

Institute of Actuaries of India

Subject SA2 – Life Insurance

September 2021 Examination

INDICATIVE SOLUTION

Introduction

The indicative solution has been written by the Examiners with the aim of helping candidates. The solutions given are only indicative. It is realized that there could be other points as valid answers and examiner have given credit for any alternative approach or interpretation which they consider to be reasonable

Solution 1:

i)

Immediate Annuity - Explanation of sources of surplus –**Economic Surplus:**

- Investment surplus of Rs 10 cr as actual experience is better than expected
- This portfolio is usually backed by variety of bonds (government and corporate bonds) and less likely to be backed by equity
- Under statutory regime assets are valued on amortized book value basis.
- Bonds under annuity are generally held to maturity given the high liability duration and hence any fall in yields on government and corporate bonds during the year is unlikely to have any impact on the coupon yields on existing assets;
- However new investments made during the year would have yielded lower return and this may have caused the overall portfolio book yield to fall.
- This may also lead to reduction in interest rate assumption; but since investment surplus is calculated on opening assumption the impact of any change in assumption is not reflected here
- As the yields have reduced during the year, the Company might have sold some bonds to realize the market gain and thereby leading to higher investment income
- The statutory reporting liabilities is valued using prudent assumption and hence, positive investment surplus may be observed due to the margin between actual investment return and valuation interest rate

[½ mark for each point; max 2.5 marks]

Mortality Surplus:

- The Company shows a positive surplus of Rs 1 cr; implying that the actual annuitants' deaths have been higher than assumed during the year. For annuity portfolio higher deaths than expected leads to positive mortality variance [1]
- Reason for higher deaths than assumed could be:
 1. Random fluctuation
 2. Severe weather condition or pandemic or some new infectious disease impacting older people,
 3. Company focus towards impaired / unhealthy lives
 4. The actual experience is normal; however, the valuation mortality assumption being used is on prudent basis; hence surplus arising due to release of prudence [max 1.5]
- For annuity products companies usually make an assumption for future mortality improvement. It may be possible that the in reality no improvement in mortality is observed. [0.5]

[Max 2 marks]

Lapse / Surrender Surplus:

- Surrender surplus is 0 during the year; implying actual experience is same as expected and there is no variation.
- Zero surplus could be arising due to:
 - a. These are single premium contracts, hence lapsation does not arise.
 - b. Annuities are purchased to serve the pension needs of the buyer; hence there is a low likelihood of surrenders.

- c. Product feature does not allow surrender of the policy or the surrender value is meagre and hence economically it doesn't make sense for the customer to surrender
- d. Historic experience of the Company suggests that there are no surrenders in annuity and hence for prudence the Company calculated its liability using 0% surrender rate assumption
- e. As the interest rate is on a declining trend, customers who had purchased the annuity contract earlier may find economically beneficial to continue with the existing plan.

[½ marks for each point; max 1.5 marks]

Expense Surplus:

- Expense surplus is 4 during the year; implying actual expenses incurred by the Company is lower than expected.
- Reason for this could be:
 - a. Since statutory liabilities are calculated on prudent basis the surplus emerging may be on account of release of prudence
 - b. Company might have taken various initiatives to reduce the expenses:
 - i. Lower salary cost on account of lower headcount
 - ii. Sale through low cost channels
 - iii. Savings on rental expenses. Due to current pandemic many employees are working from home. This may lead to vacating some of the additional office space and savings on rental expenses
 - iv. Reduction in fee under an outsourcing or IT application licencing cost
 - v. Higher growth in premium or policy count compared to growth in expenses; thereby leading to reduction in per policy expenses
 - vi. Immediate annuity contracts are single premium contracts where the actual expenses incurred post issuance are typical lower due to reduced expenses incurred on maintenance of the contract [½ marks for each point; max 2 marks]

Non-Par Savings - Explanation of sources of surplus –

Economic Surplus:

- The investment surplus under non-par savings portfolio shows a positive 20 cr; implying that the actual investment return are higher than the expected return
 - This portfolio may be backed by variety of assets type i.e. government / corporate bonds and in some cases minor proportion of equity/property as well. [0.5]
 - In these products the policy benefits are highly sensitive to interest rates, the Investment manager would be aiming to maximize the return on investment. [0.5]
 - Company may also be investing in derivatives, for e.g. Forward Rate Agreements (FRA) to hedge the interest rate risk [0.5]
 - During the year as yields have come down the investment manager might have made some tactical decisions to book unrealized profits on government securities and invest in corporate bonds. [1]
 - There could be expiry of some FRA contracts and due to prevailing low interest rate environment, this could have resulted in realized profit [1]
 - The liabilities under statutory regime are calculated using prudent assumption. Hence we can observe positive investment surplus emerging due to release of prudence. [0.5]
- [Max 2.5 marks]

Mortality Surplus:

- Mortality surplus shows a positive of Rs 5 cr, implying that the experience has been favourable than assumed i.e. actual deaths are lower than expected

- Actual Deaths could be lower due to:
 - a. The Company might have strengthened its underwriting practice to better screen the applications and / or
 - b. have a robust fraud risk management in place to eliminate any fraudulent claims
 - c. Target market could have changed due to a new distribution channel or new marketing strategy (say tie up with a high-end bank; or online distribution)
 - d. Random fluctuation
- Expected deaths could be higher due to:
 - a. Valuation mortality assumption are usually set on a prudent basis. As per APS 7 a minimum adverse scenario of 10% worsening mortality experience needs to be considered while setting the valuation assumption
 - b. Outdated mortality assumptions: The Company might be basing its assumption on last few years' experience (for e.g. 10 years) while the recent experience has been better than earlier.
 - c. The Company while setting the assumption might have taken a prudent approach considering the pandemic situation [½ marks for each point; max 2 marks]

