INSTITUTE OF ACTUARIES OF AUSTRALIA

LIFE INSURANCE **2004 EXAMINATIONS**
PAPER ONE

MARKING GUIDE

Level of Difficulty

PAPER ONE

Question	Syllabus Aims	Units	Knowledge & Understanding	Straight-forward Judgement	Complex Judgement	Total Marks
1a	10	4	3		1	4
1b	7,11	3 & 4			8	8
2a	6	2	4			4
2b	6	2			5	5
2c	6	2		5		5
2d	6	2	6			6
3a	10	4	6			6
3b	7,11	3 & 4		6		6
3c	4	2	3	3		6
3d	4	2			4	4
4a	12	5		8		8
4b	13	5		5		5
4c	13	5			6	6
4d	13	5			3	3
5a	4	2		3	2	5
5b	1, 10	1 & 4		5	5	10
5c	1, 10	1 & 4		2	2	4
5d	2, 4	1 & 2			5	5
TOTAL			**22**	**37**	**41**	**100**

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QUESTION 1 **(12 Marks)**

Analysis

Component	Aim	KU	SJ	CJ	Total
Part a)	10	3		1	4
Part b)	7,11			8	8
Total		3	0	9	12

Question

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 1: SOLUTION **(12 Marks)**

(a)

The solution should be presented in a report format using appropriate language. 1 mark (CJ)

Products that could be sold include:

- Unit trusts
- Life Insurance non-superannuation investment-linked
- Personal Superannuation Plans
- Corporate Superannuation Plans
- Management Platform products such as wrap accounts and mastertrusts.
- The products could be either single premium or regular premium products.

½ mark for each product/point, max 3 marks. (KU)

(b)

Solution should still be in report format.

The company should consider the following factors:

Capital requirements.

- The life company is likely to have more onerous capital requirements.

Legislative requirements

- Not all these products could be sold from outside a life insurance company or friendly society eg Life Insurance Bonds can only be sold from a life company or from a friendly society. Note the market popularity of these products is poor compared to unit trusts. (The note is an aside and not worth any marks in answering the question).
- Would need to establish a Superannuation Trust regardless of whether business was sold inside or outside the life company.
- Disclosure regime is close enough for all products as to not have a bearing on the decision.
- If done from within a Life company then would need to establish an additional statutory fund.
- If set up and sold from outside the Life company, two sets of company legislation would have to be complied with, increasing the burden of the compliance department.
- For products sold from a life insurance company it is more difficult to alter terms and conditions from the policy document. With unit trusts, the conditions are valid for the life of the prospectus and hence, it is easier to introduce change.
- Also need to set up a Trust Deed for the unit trust product and comply with the Managed Investments Act. Whilst this could be set up from within the Life company shareholder fund it is probably easier and less capital intensive to run this from a separate company.

Tax

- Need to consider tax impact on individuals of different products, particularly for the non-superannuation products. The life company products have a tax paid status plus additional advantages relating to the 10-year rule and 125% of prior year contributions. However, they do not get the benefit of the 50% reduction in capital gains (for assets held for more than 12 month), which do apply for unit trust investors.

Administration

- Unit trusts are required to distribute all income and realised gains (known as distributions) which means that they are more administratively burdensome.

Financial Reporting

- The different structures have different rules for reporting profit and hence it may be more advantageous to use a particular structure for profit.

1 mark per valid point, max 8 marks.

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QUESTION 2 **(20 Marks)**

Analysis

Component	**Aim**	**KU**	**SJ**	**CJ**	**Total**
Part a)	6	4			4
Part b)	6			5	5
Part c)	6		5		5
Part d)	6	6			6
Total		10	5	5	20

Question

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)

QUESTION 2: SOLUTION **(20 marks)**

(a)

The potential consequences of a unit pricing error that may give serious concern to a life insurance company include:

<u>Inequity between unitholders</u>

- Unitholders affected have received the wrong units/proceeds relative to the correctly priced unitholders. For example, those who buy units when the price is understated receive an excess allocation of units i.e. gain; those who sell units when the price is understated receive a shortfall in their proceeds i.e. lose. Opposite effect will occur if prices are overstated.
- Depending on how the fund works, these errors may disadvantage (or erroneously advantage) other unitholders in the fund.

