

INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS – November 2008

**SUBJECT: SA2 - LIFE INSURANCE
SPECIALIST APPLICATION**

INDICATIVE SOLUTIONS

Question 1**a) Benefit Illustrations**

- Illustrations prepared taking into account the AA's advice
- Not to create unreasonable expectations
- Illustrations to be consistent with the terms and conditions of the product as filed, wording in the policy document and company practice
- Filed with the IRDA
- Important information should not be withheld, e.g. likely conditions upon which the illustrations would not be valid
- Avoid undue complexity
- Intermediaries and the employees responsible to receive appropriate training and are supervised and monitored
- Guaranteed benefits clearly distinguished from non-guaranteed benefits
- Circumstances when guaranteed benefits available clearly stated
- Illustration of non- guaranteed benefits shall be based on appropriate assumptions about future experience
- If assumptions differ from profit test assumptions this must be justified
- Life Insurance Council sets two rates of investment returns on which illustration projections should be made
- A rate which exceeds the higher rate will not be used; lower rate can be used
- The tables illustrating the values based on the two sets of returns should specifically state the assumed rates of returns
- Full description of all types of charges for unit linked plans
- Projected rates of bonus should appropriate and supportable under the investment return rates
- Bonus rates themselves can be misleading and additional information on the rate of return achieved in a suitable form can be provided
- Benefits / options available on discontinuance of premiums before the policy acquires any value and after the policy acquires a paid up and / or surrender value to be shown
- How long the current non guaranteed surrender values would be applicable
- Indicate what needs to be done where benefits are contingent upon policyholders exercising options
- All assumptions underlying the calculations with suitable justification should be documented

a) Fair treatment of policyholders

- Identify the needs of the customers for whom products are being designed, manufactured and distributed
- Understand financial capabilities of customers

- Take into account impact and effectiveness of communications and customers' ability to understand complex issues
- Provide clear, fair and not misleading advertising, marketing and disclosure materials as well as communications after the point of sale
- Maintain a balance between increasing sales and not exposing customers to inappropriate risks, particularly in the design and marketing of new products
- Measure, monitor, control and review the risks arising from products for both existing and potential new customers. Consider current changes in the economic or market environment as well as stress testing against possible future changes
- "Stress test" possible risks taking into account product types, sales methods and after sales requirements
- Incorporate approach to treating customers fairly into corporate strategy
- Appropriate control functions to enable delivery of the strategy
- Management information to monitor the effectiveness of the strategy
- Consider all stages of the product lifecycle, including product design, financial promotions, advice (including remuneration of advisers), information at the point of sale, treatment after the point of sale, and complaints
- Behave fairly and responsibly in respect of all discretionary elements:
 - Variable charges on linked policies
 - Unit pricing basis for linked policies
 - Non-guaranteed surrender values
 - Variable-rate contracts such as yearly-renewable term assurances
- Demonstrate a reasonable degree of continuity to determining variable charges or benefits
- Attach sufficient importance to expectations relating to surrender values, early retirement values, and options to extend or convert a policy
- Consider whether proposed course of action is sound and prudent by the normal standards of the industry
- Consider whether proposed course of action is fair to different classes of policyholder, as well as to policyholders relative to shareholders

b) Need for Capital

- Capital requirements cannot be assessed adequately by considering current value of liabilities and assets available to meet them
- The need for capital is driven by the tails of loss distributions from all of the risks being borne by the company
- Also the requirement to fund the on-going business strategy
- Requires projections of the on-going solvency of the company that allow appropriately for both the size and probability of downside risks

as well as estimating the capital needed to support the future new business strategy of the company