Lapse / Surrender Surplus:

- Non-Par portfolio has a positive lapse /surrender surplus of 25 cr during the year.
- if the actual surrender / lapse are higher than valuation assumption there would be release of reserve which in some cases higher than the surrender value paid and this will lead to surrender surplus for the Company Or

Positive surplus could be emerging on account of:

- Surrender Value set at very low levels in order to discourage surrenders. So when the policy surrenders it gives rise to surplus
- If the initial NB Strain is quickly recovered (say by 2nd yr); however no benefit paid out in case of discontinuance till 3 premiums are paid; surplus will arise in lapses in these durations.
- Actual surrender / lapse experience of portfolio is higher than expected.
 1. Policyholder may not find much merit in continuing with the contract or there could be monetary issue hence she / he is unable to pay the renewal premium
 2. Better alternate new product offered by the Company or Competitors which may be causing the policyholder to switch to new plan
 3. There could be miselling / churning of business done by some of the distribution partners which is leading to higher lapses
 4. Benefit offered under the product is much lower than available elsewhere (for eg Bank Fixed Deposit, PPF, etc) hence the policyholder finds better value by switching to other saving options

Expected surrender / lapse

1. As per APS 7 a minimum adverse scenario of 20% rise/fall in persistency needs to be considered while setting valuation lapse / surrender assumption; hence the assumption used is more prudent.

[½ marks for each point; max 2 marks]

Expense Surplus:

- Non-Par portfolio has a positive expense surplus of 5 cr during the year.
- Expense surplus will arise when the actual expenses could be low or the expected expenses are set at higher levels
- The actual expenses would be lower because:

Company might have taken various initiatives to reduce the expenses:

- a. Lower salary cost on account of lower headcount
 - b. It could be the case that during the year non-par savings product is mostly sold by Bancassurance partner which typically has lower cost ratio compared to agency channel; however, while setting the assumption Company might have taken an aggregate view.
 - c. Higher growth in premium or policy count compared to growth in expenses; thereby leading to reduction in per policy expenses
- Expected Expenses could be higher because:
 - a. Since statutory liabilities are calculated on prudent basis the surplus emerging may be on account of release of prudence
 - b. While the actual expenses may be lower during the current year, expense surplus is estimated from opening assumption which may be on higher side and hence leading to positive surplus.
 - c. Expenses could have been based on outdated expense investigations; which was done before the company undertook new measures to reduce costs.

[½ marks for each point; max 1.5 marks]

[Max 16]

ii) Immediate Annuity: *Explanation of EV AoM variance:*

Economic variance:

- Investment variance under annuity portfolio is negative 2 crore while under AOS results it is Rs 10 cr; implying that on economic basis there is a loss.
- Difference in result emerging due to differences in underlying basis of valuation of assets and liabilities under EV and AOS framework.
- As per APS 10, under EV calculations asset values must be consistent with values observable in investment market and unrealized gain / loss should be allowed for in the projection whereas in Statutory Balance sheet bonds are valued on amortised book value basis.
- EV is calculated on best estimate assumption without any margin for adverse deviation; while reserves in statutory balance sheet is computed using prudent assumption
- As outlined bond yields have reduced at almost all durations during the year, implying market value of the bonds has increased
- As there is an investment loss it means that the change in asset value is not equal to change in best estimate liability; suggesting that the assets and duration are not perfectly matched; liability duration being higher than assets duration.
- This could be because the Company has invested in assets of shorter duration as compared to liability duration. Reason for this could be deliberate to maximise returns or due to non-availability of longer duration assets.

[½ marks for each point; max 2.5 marks]

Lapse / Surrender:

- The lapse / surrender variance under immediate annuity contract is 0. This implies that the actual experience is in line with the best estimate assumption used for calculating the embedded value.
- This could be due to:
 - a. These are single premium contracts. The Company may not be offering any surrender value under the product and hence both the best estimate and valuation assumption would be 0%.

- b. The surrender value is very small amount compared to the purchase price. The company would be basing its best estimate assumption using very credible past experience and hence there is not much divergence in actual from past experience

[1 mark]

Mortality:

EV AoM variance shows a positive of 2 Cr while in AOS it is 1 cr.

The positive mortality surplus would emerge if the actual deaths are higher than expected. It seems that the valuation mortality assumption is higher than the best estimate mortality assumption. This could be on account of:

- a. Future mortality improvement assumed in EV is higher compared to the once used in valuation
- b. The Company may be using the recent years experience while calculating the EV wherein lower deaths are experienced in last few years, however while setting the valuation assumption experience of relatively larger period is being considered in which case the observed annuitant deaths were higher.
- c. The Company might have recently re-priced annuity contract wherein more conservative assumption on annuitant deaths might have used, considering the recent experience / target market. The same was reflected in EV computation but not in Statutory reserve.