<u>Financial loss to the company</u>

- It is unlikely that the company can offset the effects of pricing errors that unitholders experience as "gains" and "losses". The company will have to compensate the "losses" if material (>0.30% as per IFSA GN4) and is unlikely to be able to recover the gains.
- Some errors directly affect the company's own manager pool, while others may dilute the interests of the general pool of unitholders. In the former case, the company loses from every unitholder "gain", while in the latter case, it will be required to compensate the general pool for any dilutions suffered.
- Significant administrative work (time and cost) is involved to correct errors.

<u>Damage to the company's reputation</u>

- May deter prospective new business, due to undermined confidence of individuals, advisers.
- May unsettle existing unitholders leading to an increase in surrenders.
- Damage to reputation can result in a fall in the share price of the company (if listed).
- Damage to reputation can result in more difficult/expensive access to capital.
- Managing any reputation damage with analysts, ratings & research agencies and especially the regulator takes a big toll on management time and morale.

<u>Reassessment of Capital Adequacy Investment Linked Margins</u>

- The error may establish evidence that there is weakness in the controls, which may lead to a reassessment of the margin used. This could increase the amount of capital to be held constraining growth.

Enforcement or other actions by the regulators

- APRA/ASIC may take action (including additional requirements on the company). These may lead to more onerous requirements to the company. This may add time and cost as well as reinforce the damage to reputation. It is likely to lead to a higher level of prudential regulatory supervision, which in turn increases the time commitment of management.

The above is quite detailed and the students are not expected to produce an answer in such detail. 1 mark per valid point (i.e. the underlined heading) with appropriate discussion, max 4 marks.

(b)

A broad outline of the project plan, describing each of the major steps required is as follows:

Broad Outline	Major Steps	Comments
Establish Project	Establish the project scope, structure, goals, reporting etc	As this is a high profile project it must be comprehensively established. This includes methodology, resources, reporting, etc
Investigations	Determine causes, nature and extent of errors	The first phase is a thorough analysis to fully identify all errors and their causes, so any immediate actions that may be required to prevent any further errors are taken.
	Make sure existing errors are identified and solutions implemented.	Implement an interim strategy to prevent the errors from growing.
	Estimate the extent and amounts of all impacts arising from the errors.	Investigations will need to identify the affected groups and estimate the impacts of errors in terms of “losses” and “gains”.
Communications	Fully inform management, Board	With such a high profile project, a proper communication plan is a high priority due to the sensitive nature of the issues.
	Advise regulators appropriately	It will need to be discussed fully and frankly with APRA and ASIC, once management is able to give relevant information about what happened, the impacts, and proposed remediation actions.
	Advise Unitholders	Needs careful coordination.

Compensation	Determine amounts of compensation	Full analysis of all impacted parties, who “gained” and “lost”.
	Implement payment of compensation	This phase is highly important, as well as sensitive. It must be well coordinated, communicated, documented and approved by mgt, Board.
Corrections	Correct, test and implement solutions for any system errors.	Having taken interim preventative measures, it is essential to develop, test & implement robust systems and procedures to secure the ongoing integrity of pricing.
	Get Mgt, Board and Appointed Actuary signoffs	Signoffs are critical, as responsibility finally rests with the directors. Also important for audit review.

There are numerous ways to present this information. Marks are to be awarded based on the outline and major steps, with a brief and relevant comment.

Markers should use their own judgement in determining marks to be awarded. Max 5 marks.

(c)

The required characteristics of any system used to calculate unit prices include:

<u>Robustness</u>

- Systems should be of the highest commercial and audit standards, considering the nature of investment-linked business, and its reliance on the integrity of UP systems and processes. Reliance on one or a few people to maintain systems would indicate a weakness, as would regular failure of processes.