- Important factor that will affect the insurer's financial position of an insurer is its marketing plan and the projected volume of new business
- Need an assessment as to whether projected volumes are realistic
- Advise the Board of Directors as to the capital requirements associated with writing the required volume of business
- If new business strain likely to be a problem, the insurer needs to be able to meet the reserves and solvency margin requirements from capital within the shareholders funds
- Estimate the pattern of capital releases to shareholders - can be used to assess the cost of capital in calculating the embedded value of the company
- For with-profits funds that are closed, or in decline, solvency projections are important in preparing run-off plans for the fund
- Part of successful risk measurement and risk management within the company

c) **Financial Condition Report**

- Purpose.
- Historical development with implications for the future especially policy conditions, methods of selling etc. which has led to Policyholders' Reasonable Expectations being formed.
- Review of business and operating environment.
- Future factors which present a threat and the options open to deal with those factors.
- Methods and assumptions – important and less important - those within the insurer's control and those that are not.
- Changes compared to the last similar report.
- Inadequacies in analysis eg because of data availability.
- How assumptions made compare with recent experience and explanations where assumptions significantly differ from the recent experience.
- Specific financial characteristics of the existing business or new business that require special consideration.
- Financially significant reinsurance arrangement.
- Planned changes in method of operation.
- Use made of derivatives – purpose and financial significance.
- Post Balance Sheet events.
- Concentration of assets in particular risk areas.
- Assets with unusual provisions.
- Sources of new business with unusual characteristics.
- Impending major claims or litigation.
- Risks arising out of product literature or policy documentation.

- Loss of a distribution channel.
- Premium rates on which the company has written existing business and intends writing new business.
- Impact of options and guarantees.
- Current and future expenses.
- Current and future persistency.
- Current and future mortality and morbidity.
- Current and future taxation position.
- Nature and timing of allocations of surplus to policyholders and/or shareholders.

d) Types of Capital

- Regulatory capital - regulatory value of liabilities and the associated capital resource requirement which are set to protect policyholders.
- Economic capital - internal calculation of capital required, based on a company's risk appetite, including the view of policyholders' risk tolerances and allowing for the needs of the company's on-going business strategy.
- Rating agency capital - rating agency capital adequacy standards are a proxy for the policyholders' requirements.
- Risk capital - to cover the day-to-day risk exposures:
 - Market and interest rate risk – to allow greater investment freedom
 - Credit risk
 - Persistency risk
 - Operational risk (eg accidents, terrorism, malicious damage or systems failures)
 - Mortality (including longevity) and morbidity risk
 - Expense risk
 - Liquidity risk
 - Reinsurance risk
 - Group risk.
- Working Capital – to support the ongoing business strategy
 - New business, including the cost of attracting support from intermediaries
 - Overheads and development costs of expansion, such as computer hardware and software, product development, head office and branch premises,
 - To acquire other companies or blocks of business.

e) Non Unit reserves

- Non-unit reserve is the amount required to ensure that the company is able to purchase units in accordance with its funding plan, pay claims and meet its continuing expenses without recourse to further finance.
- Liability may be dependent upon factors that can be subject to discontinuities, such as:

- Unit allocation percentages with specified variations
- Management charge fluctuations due to movements in the value of the unit fund
- The allocation of “bonus” units at certain durations
- The conversion of capital units to accumulation units.
- Necessary to consider the month by month incidence of the various components of the cash flows to determine if and when a non-unit reserve is required.
- Necessary to check that the sum of the unit and non-unit reserves is not less than the surrender value, and that on valuation assumptions this remains the case throughout the contract’s life.
- Similar tests need to be applied to ensure that the total unit and non-unit reserves are sufficient to cover any guaranteed cash options that exist.
- In aggregate non-unit reserves should not be negative.
- Negative non-unit reserve implies a mismatching risk; extent needs to be assessed and an appropriate addition made to the negative non-unit reserve.
- Allow for the impact on future management charges of an immediate change in asset values broadly consistent with the change in asset values which would be assumed if the unit funds were backing non-linked business.
- Allow for the effect of the changed investment conditions on the valuation interest rate and other assumptions used in the calculation of non-unit reserves.
- Non-unit reserve assumptions
 - Unit growth rate - prudent assessment of the average likely return on the assets in which the units are invested; typically, management and other charges depend on the future value of the units, in which case a low assumption would be prudent.
 - Non-unit interest rate - prudent assessment of the return on the assets in which the non-unit reserve is invested.
 - Expense inflation - consistent relationship between the unit growth rate and expense inflation assumptions.
 - Mortality - prudent assessment of future mortality, based on recent experience.
 - Expenses - take account of the actual expenses in the 12 months preceding the valuation date and the possibility that the company might close to new business 12 months after the valuation date. Care needs to be taken, in expressing the assumption, for the possibility that selective withdrawals might render inadequate the allowance for expenses.

