There is only one investment strategy available to the customer being "Balanced"**
- **Customer has option of having a minimum guarantee of initial investment at any time in the future. The investment strategy is the same regardless of the option taken**
- **Fees are 4% pa (of unit value) for the capital guaranteed option and 1% pa for the non-guaranteed option and are deducted evenly throughout the year**
- **There is an up front commission of 2% for both options payable by the company to the financial advisor**
- **No surrender penalties apply**

It is now 30 June 2010 and this book of business needs to be considered for valuation purposes for the first time.

a)

i) List the accounting and actuarial standards which are relevant in calculating policy liabilities for these products (with and without the guarantee) and briefly explain why the information contained in each standard is important to the calculation. **(3 Marks)**

ii) Should the guaranteed business be treated as an insurance contract or an investment contract for accounting purposes? Give reasons for your answer. **(1 Mark)**

Suppose that $1 billion of single premium deposits for the non-guaranteed option were received evenly throughout the year, and investment returns were 10%, also spread evenly throughout the year, and no one has yet surrendered.

b) Describe and calculate the Policy Liability for the non guaranteed business as at 30 June 2010 under LPS 1.04? **(4 Marks)**

c) Describe (in words) the steps you would take to perform a stochastic calculation of the capital required to support the guaranteed option business. **(5 Marks)**

Suppose that the policy liabilities for the non guaranteed business were to instead be calculated using a best estimate projection methodology (without any profit margins) and the following assumptions.

- **Risk discount rate of 10% and expected earnings of 10% pa**
- **Maintenance expenses (including commissions) of 0.5% of FUM**
- **All surrenders occur at the end of each financial year and according to the table below**

Year of Surrender (from inception)	Assumed Surrenders
1^{st}	0%
2^{nd}	20%
3^{rd}	20%
4^{th}	100%

d)

i) Calculate the best estimate liability using the projection methodology and state any assumptions made. (4 Marks)

ii) Compare your calculation to your answer to part b). What does the difference between the two figures represent? (3 Marks)

QUESTION 4 SOLUTIONS

a)
i) The relevant standards are:

- LPS 5.02 Cost of Investment Performance Guarantees. This defines the approach to be taken in calculating the cost of providing the guarantee, which must then be compared to the total liability value, and if representing less than 5% of the total liability then both types of business can be included in the same (unit linked) statutory fund. (1 mark)

- AASB 139 Financial Instruments. This defines the conditions for separation of the embedded derivative from the hybrid contract in respect of the guaranteed option. It also details the considerations for calculating the fair value of the financial liabilities. (1 mark)

- LPS1.04 Valuation of Policy Liabilities. This is the base actuarial standard for setting policy liabilities and refers the reader to the relevant accounting standards for investment contracts. That is, it contains no additional requirements beyond those in the accounting standards. (0.5 marks)

- AASB 4. This standard includes a definition of an insurance contract and refers the reader to AASB 1038 and AASB 139 for valuation of life insurance contracts and life investment contracts respectively. (0.5 marks)

- AASB 1038 Life Insurance Contracts. This standard states that investment contracts should be valued at fair value through profit and loss and refers the reader to AASB 139 for the financial instrument component and AASB 118 for the management services element. (0.5 marks)

Marking Guide
To a maximum of 3 marks (KU)

ii) The guaranteed option is treated as an investment contract as there is no transfer of insurance risk, as defined by AASB 4, nor is there a discretionary participation feature in the product.

Marking Guide
To a maximum of 1 mark (SJ)

b)
The Policy Liability consists of both a Life Investment Contract Liability (LICL) and a Management Services Element (MSE) (0.5 marks)

- LICL = Fair value of underlying assets (0.5 marks)
  FV assets = Premiums + return – fees = $1bn * (1 + 10%/2) * (1 – 1%/2) = $1.045bn (0.5 marks)
  LICL = $1.045bn

- MSE consists only of DAC as there are no up front fees received (i.e. DRL is zero) and is therefore negative (0.5 marks)

MSE = -DAC = -2% * $1bn = -$0.02bn (0.5 marks)

Need to consider any amortization of the DAC. As there have been no surrenders and the FUM has increased, no amortization has been applied. (0.5 marks)
The recoverability of the DAC from future fees less expenses must be checked (0.5 marks)

Therefore, Policy Liability = $1.045bn - $0.02bn = $1.025bn (0.5 marks)

Marking Guide
To a maximum of 4 marks (SJ).

c)
Steps required would be:

- Determine an acceptable probability of ruin / insolvency (0.5 marks) and associated time horizon for that probability of ruin. E.g. Company may wish to hold an amount of capital so as to be 99.5% sure of losses on the product not exceeding that capital amount over the following year (i.e. 0.5% probability of ruin). (0.5 marks).