[1 mark]

Non-Par Savings: *Explanation of EV AoM variance:*

Economic variance:

- Investment variance under non-par savings portfolio is negative -5 crore while under AOS results it is Rs 20 cr; implying that on economic basis there is a loss.
- Similar to above response on annuity, Difference in result emerging due to differences in underlying basis of valuation of assets and liabilities under EV and AOS framework
- Non-Par savings contract have lower duration compared to annuity in general. Being shorter term; insurers tend to be more aggressive on their guarantees in the product; hence making it more sensitive to the market movements.
- Unlike in immediate annuity which is Single premium contract; where the reinvestment of renewal premiums is not a risk; non-par savings product gives upfront guarantees with premiums still to come in future periods, which makes it prone to reinvestment risks.
- Duration matching for Non-Par savings will not be as difficult as for immediate annuity, however, there could be some residual mismatch that may be leading to EV loss.
- The Company may also be investing some proportion of money in equity and there could be some adverse movement in equity market during the period leading to loss in equity market value. The PVIF on the other side is discounted using market consistent basis on risk-free rate and hence is unaffected due to change in equity market.
- In AOS expected is calculated using opening valuation assumption, any downward revision in valuation rate of interest, due to fall in interest rate / yields, is not getting reflected in AOS Investment Surplus rather this may be part of the assumption change impact. Hence AOS surplus may not be true point of comparison.
- For longer duration cash flows, the Company may be extrapolating the yield curve to a defined equilibrium rate. Whereas finding market assets to hedge this may be difficult and could be further source of negative surplus

[2.5 marks]

Lapse / Surrender:

- Statutory surplus captures the impact of actual experience versus expected during the inter valuation period. While EV is a measure of consolidated value of Shareholder's interest in the life insurance business.
- Statutory surplus simply captures the excess of release of reserves over surrender value benefit paid, EV additionally captures the loss of future profit that the contract would have generated had the policy stayed in-force.
- EV Persistency variance has two elements primarily: one is the Adjusted Net-worth (ANW) variance and the other is PVFP variance. While ANW captures the difference between actual experience and best estimate assumption for the inter-valuation period, PVFP captures the loss / addition to EV (future profit) on account of a policy getting lapse / surrender.
- While ANW can still show a profit as the release of reserve will be higher or equal to surrender value; PVFP can show a negative if the contract has been priced profitably

[1 mark]

Mortality:

- EV AoM shows a negative variance of Rs 2 crore compared to positive surplus under statutory surplus.
- This could result on account of following reasons:
 - a. Actual deaths are higher than best estimate assumptions
 - b. Valuation mortality assumption has a high level of prudence in it thereby even though the actual claims are higher it is still below the valuation assumption
 - c. Mortality statutory surplus is calculated using opening assumption and doesn't reflect the impact of change in bases made during the year
 - d. Statutory surplus ignores the loss of future profit from the contracts and hence if a contract is profitable EV will show greater negative variance than statutory surplus variance.

[0.5 marks for each point; max 1 mark]

[Max 9]

iii) ***Difference in policyholder taxation provision between non-par savings and unit-linked policy is as below:***

- Difference in GST (Goods and Services tax) applicability:
 - a. Non-Par Savings: GST of 4.5% is applicable on the first-year premium and 2.25% on premiums for subsequent years
 - b. ULIP: The GST rate for ULIPs is 18% and it applies on all the cost heads, including the premium and fund management charges. ULIP premium partly goes towards insurance and partly towards investment. GST is not charged on the money invested net of costs. [1.5]
- Exemption under Section 10(10D) on maturity proceeds received:
 - a. Non-Par Savings: When the premium paid on the policy does not exceed 10% of the sum assured for policies issued after 1 April 2012 and 20% of sum assured for policies issued before 1 April 2012– any amount received on maturity of a life insurance policy or amount received as bonus is fully exempt from Income Tax under Section 10(10D).
 - b. ULIP: Similar provision as Non-Par Savings contract is applicable for ULIP policies issued prior to Feb 2021. However, ULIP's that are issued on or after 1, Feb 2021 and have premium exceeding 2.50 lakhs in any previous year during tenure of the policy shall now be taxed at the time of maturity. These shall be treated as Capital assets and hence proceeds on maturity shall be treated as capital gains. [1.5]

[1.5]

[3]

iv)

a) Capital requirement:

- NB Strain:
 - a. As per IRDAI (Linked Product Regulation), 2019 there is a maximum capping of 12.5% on first year allocation charge on UL contracts.
 - b. Given the Company is mid-sized it is possible that the company is yet to achieve economies of scale and might be having higher operating expense ratios.
 - c. leading to higher initial capital requirement under ULIP. [1]
- Solvency Factors:
 - a. As per IRDAI (Actuarial Report and Abstract) Regulation, 2016, the solvency requirement under non-par savings contract is 3% of reserves and 0.3% of sum-at-risk
 - b. whereas for an ULIP contract this is 0.8% of reserves and 0.2% of sum-at-risk. It is therefore expected that UL may have lower solvency capital requirement.
 - c. However, in case the company is designing UL contract with investment guarantee feature like guaranteed return of premium, then the Company may be required to hold additional solvency capital. [1.5]
- Company has been predominantly selling non-par savings contracts. In order to shift majority of the business to ULIP there might be huge investment required to train the advisors, market the product, investment in system setup, etc. This may entail additional capital investment for the Company. [1]
- Consideration also needs to be placed on risk-based capital (RBC) regime. People generally buy ULIP contracts to get access to market linked return and prefer parking their premium in equity funds. Given the high volatility observed in equity market the Capital requirement under RBC regime could be higher for an UL contract [0.5]
- However, under Non-Par Savings platform the Company would still be exposed to future reinvestment risk on account of lower interest rate. If the non-par savings portfolio is not adequately hedged it can expose the Company to interest rate risk; which to large extent will not be the case with UL product. [1]

[Max 4]

b) Profitability:

Profitability under both the contracts will depend on various factors:

- So far, the Company would be pricing the contract using certain level of expenses and commission. With the introduction of UL product, it needs to consider whether similar level of expenses and commission are financially sustainable given the limit on charges under ULIP as per IRDAI Linked product regulation and the level of effort required to sell ULIP product as compared to non-par savings product. [1.5]
- The company may not be in a position to immediately reduce the commission rate as this might not go well with the distributors and can hamper the sales volume [0.5]
- If the commission rate is fully loaded and similar to non-par savings product, then this can create mis-match between the initial expenses and the charges that can be collected leading to high new business strain. [0.5]
- Persistency is another important factor for overall profitability of the ULIP contract. Unlike Non-Par Savings contract there are no surrender penalty applicable if the policyholder surrenders the policy post payment of 5 years premium. As the expenses of a life insurance company are mostly front-ended in case of surrender the company may not be able to recoup the expenses that it has incurred; leading to loss [0.5]