- Withdrawals - allow for the possibility that reserves may be increased on allowing for withdrawal of the policy and/or the ceasing of regular premiums. Assume nil withdrawals – unless to do otherwise would increase the required reserves. In this event, the most onerous duration of withdrawal would be assumed.
- Variations in experience and other factors - adverse variations in assumptions would be allowed for by taking appropriate margins.
- Test both a low interest/low inflation scenario and a high interest/high inflation scenario to ascertain which produces the higher reserve.
- Allowance needs to be made for resilience for example by assuming an immediate fall of 25% in the value of the matching assets when determining the non-unit reserve.
- Consider ability to vary future management or benefit charges; unless there is a definite expectation that the charge will increase, assume that current levels will continue.
- Any increases assumed must be within the reasonable expectations of policyholders.
- Allowance also to be made for any delay before the increases could be implemented and for the costs of making any increases.

f) Closure to New Business

- GN1 Requirements
 - Value placed on the liabilities must make appropriate provision for future expenses and this provision must at least equal that required if the company were to close to new business one year after the valuation date.
 - The possibility that preferential service agreements, if any, might be altered or terminated also needs to be allowed for.
- Economic Capital Adjustments
 - Possibility of slowly declining overhead costs.
 - Transition to a closed fund is likely to be costly.
 - More than twelve months may elapse from such closure before the lower level of expense appropriate to a closed fund is achieved.
 - Specific allowance for additional expenses that are likely to occur in the event of closure to new business.
 - Allowance for outstanding margins on the existing business projected to emerge over the period that the additional expenses are incurred.
 - Allowance for the loss of future margin as policies are made paid-up.
 - Recognition that future tax position of the fund may be affected.

- Provide for any expense overrun in respect of new business to be issued in the following year.
 - Take into account whether the new business is expected to be self-supporting allowing for the repayment of any valuation strain.
 - Take into account whether any valuation strain associated with the new business to be issued in the forthcoming twelve months is covered by the surplus expected to arise during this period from existing business.
 - Recognise the need to meet policyholders' reasonable expectations.
- g) Outsourcing**
- Used where insurer has difficulty in attracting appropriate specialist skills or sufficient scale to perform the function efficiently.
 - Could include
 - Investment management
 - Policy administration
 - Actuarial services
 - Unit pricing
 - IT.
 - Can be used to maintain unit cost during run-off, where, in the absence of outsourcing, the level of fixed expenses would become onerous as the number of in-force policies reduces.
 - Insurer is still responsible to its customers for the service provided.
 - Terms of outsourcing contracts, together with the financial strength of the service provider, will influence the need to set aside additional capital for operational risks in respect of outsourced functions.

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Question 2**a) New Issues and Risks**

- Completely new class of business (general annuity)
- Razor sharp competition
- Admin systems
- Annuity payment systems for regular payments, the existing claims system is geared to one time payments
- Investment processes including governance
- Reserving and capital adequacy
 - challenge of reserving for future mortality improvements
 - resilience or mismatching reserves
 - guaranteed conversion rate
- Experience monitoring
- Pricing reviews vital for single premiums as the yield curve changes
- Credit risk – need to invest in corporate bonds to increase yield through

- credit spread
- Market risk – very long term interest rate guarantee vulnerable to reinvestment risk
- Liquidity risk – asset matching must allow liquidity for the regular annuity payments
- Operational risk – payment of annuities on time, to the correct person, and verification of survival
- Insurance risk
 - longevity and future mortality improvements
 - with return of purchase price on death, longevity losses for improving mortality are offset by lower refunds on death
 - life annuities, and short guarantee periods are very sensitive to mortality however
- Management information
- Complicated rating structure – age, sex, frequency of payments, three benefit options
- Real time pricing
- Embedded value assessments if undertaken

b) Pricing

Methodology

- Formula or cash flow?
- Fully allocated expense assumptions or marginal?
- Profit criteria
- Interest and mortality are vital assumptions
- Tax – not an issue
- Policyholder behavior – not an issue
- Free look options – upwards spike in interest rates
- Basic reserve
- Reserve assumptions including MAD
- Resilience Reserve
- Solvency margin
- Economic capital
- How rates would be varied in near real time