- Develop an economic scenario generator for simulating the values of the underlying assets backing the guaranteed liabilities. This economic scenario generator should be calibrated to appropriate expected return and volatility parameters for each underlying asset class. (0.5 marks)

- Determine the number of simulations to be performed. This will likely be a function of both the selected probability of ruin (with lower probabilities of ruin requiring more simulations for sufficient statistical comfort to be gained with the tail simulations) and also the computing power of the company. (0.5 marks)

- For each simulation, determine the value of the assets at regular intervals (probably daily) during the projection period. (0.5 marks)

- Compare the asset values Y1,…,Yn to the guaranteed minimum value of the liabilities (Z). If Yi < Z then the guarantee will be "in the money" and the company will have to pay Li = (Z – Yi) in the case where policyowners lapse. If Yi > Z then the value of Li = 0. (1 mark)

- In determining which policyowners lapse, we need to consider, amongst other things, the rationality/level of inertia of the policyowners. There may also be tax benefits for not lapsing. (1 mark)

- Discount all values of Li back to time zero using the risk free rate. The risk free rate should be the simulated risk free rate to time point i in that particular simulation. Call each discounted value DLi (0.5 marks)

- Determine the maximum value of DLi for each simulation and call this value DL. (0.5 marks)

- List and rank the DL's for all simulations. (0.5 marks)

- Set the capital amount to the discounted value of L which corresponds to the tolerance level chosen. For example, if there are 1000 simulations and a 99.5% probability of adequacy is chosen then set the capital equal to the 995th best (i.e. 5th highest) value of L. (0.5 marks)

Marking Guide
To a maximum of 5 marks (CJ).

d) (i)
Best estimate liability = PV Benefit Outgo – PV Premium Inflows (0.5 marks)
Question states that surrenders occur at end of year. Assume all remaining cash flows occur in the middle of each year
PV Benefit Outgo = PV Expenses + PV Surrender Payments (0.5 marks)
Account balance at 30/6/2010 = $1.045bn
Account Balance Pre Surrender at 30/6/2011 = $1.045bn *(1+10%)*(1-1%) = $1.138bn
Account Balance Pre Surrender at 30/6/2012 = $1.138bn * (1-20%) *(1+10%)*(1-1%) = $0.991bn

Account Balance Pre Surrender at 30/6/2013 = $0.991bn * (1-20%) *(1+10%)*(1-1%) = $0.863bn

Account Balance Post Surrender at 30/6/2013 = nil (1 mark)
PV Expenses = 0.5% * [($1.045bn + $1.138bn)/2*1.1^(-0.5) + ($1.138bn + $0.991bn)/2*1.1^(-1.5) + ($0.991bn + $0.863bn)/2*1.1^(-2.5)] = $0.0135bn (0.5 marks)
PV Surrenders = 20% * $1.138bn *1.1^(-1) + 20% * $0.991bn *1.1^(-2) + 100% * $0.863bn *1.1^(-3) = $1.0191bn (0.5 marks)
PV Inflows are equal to zero as fees have been implicitly included in the projection of future surrender values above (0.5 marks)
BEL = $0.0135bn + $1.0191bn = $1.0326bn (0.5 marks)

Marking Guide
To a maximum of 4 marks (SJ).

ii) The best estimate liability is slightly higher than the policy liability calculated in part (b) (0.5 marks)

- This is because the future profits from fees less expenses (which are taken into account in the best estimate projection but not for the policy liability under LPS 1.04) are insufficient to recover the DAC in part (b), using the assumptions provided (1 mark)

- In reality the fact the DAC is not recoverable should imply an increase to the policy liability in part (b) (i.e. reduction in DAC) up to the level of the best estimate liability (0.5 marks)

- The difference between the two figures represents a negative Value of in force Business for the non guaranteed portion, at a risk discount rate of 10% and assuming a zero cost of capital (1 mark)

- If the DAC is written off then the negative value of in force business is transferred to net worth (0.5 marks)

Marking Guide
To a maximum of 3 marks (CJ).