- Even during the first 5 years the level of surrender charge is substantially lower than non-par savings contract. Hence the risk of loss of profitability due to poor persistency is higher in ULIP contract. [0.5]
 - Additionally lot of effort need to be put in for customer retention and surrender control to achieve the desired profitability [0.5]
 - As mentioned ULIP are more transparent in design and are easier to sale. This can help the company to achieve scale and will help in spreading of fixed expenses. [0.5]
- [Max 3]

c) Risk

- Investment risk:
 - a. Under a UL contract the investment risk is primarily borne by the policyholder while in non-par savings contract the benefits are fixed and any investment risk are borne by the Shareholders [0.5]
 - b. In order to better match the assets and liabilities and protect the Company from reinvestment risk, the Company may be investing in derivative contracts under non-par savings portfolio. Derivatives might lead to counterparty default risk, residual hedging risk which may not be the case under ULIP contracts [0.5]
- Mortality risk:
 - a. Both the non-par savings and ULIP contracts are savings product. The underlying mortality experience and risk is not expected to be materially different [0.5]
 - b. ULIP contracts may allow for mortality charges to be varied during the term of the policy (if the contract design allows); making it easy to manage future mortality deterioration.
- Persistency risk:
 - a. As stated earlier the level of surrender charge on ULIP is substantially lower than non-par savings contract.
 - b. Given after the lock-in period of 5 years there are no surrender penalty applicable, the policyholder might be inclined to surrender the policy.
 - c. Moreover, as the NAV under UL are declared daily in case of market rally PH may be inclined to book the profit by surrendering the policy. This may not be the case with non-par savings contract as the policyholder may not find much value in surrendering the contract. Hence the risk of poor persistency may be higher under ULIP [1]
- Customer grievances: ULIP contracts are more transparent in nature as the various charges are outlined up-front and there could be possibility of lower customer grievances / complaints. However, if there is a sharp fall in market return and hence the fund value that may also result in sense of dis-satisfaction within the customers [1]
- Sales volume risk: As the company so far been selling mostly non-par savings product, Company may be required to do significant investment in people training, marketing to replace existing product with UL and can hamper the sales volume in the short term. [0.5]
- Mis-selling risk – Since in the ULIP contracts the investment upside is the policyholder’s; there is risk of the sales force using very high growth rates for benefit illustration while prospecting the client (unless the BIs are regulated); compared to Non-Par where all the benefits are guarantees upfront.
- Expense risk: Risk of expenses being higher or lower than assumed is equally applicable to both the products. However, under non-par savings contract the Company has greater flexibility to allow for higher expenses / commission in the product pricing however in case of ULIP due to restriction on various charges the flexibility is restricted [1]

- Distributors would be more inclined to sell ULIP products now as the Company is promoting the same. There could be some churning of business done by few distributors thereby impacting the overall profitability of the existing non-par book [0.5]
- System risk: As the Company would be writing ULIP business for the first time, there could be some operational risks that can emerge in the initial period, for e.g. incorrect NAV calculation, issue in policyholder benefit calculation / system set-up, etc. [0.5]
[Max 4]

v) **Key consideration while determining the bases for pricing:**

- **Mortality:**
 - a. Mortality assumption is one of the key bases that is required for pricing a term assurance contract.
 - b. The Company has been predominantly writing non-par savings and immediate annuity contracts. So, no past experience available for term assurance. [1]
 - c. The Company may consider using external data such as reinsurer's own data to price the product. [0.5]
 - d. Adjustments may need to be made based on the expected nature of the policyholders to whom the business will be targeted and the underwriting method it intends to use (for e.g. graduates / non-graduates, salaried / non-salaried, tier I city / tier II city, medical / non /medical / tele-medical underwriting etc) [1]
 - e. For the likely impact on COVID-19 pandemic on mortality of assured lives, it may study the COVID claims that it may have received in its other portfolio or may use data from reinsurer [0.5]
 - f. Company may apply a loading for COVID for all future years if it of the opinion that the long-term adverse impact of COVID is there to stay, else it may apply a higher loading in the mortality assumption during the initial few years. [1]
 - g. It can also offer discount for people for are fully vaccinated and incentivise them to buy term assurance from Company. This will also help in minimising the impact of COVID in its portfolio. [0.5]
 - h. It is also observed that in some people who have recovered from COVID they are still exposed to long term morbidity impact. Alternatively, in the proposal form the Company can seek question on past COVID status and filter out those applications who were recently diagnosed with COVID [0.5]
- **Reinsurance:**
 - a. Allowance for reinsurance cost needs to be factored in while pricing the product.
 - b. Reinsurers may be charging higher rate during the initial to cover the cost of additional cost on account of COVID. These need to be factored in the overall cost while determining the bases for pricing. [0.5 for each]
- **Persistency:**
 - a. Separate assumption may be required for rate of withdrawal. As experience appropriate to this specific product may not be available, the Company may want to apply some adjustment to its existing experience of savings product / use industry data.
 - b. Regular premium term assurance plans are usually lapse supportive; i.e. lapsation of these plans may be profitable (due to lack of any surrender value); considering a lapse assumption in term pricing can be considered aggressive.
 - c. And in that case, if the persistency is better than priced assumptions; the company may incur loss

- d. If the Company is designing whole of life term assurance product then persistency / withdrawal assumption in later duration becomes a critical input. Care needs to be taken that the assumption used closely reflect the experience and else enough margin needs to be built while using the assumption.
- e. COVID pandemic has created lot of awareness about the need for protection and life insurance contract. Company may consider the impact of this while deciding on the withdrawal assumption.