Mortality

- This is a key assumption, especially future mortality improvements which have been substantial in other markets
- Standard annuitants' table in India is LIC (a) (1996-98) Ultimate
- This table is based on the experience of LIC and therefore reflects the markets in which the LIC operates, and may not be suitable for another company
- Probably based more on purchases from corporate superannuation funds than on individual deferred pensioners

- The table is ten years old and does not reflect mortality improvements over this period
- The table gives no guidance on how allowance can be made for
 - year of birth, or
 - future mortality improvements
- Look to overseas studies (CMI in the UK) for indications of future mortality improvements

Investment return

- Together with mortality, this is the other key assumption
- Starting point are yields under long term (10 and 30 year) fixed-interest Government securities.
- If higher-yielding assets or even equities are considered, then a higher assumed rate of return might be appropriate, but the higher credit risk and lower liquidity will then call for higher MADs in the statutory valuation basis
- The very long term of immediate annuities means that expense inflation is an issue, and there are grounds for a small proportion of growth assets to back the future expense reserve

Expenses

- Initial expenses are relatively low
 - low commission (2% maximum)
 - no underwriting
 - simple non par product avoids many mis selling issues
- Will sales of the immediate annuity be through an existing distribution channel?
- Will the same product be used to write annuity business using funds coming from external sources as well as from accumulation proceeds from its deferred pension product? If not, it might be possible to improve the rates in the latter case by reduced expenses. But if no commission is paid, and an 'open market' option exists, this might not be effective in practice.
- Renewal expenses for payment of installments can be very low if electronic cash transfers are utilized
- Some expense for verifying continued survival and claims under the return of purchase price on death
- Expense structure therefore quite different from that of unit linked business
- Future inflation allowed for at a rate consistent with the basis on which the investment return assumption has been assessed

Surrenders

- Even if surrenders are allowed, there are unlikely to be many
- Ignore surrenders in pricing basis

c) **Product Filing**

- Standard six month period after approval of a new product during which time contracts cannot be varied
- Need to be able to vary rates at short notice
 - if interest rates fall, the product pricing will be unsound
 - if interest rates rise, the product will be uncompetitive and the company will lose sales
- Under IRDA guidelines, insurers may adjust their pricing for approved immediate annuity products with plus/minus 10% of the approved rates in line with changing conditions
- The plus/minus 10% range is equivalent to a change in interest rates of about minus/plus 2 percentage points
- If the changing yield curve requires adjustment outside this range, then the rates will require IRDA approval

How would you address this?

- Structure the product so that the formula is approved, and then it is straightforward to use a different interest assumption in line with current fixed interest yields

Other issues

- General awareness of File and Use
- Rates used in benefit illustrations for conversion of accumulation to annuity may not be the same as the approved rates
- Requirement that insurers cannot launch a deferred pension product unless they also have an immediate annuity contract to complement it
- Requirement that mortality basis used must be expressed in terms of the official table LIC (a) (1996-98)

d) **ALM – purpose and issues**

- ALM purpose
 - “The purpose of asset liability management is to derive an investment strategy that takes into account the insurer’s attitude to investment risk, meaning the extent to which it is prepared to take the risk of not being able to pay its claims. This attitude will vary according to how strong the insurer is in terms of the relative size of its free reserves.”
 - To derive an investment strategy so as to ensure guarantees can be met.
 - Investing in assets which produce a flow of asset proceeds to match the liability outgo.
- Annuity payments - fixed monetary terms

- Fixed interest investments
- Government bonds are risk free but may consider corporate bonds or other fixed interest investment for a higher yield
- Then need to take into account the additional (credit and possibly liquidity) risk with such investments
- Take into account term of the liability outgo
- Take into account probability of the payments being made
- Probably impossible in practice to find assets whose proceeds exactly match the expected liability outgo.
- Terms of available fixed-interest securities are often much shorter than the corresponding liabilities.
- Technique of immunization may be used but is subject to theoretical and practical problems.
- Reinvestment risk is significant
- Equities may be considered for long term element of liabilities but need to take into account the additional capital needed for the additional risk involved
- Allowance for expenses
 - Insurer's future expenses are similar in liability terms to a benefit payment
 - Continue as long as the annuity payments continue
 - Expense payments tend to increase similar to the rate of change in a price index,
 - Can be viewed as benefit payments guaranteed in terms of an index of prices or similar.
 - Ideally index-linked securities but not available
 - Match expected term of the liability outgo.
 - A substitute would be assets expected to provide a "real" return.