Overall Marking Guide for Question 4:

- **Part a) (i) 3 marks (3 marks KU)**
- **Part a) ii) 1 mark (1 mark SJ)**
- **Part b) 4 marks (4 marks SJ)**
- **Part c) 5 marks (5 marks CJ)**
- **Part d) i) 4 marks (4 marks SJ)**
- **Part d) ii) 3 marks (3 marks CJ)**

20 marks overall (3 marks KU, 9 marks SJ, 8 marks CJ).

QUESTION 5 (19 Marks)

You are the Appointed Actuary for the Australian subsidiary of a specialist reinsurer based in Luxemburg which operates in 20 countries globally with a combination of branches and subsidiaries.

Two years ago, following the Global Financial Crisis (GFC), the CEO of the global organisation saw an opportunity to focus on business with investment guarantees and recommended that all operations pursue such a strategy.

This strategy has been very successful and the company has gained significant market share in the post GFC environment.

The Australian subsidiary has been successful in the reinsurance of business with investment guarantees and has reinsured $500 million of assets and liabilities of business with investment guarantees. This has been retroceded to the parent company with a recapture clause (and was approved under LPS230).

Details regarding the Australian subsidiary :

Total Assets	**$1,000 million**
Excess Assets over solvency requirement	**$150 million (being $50m of retained earnings and $100m of capital)**
Excess Assets over capital adequacy requirement	**$100 million (being $50m of retained earnings and $50m of capital)**
Liabilities retroceded to parent	**$500 million**
Retained earnings	**$50 million (all held within the statutory fund)**

A second crisis has hit the European Union and rumours begin to circulate in the press that the parent company is in financial difficulties, with speculation that the parent company will be downgraded by Standards and Poor's from A to BBB+.

The parent company has asked all local operations globally to remit all available retained earnings as a special dividend.

Given the relatively large size of the Australian operation and the relatively strong levels of cash ($100m), the parent company have asked if the Australian company can purchase their Polish funds management company for $200m. The Polish company has net assets of $50m, so the transaction would result in goodwill of $150m.

The required capital requirement in Poland of $30m is met by the net assets.

a) **The Australian regulator and the auditor have both asked for an update on the finances of the parent company. Set out the information required and questions to head office to help you prepare a response to the regulator and auditor. (5 Marks)**

b) **The CEO of the Australian business has asked you to consider recapturing the asset intensive retrocession. List the factors you would need to consider and the investigations that you would need to undertake. (5 Marks)**

c) **Draft your advice to board on the suitability of paying the proposed dividend, including what factors you would consider in setting an appropriate level of target surplus. (4 Marks)**

d) **The CEO of the Australian business has asked for your input in relation to the suitability of the purchase of the Polish funds management company. Discuss the points you would include in your advice, and make a clear recommendation on the proposal. Note that this purchase would be concluded after the payment of the proposed dividend. (5 Marks)**

(LPS 3.04 Capital Adequacy Standard sections 5.1.2 and 10.5.2 are relevant).

QUESTION 5 SOLUTIONS

a)
Information required and questions to be asked :

- Latest internal accounts
- Estimated parent company capital position at next financial reporting period and the next few years. (What basis have these projections been prepared?)
- What is the impact on the asset values of the economic crisis?
- What is the impact on the liability valuation of the economic crisis?
- Were there any hedges in place? How effective where the hedges?
- Any issues with hedge counterparties?
- Any capital issues with any other branch or subsidiary?
- Why are Standards and Poor's considering a possible downgrade?
- What is the level of cash in the Parent Company?
- Why is cash required to be remitted?
- Are there any issues with our retrocessionaires?
- Are there any plans for raising capital?
- What is the likelihood of being able to raise capital given the state of the market?

Marking Guide
- **0.5 marks for each reasonable point made.**

To a maximum of 5 marks (SJ).

b)
Factors to consider :

- Market values of the assets and full details of the assets that would returned on recapture
- Note that the liability position is already known as gross and net numbers presented in accounts
- Solvency and capital adequacy position upon recapture and projected positions
- Expected level of volatility post recapture of profit and capital positions
- Potential benefits of reduced exposure to the parents credit rating problems.
- Level of capital within the subsidiary - known
- Ability to enter into hedges
- Technical capability to manage the guaranteed book of business
    - Sourcing of economic scenarios
    - Management of positions
    - Ability to settle positions
- Availability of sufficient management to have separation of duties
- Investment policy post recapture
- Cost of hedging program compared to cost of retrocession
- Views of the local board especially the independent directors (advice should be given to the board under LPS320)

Investigations

- Projected capital positions under economic scenarios

- Projected profit outcomes under economic scenarios
- Projected capital position if there are further downgrades to assets that are returned on recapture
- Comment on impact if proposed dividend proceeds

Marking Guide

- **0.5 marks for each reasonable point made. Maximum of 4 marks for factors and 2 marks for investigations.**

To a maximum of 5 marks (SJ).

c)

Chair of the Board

I am writing in connection with the proposed payment of a special $50m dividend to our parent company. Advice is required as the retained earnings are currently held in the statutory fund. It would not be required if they were in the shareholders' fund.