<u>Security</u>

- For the same reasons, UP systems must be contained in a highly secure environment, so that change control and protection processes are up to full audit standard. Again, reliance on one or a few people compromises the responsibilities of the company.

<u>Well Documented</u>

- It is essential that systems and procedures be fully and comprehensively documented, tested and supported, by a wide group of staff within the company. This enables support, backup and review to be maintained at the required levels of independence.

Integration

- The flows of information should interface seamlessly with other systems e.g. admin, investment and GL systems. Significant re-entry or massaging should not be required.

Frequency

- Daily pricing is preferred, as it reduces the scope for some types of errors.

Basis

- Forward pricing is preferred, as it reduces the scope for some types of error as well as reducing the scope for unitholders to exercise options to the detriment of others.

1 mark per valid point and appropriate discussion, max 5 marks.

(d)

The operational processes, checks and controls that should be established in order to minimise the frequency and impact of errors would include:

Comparison with benchmark

- Inspections of unit price returns with the return on a suitably chosen benchmark supported by examination of particular instances where returns are out of line. This should be done each time unit prices are calculated.

Comparison between unit classes

- Where the same asset mix applies across several classes of unit, consistent trends of returns (adjusted for fees and tax rates) should be evident.

Tolerance Limits

- Closer examination of movements that fall outside reasonable ranges should be investigated, together with sign off by management.

Reconciliations

- Regular reconciliations of the unit balances between UP systems and admin systems.
- Regular reconciliations of policy cashflows between UP systems and GL systems.
- Regular reconciliations of asset values and investment cashflows between UP systems and GL systems.
- Regular reconciliations of tax balances in UP systems and GL systems.

(Students need to cover at least three points under reconciliations to earn the full mark for reconciliations.)

Focused Reviews

- Internal and/or external reviews of UP systems and general procedures should be held every year.

Staff Rotations

- Regular rotations to ensure widest scope and independence.

Documentation/review

- Whilst documentation is essential, it is also vital that the documentation is kept up to date. There should be at least an annual review of documentation and any table of factors used in unit pricing.

Change Control Process

- The easiest time to introduce an error is whenever any change is being made to an existing process or system. Having a tight change control process involving documentation and a test system would reduce the possibility of errors when a change is being introduced.

1 mark per valid point and appropriate discussion, max 6 marks.

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QUESTION 3 **(22 Marks)**

Analysis

Component	**Aim**	**KU**	**SJ**	**CJ**	**Total**
Part a)	10	6			6
Part b)	7,11		6		6
Part c)	4	3	3		6
Part d)	4			4	4
Total		9	9	4	22

Question

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 3: SOLUTION **(22 marks)**

(a)

Information required for each of the products:

- New premium rates including loadings and discounts for sum insured.
- Average policy size (sum insured or premium).
- Advice from the ceding company about expected volumes of business, the likely distribution of business by age, sex, smoker status
- Increased non medical limits
- Advice from the ceding company of any other changes in underwriting procedures or standards
- Proposed policy document and product disclosure statement (PDS)
- Ceding company experience and assumptions (expenses are not required).

(½ mark for each valid point, max 3½ marks)

Additional information required for disability income product:

- Likely distribution of business by occupation class, waiting period and benefit period.
- Benefit definitions and type of cover (agreed vs indemnity).

(½ mark for each valid point, max 1 mark)

Additional information required for whole of life product:

- Proposed basis of calculating surrender values including any guarantees.
- The anticipated level of bonus rates for the new policies.
- Asset mix and investment policy.

(½ mark for each valid point max 1½ marks)

Bonus mark if the student raises the point of whether the reinsurer is to follow the bonus rates or is to use special non-participating rates. (The question does imply using the company's own rates by the definition of coinsurance supplied – however, this clearly shows the student is thinking about the product structure).

(b)

Investigations required for each of the products:

- Premium rates and other conditions of the policy would be compared with other similar products in the market to enable a better understanding of the ceding company's market strategy.
- Comparison of ceding company experience with the reinsurance company's expectation of likely experience (mortality and lapses).