e) **Conversion Option**

- This is a valuable option with non symmetrical pay-offs; the policyholder will only exercise the option if he or she cannot get a better rate elsewhere
- The cost of the option is driven by conditions prevailing at the end of the accumulation phase:
 - Interest rates – may be low
 - Expenses – there could have been significant inflation during the accumulation phase so that the insurer could be guaranteeing to issue an annuity of uneconomic size
 - Mortality – there could have been significant improvements eg medical breakthroughs
- The cost of the interest rate option could be assessed using stochastic techniques
- A multivariate model such as the Wilkie model that addresses both interest rates and inflation might be used to address the expense element

of the option cost

- For mortality it may be difficult to do little more than make deterministic assumptions of what the experience could be
- There should be no need to allow for commission or other marketing type expenses in the rates
- Derivatives could be used to protect against an increase in guaranteed annuity option liabilities arising from a fall in interest rates; achieved by entering into an option to take out a swap on a pre-determined basis at the guaranteed annuity option date. If interest rates fall the change in value of the swap option should match the change in the insurer's liabilities.
- Use of derivatives is subject to particular IRDA restrictions
- Given the significant risks the once common practice in the UK of guaranteeing rates has largely ceased.
- This could well be a product feature that it is not sensible to implement at any cost.

f) Equity Investment

- This is a deliberate mismatching strategy
- Don't reject idea entirely given the difficulties in matching anyway
- The extent of mis matching with equities is limited by the company's free capital
- Need to allow for in reserving eg resilience reserves
- However, this can be factored into product pricing so net impact on rates might be negligible (higher investment earnings compensate for higher resilience reserves)
- Reference to hedging – limited opportunities in practice even if IRDA allowed
- Cost of hedging would also bring back price to starting point level
- MCEV concepts
 - the CFO's point is that if the assets earn more, the discount rate should be higher and the value of liabilities lower
 - but the principle of MCEV is that guaranteed benefits and options should be valued making allowance for the time value of guarantees based on stochastic techniques
 - also, guaranteed benefits must be valued consistently with financial products with similar cash flows and guarantees
 - the discount rate is set by market rates, rather than by the actual asset portfolio

g) Sales Material

- No surrender value is allowed.
- Possibility that the total annuity payments made may be less than the consideration paid, if this is a concern, the customer should select a minimum guaranteed period, or the return of purchase price on death.

- Annuity is un-tied, and the customer is free to seek better terms from another insurer.
- Customer may be disappointed if interest rates are low at conversion date. One option is to defer the vesting date under the deferred pension product if the customer believes interest rates may rise.
- Obviously, if the conversion option is in the money, this should be given to the customer, and not current rates.
- The annuity is non participating and there will be no increase in the annuity payments.
- Effect of inflation on benefits.
- The customer may commute one third of the proceeds of the deferred pension tax free. The balance must be applied to purchase a life annuity with this company.
- The insurance company pays no tax on the investment income of its general annuity fund.
- However, annuity payments are taxable in the hands of the annuitant.

h) Benefit Illustrations

- 6% and 10% regime for the deferred pension product shows the fund build up in the accumulation phase
- Also need to illustrate the resulting annuity payments
- Allow for commutation of up to one third
- Some country's require that an inflation adjustment be shown for the annuity payments – eg assuming inflation at 3% pa, the purchasing power of this annuity in today's terms would be Rs xxxx
- Need to determine annuity rate to use in each case
- Must be clear that these are non-guaranteed rates
- The guaranteed rate is also shown in each case
- An illustrative actual rate in each case:
 - Based on 6% / 10%?
 - In current conditions these rates imply equity exposure.
 - For the annuity basis, the rates used should reflect fixed interest rates lower than 6% / 10%
 - What are mortality assumptions then likely to be?
 - Expense loadings - what the net impact of inflation / expenses / size of policy
- Non participating, there will be no increases to the annuity payments
- Additional disclaimers / qualifying notes

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