Advice is required as to the consequences of the proposed dividend payment. In particular, no distribution can be made if the statutory fund would then fail to meet the APRA solvency standard. After the distribution, the company must continue to meet the APRA capital adequacy standard. In the case of our statutory fund, the payment of the $50m dividend would mean that the fund would continue to meet the solvency and capital adequacy requirements by $100m and $50m respectively.

In considering this matter, due regard must be paid to the effects of the possible downgrading of our parent company's credit rating. In accordance with the capital adequacy standard, the value of our retroceded business would need to be written down by $175m in three months time (500m * 35%) and by a total of 325m ($500m * 65%) in twelve months time. Either additional capital would be required to meet the solvency and capital adequacy standards or we would need to look at recapturing the $500m retrocession to our parent.

Recapturing the $500m retrocession would require separate advice under LPS 320. The effect on our capital position of the details of the recapture would need to be examined before the appropriateness of the dividend could be assessed.

Above the statutory requirements, we need to have regard to our target surplus policy. In determining the desirable level of target surplus, or the excess of assets over the capital adequacy requirements we should have regard to:

- The desired probability of breaching the capital adequacy requirements in adverse circumstances.
- The cost of capital.
- The amount required to secure a given financial strength rating.
- The risk profile of the company, including:
  - Insurance risk and mitigation strategies, reinsurance retention, catastrophe exposure. Insurance risk is the risk of higher than anticipated claim payments.
  - Asset risks . This covers market risk, interest rate risk, credit risk, currency risk and asset-liability mismatch risk

- o Operational risks. The risk of loss from failed internal processes, people or systems; or from external events.
- o Diversification and independence of risks. The assumed independence of risk factors reduces the target surplus.

- Working capital needs. This is the difference between the release of capital from the runoff of in force business and the capital strain from new business.

My advice is that while retained earnings could be distributed, there is a risk that if the downgrade of the parent company's credit rating occurs then the company could be in breech of the capital adequacy standards. Additionally, there may be requirements around the possible recapture of the $500m retrocession, and it is desirable to continue to meet the requirements of the target surplus policy. I would, therefore, not recommend the payment of the $50m dividend.

I am happy to discuss this further with you.

Kind regards,

Ann Actuary

Marking Guide
- **0.5 marks for each reasonable point made.**
- **Drafting mark – language (0.5 marks)**
- **Drafting mark – format (0.5 marks)**

To a maximum of 4 marks (CJ).

d)

Points to be included in the advice to the CEO on the suitability of the purchase of the Polish Funds Management Company :

- Separate formal advice to the board on potential changes needed to investment policy would be required.
- This would be an illiquid asset
- There would be no readily identifiable market value
- Any Polish restrictions on the payment of dividends
- Taxation issues– possible double tax
- Due diligence requirements
- Related asset – rules
- Asset concentration risk, having $200m invested in one asset.
- Inadmissible Asset – Financial services company limited to $50m but further limited by capital requirements (30m) resulting in a net $20m.
- Excess capital of $100m would be reduced to $50m after the dividend payment. Due to the inadmissible asset issue, above, $180m of the purchase price would be regarded as inadmissible which would result in a breech of the capital adequacy requirements.
- APRA permission is required and this would probably be quite unlikely to be received due to the issues above.

- – Advice to CEO is that this is not recommended due to the issues above and the impact on the capital position

Marking Guide

- **0.5 marks for each reasonable point made. Can't obtain maximum marks without mentioning breeching the capital adequacy requirements and recommending against the purchase.**

To a maximum of 5 marks (CJ).

Overall Marking Guide for Question 5:

- **Part a) 5 marks (5 marks SJ)**
- **Part b) 5 marks (5 marks SJ)**
- **Part c) 4 marks (4 marks CJ)**
- **Part d) 5 marks (5 marks CJ)**

19 marks overall (10 marks SJ, 9 marks CJ).

END OF PAPER