- Projections would be carried out to determine what maximum level of initial and renewal commission could be offered to the ceding company in order to produce the level of future profits required by the reinsurer. For risk premium terms, the projections would be carried out to set the level of risk rates. These projections would be based on a model block of new business.
- Sensitivity testing to key assumptions eg mortality and lapses.

(1 mark for each valid point, max 3 marks)

Additional investigations for Disability Income:

- Would need to pay close attention to underwriting and claim practices so look at recent underwriting and claim audits to help set experience assumptions.
- Given the volatility in disability experience in the market an investigation of claim experience would be appropriate.

(1 mark for each valid point, max 2 marks)

Additional investigation for Whole of Life

- The projections would also be required to take into account the expected surrender rates, surrender values and bonus declarations.

(1 mark for each valid point, max 1 mark)

(c)

Definition of Profit (0.5 mark for each point, max 2 marks)

- Premiums less claims less expenses less increase in reserves.
- Claims would include claim expenses including legal expenses
- Expenses of the reinsurer are usually expressed as a percentage, eg 10% of premiums received
- Reserves will include reserves for outstanding claims and an unexpired/unearned premium reserve.

Share of Profit (1 mark)

- Could be either a fixed percentage or could be based on a sliding scale so that as the profit increases the amount returned to the ceding company increases.

Other Conditions (0.5 mark for each of the first 4 points or any other valid points, 1 mark for the last point, max 3 marks)

- Losses are to be carried forward and offset against future profits.
- An upper limit of sum insured for any one life for profit sharing purposes.

- Minimum number of lives to be reinsured before the profit share commences eg 1000 lives.
- Profit share only applies whilst the treaty is open to new business.
- From the reinsurer's perspective it would be preferable to have the profits of all 3 products combined, hence any poor disability experience could be offset against favourable mortality experience before returning experience profits to the ceding company.

(d)

If the reinsurance company offers coinsurance terms then its profit will be tied into the shape of the profit associated with the underlying rates of the cedant company. For example, the company might have less profitable rates in a certain age category and if it attracts too much business in this category then the profitability of the reinsurer would also suffer. However, with risk premium rates the profit margin for the reinsurance company can be managed to be uniform across all ages and hence, it is not susceptible to this distribution risk. (2 marks)

Offering risk premium terms will mean that for the participating whole of life product, the reinsurer is not having to follow the cedant's bonus rate declarations. (1 mark)

Administratively, both are fairly easy to manage for the reinsurer. However, assuming the ceding company will be responsible for calculating the reinsurance premium payable, then coinsurance terms will often prove easier for a cedant's system to manage and hence, this will prove easier to the reinsurer in the long run. (1 mark)

1 mark for every other valid point raised by the students. Maximum of 4 marks but to earn the maximum marks the students must cover the first point in the solution.

QUESTION 4 **(22 Marks)**

Analysis

Component	**Aim**	**KU**	**SJ**	**CJ**	**Total**
Part a)	12		8		8
Part b)	13		5		5
Part c)	13			6	6
Part d)	13			3	3
Total			13	9	22

Question

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 4: SOLUTION **(22 marks)**

(a)