[0.5 for each, max 2 marks for persistency]

- **Investment return:**

- a. For a regular premium term plan, the interest rate assumption may not be very important
- b. However, for whole life term assurance contract investment return assumption is very crucial and premium become highly sensitive to change in interest rate assumption
- c. Company can consider likely matching assets and yields expected to be obtained on them. If market consistent approach is used for pricing then risk free rate will be used and can be term dependent. [0.5 for each]

- **Expense and inflation:**

- a. Assumptions may be based on result of recent investigation of the Company's expenses.
- b. Impact for any one-off expenses may be allowed for in pricing e.g. marketing, system built-up. [0.5]
- c. Decision has to be made whether the product will be priced on marginal cost basis or full cost basis; whether new product will be required to take on a share of overhead expense and to what extent. [1]
- d. Any expenses related to underwriting of the contract (for e.g. medical test, cost of doctors undertaking tele-medical / video-medical underwriting, etc) need to be additionally incorporated in the premium rate. [0.5]
- e. With recent surge in mortality claims due to COVID pandemic a lot of insurers have largely stopped issuing large sum assured protection with non-medical underwriting, to avoid the risk of anti-selection / screen profile better. These need to be factored in while arriving at the expense assumption to be used. [1]
- f. Due to lockdown and restrictions imposed by various state government during the pandemic, the Company might have saved some expenses on travelling, rent, business meeting etc. Decision need to be taken whether to treat those as one-off exception and exclude those savings while arriving at the expense ratio. [1]
- g. Future inflation would be allowed for at a rate consistent with the basis on which the investment return assumption has been assessed. [0.5]

- **Profitability target:**

- a. An appropriate target needs to be determined while pricing the product. It could be based on say internal pricing IRR, net present value of future profit as a percentage of present value of premium, payback period, etc. [1]
- b. Consideration also needs to be given on the competitiveness of the premium rate.
- c. Substantially lower premium needs margin may not be that adequate thereby defeating the entire purpose for which this product was introduced.
- d. Substantially higher premium than competitors mean there would be very limited up-take and risk of early withdrawals. [1]

- **Risk discount rate or risk margin:**

- a. If the Company is pricing on 'traditional basis' this would include a risk margin over and above the 'risk-free' discount rate; reflecting shareholder required rate of return. [0.5]
- b. Level of margin allowed for may depend on the extent of risk inherent in the business being written. Given the surge in claims due to COVID pandemic, there is greater uncertainty around claim experience in recent future especially under protection. To compensate for the increased risk variable the Shareholder want higher return. [1]

[Max 11]

[50 Marks]**Solution 2:**

- i) For the purpose of this exercise, cashflow projections may be carried out as below:
- Since solvency projection is required, it would require projection of both the assets and the liabilities [0.5]
 - The projection would also require allowing for the expected new business over the 3 years of the projection period, consistent with the company's business plan [0.5]
 - Products selection for new business, product mix and appropriate model points would need to be chosen to reflect the new business [0.5]
 - The actuarial model would then need to project the expected cashflows on best estimate basis, both for existing and new business, which would be the premium income, all policyholder benefits (death, surrender, maturity), expenses, commission, reserves, and tax, if applicable. [0.5]
 - The bonuses would also need to be allowed for in the projected benefits, in line with the company's bonus policy [0.5]
 - For assets projection, the company would require assumptions for investment returns [0.5]
 - The investment return should be based on the asset mix as per the investment strategy and the outlook of the returns from these asset classes over the next 3 years [0.5]
 - With both the assets and liabilities available at each future time period, it would give the position of the available assets at each point of time [0.5]
 - Any assets which are inadmissible for the purpose of solvency would need to be excluded from the projections [0.5]
 - Along with the projected liabilities, the company would also require projection of the sum at risk, to determine the required solvency margin [0.5]
 - The projected available assets and the projected required solvency margin would give the solvency position at each time period [0.5]
 - For the stress test projection, the above steps would need to be re-performed but reflecting the stressed economic outlook [0.5]
 - The key changes required in the assumptions would hence include change to investment return, valuation rate of interest and expense inflation [0.5]
 - The investment return would need to incorporate the lower yield, higher spread and lower equity return [0.5]
 - The revised return would need to be reflected on the new money, including reinvestments during the projection period [0.5]
 - Given the permanent change in the economic outlook under stress scenario, the valuation rate of interest needs to be revisited by re-performing the ALM and accounting for the lower yields and higher spread [0.5]
 - If the company is only taking into consideration the dividend yield for the purpose of setting the valuation rate of interest, then it may choose to keep it unchanged since the stress test instructions do not specify anything [0.5]

- For participating business, since the valuation bonus rates need to be consistent with the valuation interest rate, any change to valuation interest rate may require change to the valuation bonus rates [0.5]
- Given the interest rate reduction under stress scenario, the expense inflation assumption should also be aligned accordingly [0.5]

[8]

ii) Possible reasons for drop in solvency can be:

- The company is a medium sized company with solvency ratio of 180%. So, it seems unlikely that the company would have sufficient free assets, and hence the stresses are expected to have a significant impact to the solvency. [1]
- The company expects to write significant amount of new business over the next few years. Given the new money, from significant new business and any reinvestments, would be invested in stressed conditions, it would have an adverse impact on the projected solvency. [1]
- The company's asset has a significant equity mix. Due to high reduction in equity by 30% and no recovery over the 3 years, it is possible that there are equity losses in the portfolio. [0.5]
- Since such equity losses need to be considered in the solvency calculation, it would have a negative impact to the company's solvency [0.5]
- The company's liabilities are very long term in nature and hence there is a high possibility of a significant asset liability mismatch [0.5]
- Such mismatch would be reflective in the valuation rate of interest (VRoI). Given the significant fall in 10 Yr GSec yield by 75 bps, it is likely that the VRoI would have reduced, leading to increase in liabilities. [0.5]
- The liabilities constitute half proportion from non-par savings business. Given the benefits are guaranteed, the impact due to change in VRoI is expected to be quite high. [0.5]
- The impact would also depend on the level of guarantees which the company has offered and plan to offer as part of new business. Higher the guarantees, higher would be the impact. [0.5]
- For par business, the impact from any change to VRoI is expected to be lower compared to non-par business, since the valuation bonus rates can be aligned to the new VRoI. [0.5]
- However, any change to the valuation bonus rates would be limited by the following:
 - If the level of current valuation bonus rates is already low, then the scope to adjust them would be less [0.5]
 - The valuation bonus rates should reflect the PRE, so any change to bonus rates would be constrained by PRE considerations and bonus philosophy. For example, the company might be constrained to reduce the bonus rates significantly and immediately and may have to smooth out any change to bonus rates. [1]
- The extent of impact to par liabilities would also depend on the already declared bonus rates, which have become guaranteed and are already part of the liabilities. If these constitute a significant portion of the par liabilities, then the impact would be high. [0.5]
- Given the increase in credit spread, the default risk in the company's portfolio may increase. However, the increased spread may have an upward impact on the portfolio yield. The VRoI should be set taking into account the default risk of the underlying assets. However, given corporate bonds exposure is low, the impact on VRoI from spread change may be minimal. [1]
- Given the PAD as per APS7 is based on the 10 Yr GSec yield, the PAD would reduce from current level, which would give slight uplift to VRoI. [0.5]
- The expense inflation rate being used in the liability calculation should also be adjusted to make it consistent with the VRoI, which will reduce the liabilities to some extent. [0.5]
- The required change to VRoI would also depend on the level of prudence already built in setting the VRoI. However, given the solvency of the company has dropped significantly, it seems there isn't too much prudence in the VRoI. [0.5]

[9]

iii) The company can explore the following possible actions for the solvency uplift:

- **Asset liability management**

- Optimize the asset duration, with due consideration to the risk-adjusted return [0.5]
- The company may explore establishing a derivatives program, which will help it to lock-into future yields. [0.5]
- The above will help to achieve a better ALM position which shall help to reduce the capital requirement. [0.5]
- The cost of any such derivatives program should be taken into account while assessing the projected solvency position. [0.5]
- However, given that both these actions are likely to take some time to fully implement, such timing of implementation should be reflective in the projected solvency position of the company. [0.5]

- **Re-pricing of existing products/ pricing new products**

- Review the level of guarantees being offered under new business. Given the change in the economic outlook under the stress scenario, it is likely that the current level of guarantees would have become unsustainable and would require re-pricing. Reducing the guarantees should reduce the capital strain, and hence uplift to the solvency. [1]
- Company may also explore to reduce the duration of the policy terms being offered. The liabilities currently being offered are very long term. By reducing the policy terms, specially under non-par savings business, would lead to better ALM and would also lead to reduction in the long-term guarantees, thereby a lower capital requirement. [1]
- Introduce SP and limited pay options under the new business. This would again allow a better ALM by reducing the reinvestment risk and hence lower capital requirement. [0.5]
- Explore if there is a possibility to reduce the distributor compensation, specially in the first year, where the compensation is typically very high, without compromising on the ability to write new business. [0.5]

- **Bonus review**

- Under the stress scenario, it is likely that the current level of bonus rates would have become unsustainable and would require bonus reduction [0.5]
- The level of bonus cut should have regards to the company's bonus policy including PRE/ TCF considerations, and the use of FFA [0.5]
- Given the equity level has dropped by 30%, such drop will be immediately reflective in the asset share. So, any maturities and/or surrenders in the next 3 years, might require reduction in the TB rates, bringing uplift to solvency in the form of lower payouts. [0.5]
- Since the future yields have reduced a lot under the stress scenario, it is likely that the reversionary bonus rates would have to be reduced, which shall reduce the level of guarantees and reduce liabilities. [0.5]
- In doing so, the company needs to account for its smoothing policy and the reasonableness of the level of cross subsidy between customers against asset share. [0.5]

- **Review of Strategic Asset Allocation**

- SAA should be determined taking into consideration the nature and the duration of the liabilities [0.5]
- The current asset mix has a significant portion of equities. The company may evaluate the impact of reducing equity proportion and increasing the proportion of fixed interest securities in its portfolio. [0.5]
- Given the 30% fall in equity under the stress scenario, it is likely that the projected solvency would improve with a reduced equity proportion [0.5]
- While doing the SAA review, the company should perform simulations using different asset mixes and choose the one which best fits as per its risk appetite framework [0.5]

- The timing of implementation of any change to the SAA should be reflective in the projected solvency position [0.5]
 - **Others**
 - The company can review the current product mix and focus more on the products which are most capital efficient [0.5]
 - The company expects to write significant amount of new business. It may explore to reduce the new business under the stress scenario, thereby reducing the capital strain [0.5]
 - It is likely that the company may have expansion plans since it is expected to write significant amount of new business. So, any review of the new business should be appropriately reflected on the company's expense as well. [0.5]
 - The company may check if any significant planned expenses (for example, any projects costs, etc.) maybe deferred beyond 3 years [0.5]
 - The company may review its reinsurance arrangement and check if there is a possibility to get better reinsurance terms. However, given the company writes savings business only, any benefit from reinsurance may be minimal. [0.5]
 - The company may check if there is more prudence than required in any of the valuation assumptions, which may be then aligned to the limits as prescribed under APS7 under the stress scenario [0.5]
- [10]**

iv) The below points may be included in the response to the CEO:

- The company should check its internal governance for any approvals which may be required before starting to implement the change. Given, significant change to the SAA is proposed, it may need to be put before the Board of Directors. [1]
 - The change in SAA may have implications on future bonus rates, both RB and TB rates. This assessment should also be carried out before implementing new SAA. [1]
 - The change in the SAA might require an update to the internal governance policy on participating business and any changes to the bonus strategy. [0.5]
 - Given the equity proportion is proposed to be reduced, consideration will need to be given on the best time to sell equities, given the market levels. [0.5]
 - Or, the company may choose to simply not buy additional equities from new money and use the new money to buy fixed interest securities to achieve the desired SAA. This would depend on how quickly the company wants to achieve the target SAA. [0.5]
 - The company also needs to decide which type and duration of fixed interest securities does it want to buy or does it want to hold similar type of fixed interest securities as there are currently in the portfolio. For example, if the company wants to increase the duration, it may choose to invest more in 30 Yr GSec. [1]
- [4]**

v) Considerations for bonus declaration as per GN6:

Grouping

- The AA should consider whether it is appropriate to group policies for the purpose of determining bonus rates [0.5]
 - The grouping of policies should not materially disadvantage one group of policyholders at the expense of another group of policyholders [0.5]
 - Policy grouping will also be influenced by any risk sharing rules that insurer has [0.5]
 - Asset shares should be separately determined for each policy grouping [0.5]
- [Max 1]

Method and assumptions

- Asset share for a policy grouping would be the accumulation of premiums, plus investment income less expense, commissions, PH outgos, tax, any charge for cost of capital and guarantee, contribution from miscellaneous surplus and SH transfers [1]
 - The AA should consider the various sources of surplus in the participating fund and should document the company's approach to and treatment of each of these items of surplus or deficit for the purposes of deriving the asset shares [0.5]
 - The asset share formula should also allow for survivorship with the relevant decrements such as mortality, morbidity and possibly surrenders [0.5]
 - The AA will consider the treatment of miscellaneous surplus and whether it forms part of the asset share or the estate [0.5]
 - The AA may either make an explicit deduction for the cost of guarantees in the asset share formula, or allow for the cost of guarantee implicitly through having a target payout less than the calculated asset share [0.5]
- [Max 2]

Comparison of AS with GPV

- An insurer will typically compare the asset share with the GPV for each policy grouping to decide the scale of bonus rates. For this purpose the AA should consider the interaction between RB, TB and the level of prudence in the valuation basis [1]
 - The AA should also ensure that there is consistency between the asset shares used to determine bonuses and the liability on the balance sheet of the Company [0.5]
- [Max 1]

Assumption setting

- Wherever possible, the AA should make use of actual historical data and cashflows to derive the historical asset share [0.5]
 - The AA would also need to consider the need to calculate investment returns on a MTM basis and the extent to which smoothing may need to be applied to investment returns [0.5]
 - It is also necessary that expense allocated to asset shares is consistent with PRE [0.5]
- [Max 1]

SH transfer and tax

- Shareholders' transfers are calculated as a certain percentage as stipulated in the Distribution of Surplus Regulations [0.5]
 - For the purpose of asset share calculations, shareholders' transfers refer to the shareholders' share of the cost of bonus [0.5]
 - The AA should keep abreast of changes in tax rules, and ensure that derivation of asset shares is consistent with the appropriate tax rules prevailing [0.5]
- [Max 1]

Operation of smoothing

- A company will have some discretion in its smoothing of benefits, but the AA should have regard to the following when advising the company:
 - whether there is a genuine reduction in the volatility of payouts;
 - whether there is a significant increase in the risk of statutory or realistic insolvency; and
 - whether all policyholders are treated fairly. [1]

Treatment of over or under distribution

- The bonus distribution should reflect the performance of the participating fund and ensure that the payouts on policies are fair [0.5]
- The AA should document the company's approach to setting reversionary and terminal bonuses, covering:

- a) Guidelines on the extent to which reversionary bonuses may be changed from one year to the next;
 - b) The proportion of asset share targeted for maturity claim payouts;
 - c) The projected financial strength of the participating fund and the bonus strategy assumed in that projection;
 - d) Consistency of the assumed strategy with current rates of bonus; and
 - e) Any differences in the intended treatment of different categories of policyholder [2]
 - The AA should consider whether the treatment of surpluses or deficits arising from the smoothing of maturity values, in particular whether they are shared with the surviving asset shares or with the estate, is in accordance with PRE. [0.5]
- [Max 2]

Surrender Values

- The AA should consider the impact of the bonus rates on surrenders [0.5]
 - When considering surrender values, the AA should have regard to the following:
 - a) Progression of surrender values over the life of the policy. Consideration should be given to the consistency between surrender values and maturity values. [0.5]
 - b) Policyholders' reasonable expectations in respect of surrender values. [0.5]
 - c) Where future surrenders have not been assumed in the liability valuation, the level of surrender surpluses expected to emerge. [0.5]
 - d) Whether and to what extent surrender surpluses are being used to support the payouts to policyholders who hold their policies for longer. Where surrender surpluses are being used to support payouts to PHs who hold their policies for longer, the AA should consider if the method of surplus distribution, either reversionary or terminal bonus, is well-matched to the source of surplus. [1]
- [Max 2]

Treatment of riders or any non-par business written in Par fund

- Where such products are written in the participating fund the following conditions should apply:
 - pricing should be fair and follow actuarial principles [0.5]
 - surpluses and deficits from riders or any non-participating business written in the participating fund should be treated consistently, and in accordance with PRE [0.5]
 - pricing of these products should not put undue strain on the fund. In particular, the ability to supply capital in support of the investment strategy of the assets backing the participating business should not be expected to be compromised. [0.5]
- [Max 1]

Policyholders' reasonable expectations

- These may be assumed to be influenced by, sales material, benefit illustrations, any other documentation shared with the policyholder that relates to the management of participating business and the company's past practice. [0.5]
- Consideration should also be given to the impact of writing new business on existing policyholders to ensure that they would not be expected to be disadvantaged. [0.5]

Expense allocations

- Allocation of expenses should be considered at two levels for participating business;
 - 1) The amount of expenses charged to the participating funds versus other non-participating and unit linked funds [0.5]
 - a) AA should understand the approach being adopted for the expense allocation to the different funds [0.5]
 - b) Expense allocations would be relatively straightforward for certain items that are directly related to the policies, such as commissions, but it is likely that the apportionment of many other

- items will be subject to some degree of discretion. The AA should judge whether the basis of the allocation adopted is reasonable, given the nature of the expense. [0.5]
- c) Basis of allocations should not be subject to arbitrary changes from year to year. [0.5]

2) The amount of expenses charged to the historical asset share of policies

- a) The AA must consider the consistency of expenses being charged to asset shares with what has and is being illustrated to customers. In particular, the expenses intended to be allocated to the asset shares should be consistent with the bonuses projected in benefit illustration [1]
- b) In respect of renewal expenses, so long as PRE encompass expense risk, the AA, when making the actual allocation to asset shares, may use a degree of discretion in departing from the expenses implicit in any benefit illustration issued at point of sale. However, in respect of acquisition expenses, the level of expense should be known with greater certainty. [0.5]
- c) Where the expenses allocated to the fund exceed those allocated to the asset shares, the AA should consider the reasons and be satisfied that the approach is reasonable [0.5]
- [Max 2]

Reinsurance and Investment

- The AA has the responsibility to ensure that reinsurance programmes in place are sufficiently robust, consistent with the policyholders' risk appetite and protect the balance sheet vis a vis the insurer's risk appetite and capital strength [0.5]
 - The AA should evaluate the appropriateness of the investment policy with regard to the nature and term of liabilities, the investment environment and take into consideration the interests of policyholders [0.5]
 - The AA should consider the likely investment management approach for the participating funds operated by the company and the implications this has on whether PRE is being appropriately set through sales literature and illustrations [0.5]
- [Max 1]

Segregation and Merging

- Prior to the segregation or merger of two or more participating funds, the AA should consider:
 - clear allocation of expenses and investment income to each of the funds
 - the bonus outlook for all affected policyholders
 - pre and post financial condition of the participating funds, wherever appropriate, including but not limited to the security of benefits for all affected policyholders
 - the pre and post diversification benefits on a risk capital basis
 - whether there is any material impact on the affected policyholders' interests [2]
- [Max 1]
- [11]

vi) Potential impact of new SAA on future bonus declarations:

- The starting point may be to check if the current balance between reversionary and terminal bonuses is still appropriate or requires a change. [0.5]
- The proposed change in SAA is higher allocation to fixed interest securities and lower proportion to equity. This may hence require the reversionary bonuses (RB) to make up a higher proportion of the overall return and lower proportion of terminal bonuses (TB). [1]
- If the change in SAA has resulted into change in expected yields, then the RB rates would need to be aligned accordingly. [0.5]
- The extent of change in RB rates would depend on the following:
 - The extent of change in the expected yields. If the change is not material, then RB rates might require no change [0.5]

- The level of existing RB rates versus the expected new yield. For example, if the expected yield has reduced but the RB rates are already low, then it might be that the RB rates may remain unchanged. [0.5]
- The extent to which the fund is matched with respect to assets and liabilities. Higher the mis-match, lower is the ability to withstand market shocks. The fund may not be sufficiently matched due to very long-term liabilities. However, moving to higher proportion of fixed interest securities is expected to lead to better matching. The extent of any change would depend on the overall outcome of better matching and being able to withstand market shocks. [1]
- Policyholders' expectations with respect to RB rates. For example, if the SAA change reveals that there is scope to increase the RB rates, but there is no as such policyholders' expectation, which might be the case since the declared RB rates have remained stable for many years, then it might be better not to increase RB rates which would increase guarantees [1]
- Level of RB rates being offered by competition [0.5]
- Projected solvency of the company. For example, if sensitivity tests reveal that future solvency might be at risk if RB rates were to be increased, then the company might not want to increase the RB rates. [1]
- The extent of change in TB rates would depend on the following:
 - Change in expected yield. For example, if the expected yield has reduced, it might require reducing the future TB rates [0.5]
 - Change to RB rates as discussed above. For example, if the RB rates increase, then the TB rates might have to be reduced [0.5]
 - Given the TB rates have changed frequently in the past, it might imply that change to the future TB rates from policyholders' perspective might not be an issue [0.5]
- If the new SAA reveals a significant change to the future returns, then the company may choose to introduce a new bonus series for the new business. [0.5]
- Given the higher allocation to fixed interest securities, the future returns are expected to be less volatile and hence the need for smoothing should be lower. [0.5]
- The company needs to consider what is mentioned in its internal governance policy on participating business with respect to bonus distribution strategy. [0.5]
- The company also needs to consider equity between different policyholders' generations, if there is a change to bonus distribution strategy. [0.5]

[8]**[50 Marks]**