General criteria and applicability to each company's products

Criteria	Comments
Equity	Fair treatment between surrendering and continuing policyholders. Possibly an issue for "X-Plus", e.g. in situations where large unrealised gains or losses have built up. For Achieve policies, the Investment Reserve is large, so it needs to be considered whether a share of this should be made to the owners of the surrendering policies, who may have contributed to its accrual (via lower crediting rates in the past).
Solvency	Protection from threat to security of ongoing policyholders. For Achieve policies, depending upon the size of the Investment reserve, this is unlikely to be an issue as a large reserve has built up. In that case, allowing a share of the Investment Reserve for surrenders is not likely to threaten ongoing solvency. For X-Plus policies, the guarantee requires a highly conservative asset mix, to avoid significant unrealised losses, which may pose a threat to solvency.
Profitability	As the Investment Reserve is large, surrenders would currently result in a "tontine" effect, which is positive for profitability. It would be possible to allow a share of the Reserve in surrender values, which may reduce "surrender profits", but not result in surrender losses. Hence, this should not be an issue for the Achieve policies. For X-Plus, the guarantee could lead to losses on surrender, when there are significant unrealised losses. Higher surrenders may tend to force increased realisations of losses on asset values.
Stability	This refers to how frequently the surrender basis would need to change. The SV basis is likely to be quite stable for both products; if the Achieve basis is adjusted to include a share of the Investment Reserve, this would need to be calculated and explained separately. For X-Plus, the surrender charge may be challenged by back-end "marketability" scrutiny [see Marketability, below].
Ease of Calculation	Or ease of explanation. This criterion is well satisfied provided the account balance is available. The surrender charges are only slightly more complex for Achieve policies. It may be difficult to explain (or "justify") why there is no allowance for discounting the Contractual Monthly Charge to a present value, or reducing the amount to reflect savings of expenses under "Achieve" surrenders. While X-Plus has a simple [fixed] amount of surrender charge, this would also be hard to explain (or justify) why it doesn't reduce over time.
Consistency	This refers to how the SV formula moves over the life of each policy. For Achieve it is likely to be consistent with the build up from premiums and crediting, as each Monthly Charge results in a reduction of the account balance exactly matching the change in surrender charge. It will approach the full account balance towards maturity. However, for X-Plus policies the charge is the same if the policy has 1 month or 1 year or 10 years to maturity. This may lead to numerous

	complaints from policies surrendering near maturity, as the 120% charge will appear increasingly unreasonable compared to zero at maturity. It is inconsistent with the gradual recoupment of expenses over the life of each X-Plus policy.
Marketability	No real issues apparent for either product, in the sense that they would be fully disclosed at the point of sale, and through annual statements. For Achieve policies, the surrender basis may be slightly more difficult to explain (i.e. "ongoing marketability"), as it is a little more complex, requiring a formula. It is a more challenging issue for X-Life, where the charge does not reduce over time – there is likely to be a high degree of back-end "marketability" scrutiny.
Compliance	With minimum statutory values. Unlikely to be an issue for X-Plus, as 120% should be OK. For Achieve the surrender basis should be OK against minimum statutory values, provided the maximum exit charge is not excessive.

1 mark per point max 8 marks.

(b)

Note that although X-Plus is described as non-par it is still a Discretionary product and similar criteria will apply. The general criteria that should be considered when assessing suitability of a surplus distribution method include:

Criteria	Comment
Equity	In this sense, equity (or "fairness") can vary between generations by duration in force, by policy size, and between surrenders/continuing policyholders, as well as new business. A level crediting rate is intuitively equitable for Investment Account. For X-Plus the 85% guarantee (although "unbalanced" as it ignores unrealised gains and losses) is an attempt to set a minimum baseline for a fair distribution. It would require a very short investment strategy in terms of asset duration. For Achieve the investment reserve smooths earnings, which can produce significant inequity – a situation likely to have already arisen, given that the reserve is currently quite large.
Acceptability	This criterion relates to the acceptability of the discretion and smoothing applied to the surplus distribution. For both contracts the policy conditions set out the basis of distribution, including the minimum 85% basis guarantee. For X-Plus, as a non-par product, the discretion in determining a crediting rate is concerned with how much margin is taken for expenses or profits. For Achieve policies, the discretion is concerned with smoothing via the Investment Reserve, and providing the company has a well-considered Investment Reserve "policy" (i.e. philosophy or strategy) that takes account of how it is to be distributed, smoothing is generally regarded as quite acceptable – in the sense of producing "reasonable" results.
Solvency	Neither contract really makes a significant contribution to protection from insolvency as there are no bonus loadings in the literal sense. In fact X-Plus is non-par, which adds to the need for solvency support. Solvency considerations for Achieve are boosted by the protection on

	account of the Investment Reserve – in normal circumstances this is intended to apply for the benefit of Achieve policies (but in a genuine insolvency, any such reserve would simply form part of the statutory fund assets). Solvency considerations may favour further build-up of the Reserve, but would not justify an unreasonably large accumulation.
Consistency	This criterion relates to consistency of distributions with premium bases and surrender scales. X-Plus is OK in this respect, provided the benchmark asset mix for the product design is maintained. Achieve is arguably inconsistent with the surrender scale which at present gives no credit from the Investment Reserve in the SV formula. The main consideration to guide potential distribution of the Investment Reserve should come from the Investment Reserve "policy" (i.e. strategy), and this should be consistent as regards premium and surrender bases, as well as distributions.
Simplicity	A level crediting rate is inherently simple. For X-Plus, the 85% guarantee may be oversimplified as it ignores unrealised movements. This may not be a problem when there are unrealised gains, but are a real problem when there are losses. For Achieve, while conceptually simple, the Investment Reserve may detract from a simple distribution unless the Investment Reserve "policy" is capable of explanation.

1 mark per point, max 5 marks

(c)

The transfer of the investment-linked funds as proposed seems perfectly meritorious.

Furthermore, the establishment of a separate statutory fund for the X-Life investment account business would also assist with setting an appropriate asset mix to support this business.

Another benefit of splitting the business as proposed is that it may further reduce any confusion amongst staff and the distribution force regarding the maintenance of par and non-par investment account business in the same statutory fund.

In addition it will eliminate any concerns from the customer and distribution force that the Investment Reserve may be used to support X-Life investment account policies. (Help establish equity in a highly visible manner).

Moving X-Life SF1 & SF2 Par traditional business to ABC Life SF1 may result in inequity between the policyholders of different products if the participating profits are amalgamated. To ensure equity, the retained profits for the different original product lines should be maintained separately in practice, even if they are combined for reporting purposes.

The proposal could be simplified by transferring all the business of X-Life SF No.1 & 2 to ABC Life SF No.1 thereby reducing the proposed number of statutory funds and consequently reducing expenses. Although it could be argued that the other benefits outweigh the costs associated with it.

It will also be necessary to establish a bonus relationship between the participating policies of both companies to ensure equity. It may be more transparent to staff, customers and the distribution force, if the entire business from X-Life SF No. 1 & 2 were transferred to the new statutory fund.

1 mark for every valid point, max 6 marks.

(d)

Note for discussion with MD

First consideration is solvency of each statutory fund. For X-Plus business, the main implication of this is the need for a highly conservative asset mix. This can be most easily and appropriately achieved by means of the separate statutory fund.

Next consideration is equity. The Achieve Investment Reserve is an integral part of the construction of Achieve business, which includes a specific Asset Pool established for the express purpose of supporting all Achieve policies. To dilute this reserve to mitigate losses under other policies would contradict the principles of equity.

In addition, given the existing policy wording, it may be illegal to use the Achieve Investment Reserve to support the X-Life Investment Account Business. Specific legal advice should be sought on this point.

1 mark for each valid point, max 3 marks.

QUESTION 5 (24 Marks)

Analysis

Component	**Aim**	**KU**	**SJ**	**CJ**	**Total**
Part a)	4		3	2	5
Part b)	1, 10		5	5	10
Part c)	1, 10		2	2	4
Part d)	2, 4			5	5
Total			10	14	24

Question

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)

QUESTION 5: SOLUTION **(24 Marks)**

The question asks for students to draft sections of their report. Therefore, their solutions should use appropriate structure and language. This would normally earn students a mark. However, given that there are plenty of marks in this question, it is suggested that students are penalised 1 mark if their solutions do not meet this criteria.

(a)

Change existing underwriting forms to eliminate sex specific questions.

Review underwriting manuals to identify where there are sex specific factors and ratings so that they can be standardised. Consulting reinsurers for revised manuals etc may save considerable time and effort.

Use other risk indicators as a proxy for sex. Whilst using the same set of rules, look for other indicators that are more likely to apply to one particular sex e.g. height, weight, occupation.

1 mark per valid point max 3 marks

Potential problems that could arise:

- Having sufficient actuarial statistics to support alternative rating factors.
- Problem of having to avoid the indirect discrimination component of the Anti-Discrimination act.

1 mark per valid point max 2 marks

(b)

Firstly, one could consider changing the benefit design of the YRT and DII products:

- Decrease benefits for the higher risk group or increase benefits for the lower risk group. Risk of products losing marketability.
- Combine YRT and DII into a single product, so that the males and females have an offsetting impact. This may not be easy to do in practice and limits the product to only those in paid employment, thereby reducing the potential sales of YRT.
- Exclude sex-specific causes of claim from the benefits of the products (e.g. complications during pregnancy or childbirth – apply to female TPD or trauma benefits only; death due to prostate cancer – apply to males' risk benefits only). Risks include loss of marketability and increased likelihood of misrepresentation/lack of disclosure at the point of sale.
- Introduce separate individual risk products covering these specific benefits excluded from the generic products. For example, a product covering only death from breast cancer which only women would buy; a product covering only death from prostate cancer which only men would buy. These specific coverages could be sold as riders to the generic product, or if there were concerns about

indirect discrimination, only as stand-alone products (risk is that they would become very expensive).

2 marks for each valid point - 1 mark for the point and 1 mark for discussing the associated risk. Max 4 marks

Secondly, one could alter the premium rates.

Males will currently have higher death and crisis premium rates, lower disability income premium rates. TPD premium rates may already be unisex.

- Develop unisex premium rates to take into account the future mix of new business. These rates will be between the rates charged for males and females. The risk here is that it will cause the mix to change even more towards the higher risk group. Ultimately it may force nearly all the lower risk group away from the company unless all companies charge unisex rates.
- Only charge the premium rate for the higher risk group (but this will impact volumes and unit costs).
- Increase premium rates for new business for the lower risk group (but still lower than the unisex rate) – may encourage higher lapses if a competitor introduces a product tailored to the low risk group with low rates.
- Decrease the premium rate for new business to a level between that was charged previously for the higher risk group but still above the unisex rate to try and decrease the lapse and re-entry risk from existing customers.

2 marks for each valid point - 1 mark for the point and 1 mark for discussing the associated risk. Max 6 marks

Markers should use their discretion in the breakdown between the allocation of marks between benefit design and premium rates points. The maximum mark is 10.

(c)

Product Range

One could consider selling different products to those currently sold by the company:

- Change the products to group policies as the legislation is only changing conditions for individual life policies. Risk that the government may broaden the legislative change to cover group policies.
- Reintroduce whole of life and endowment insurances so that the mortality risk component is reduced. Would need to develop new systems and training programs as agents may not be that familiar with the product given its absence from the market. Does not address disability income products.
- Withdraw from the risk product market for new business and start selling savings business. Risk of systems development, brand recognition and development will all take time and significant funds for development.

2 marks for each valid point - 1 mark for the point and 1 mark for discussing the associated risk. Max 4 marks.

(d)

Other actions should cover marketing, commission and reinsurance.

Marketing

- Market the product to the lower risk group e.g. call the YRT products “Smart Lady” and offer rates closer to the existing female rates.
- Offer free additional services that appeal to one particular sex, eg non-transferable membership of a female only gym. Need to ensure that it does not break indirect discrimination section of legislation.

Commission

- Pay higher commission for the lower risk group or lower commission for the higher risk group. This will encourage more sales of lower risk group and even up the profitability between the sexes.
- Link the commission to the claims experience of the business. Administratively complex and delays the commission payments to the agent so sales would likely decrease.
- Introduce higher renewal commission on existing business to reduce the lapse and re-entry risk.

Reinsurance

- Consider reinsurance. The legislation applies to individual policies and not reinsurance. It may be possible to structure a group reinsurance scheme that could offer rates that vary by sex.
- Could also consider a stop loss treaty to limit mortality exposure.

1 mark per valid point, max 5 marks, but all three areas need to be considered for maximum marks.

END OF PAPER ONE SOLUTIONS

