

Institute of Actuaries of India

Subject SA7-Investment and Finance

December 2022 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) Real estate funds; Private equity funds: Venture capital / Restructuring capital in Distressed securities; Credit investment funds; Hedge funds; Commodities; Securitisations: Asset backed securities; Structured products
[0.5 per each] **[Max 3]**

- ii) Managed futures funds are similar to Hedge funds in most aspects like actively managed; high leveraged; incorporated as limited partnerships and similar fee structures. The key difference is that:
Hedge funds are more active in cash / spot markets and use futures and options for hedging
Managed futures funds trades exclusively in derivatives like futures and options
Managed futures funds are more regulated than hedge funds in some places
They have different legal and tax standards
[1 per point] **[Max 2]**

- iii) Algorithmic trading is automated computerized electronic trading based on quantitative rules in the form of algorithms. On order driven markets, it enables execution of multiple orders simultaneously.

When it is used for dealing and execution only – the algorithms are usually referred to as execution algorithms or just algorithmic trading.

It is used to reduce costs and risks associated with the dealing and execution of trades. It enables traders SOR (smart Order Routing) to locate and place orders in the exchanges with best real-time liquidity.

It minimizes market impact and help achieve an execution price as close to the market price as possible. It also disguises the large trades by making it into smaller pieces to stop other market participants benefitting from any knowledge about another participant's desired trades.

When algorithmic trading is used for trading with the aim of making trading profits, it is usually referred to as High Frequency algorithmic Trading (HFT), or quantitative trading.

Computers use execution management systems for complex event processing (CEP) of high frequency databases to scan the volumes of buy and sell offers on the screen much more quickly; assess the direction of new orders very quickly, and then act on the information in seconds.

A significant challenge for Algorithmic trading is latency - the time difference between order generation and execution. Low latency is essential to prevent other market participants with the fastest market access gaining a first-mover advantage and placing orders ahead of one's own. A significant and ongoing investment in technology and research may be needed to remain competitive.

There is a danger of a market participant reverse-engineering another participant's algorithm and taking advantage of any knowledge gained. This has changed the role of traders into strategists and tacticians.

[1 per point] **[Max 5]**

- iv) Stop order is an order to be filled immediately when a specific price trades in the market. For stop loss buy (sell) order to cover existing short (long) position, this trigger price should be higher (lower) than current market price.

Stop-loss orders are critical when we cannot actively keep an eye on the market to protect us from sudden market news, data releases etc. that is unfavourable to our existing position.

Stop-loss orders can also be used to take new positions when sudden market news's impact on prices, either good or bad, is not instantaneous but happens slowly in a trending fashion.

Suppose, currently we have no position and market is in consolidation phase, i.e. market is moving sideways in a range. We are not sure of the direction of breakout but believe that it will break out of this range ultimately (on arrival of sudden market news) and move significantly higher (lower) forming an up (down) trend. In this case, two stop-entry orders can be used to get into the market in the direction of breakout.

For example, the Nifty index future is trading in a consolidation phase i.e. moving in a sideways range between 17000 and 17200 for some days. We could place two stop-entry orders:

- one above the current range high of 17200—say at 17250 and
- another below the current range low of 17000—say at 16950

to allow for a margin of error—to get into the market once the sideways range is strictly broken to the up (down) side.

Once either of the order is executed, we would adjust the remaining order in the direction of the trade using a trailing stop-loss. Finally, our position is closed by the trailing stop-loss order, taking

- limited loss if the breakout turns out to be a false one or
- maximum gains if the breakout turns out to be a significant/sustained trend.

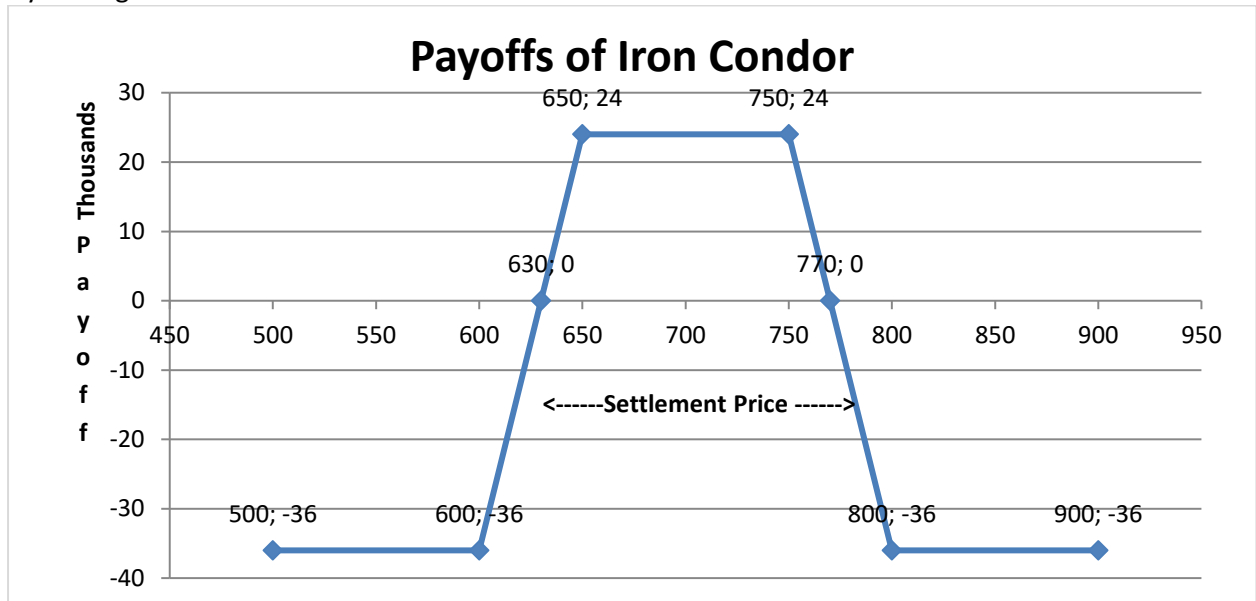
Stop orders help to restrict losses in existing positions but do not guarantee that losses would not be worse than expected. On volatile days where price gaps occur with widening bid-offer spreads, actual execution price may be worse than the price we are looking for.

In some markets, all stop orders are cancelled by exchanges where the price gaps are more than a threshold level. In such cases, the trader has to place another stop/limit order immediately to cover his existing positions.

[1 per point]

[Max 5]

v) Payoff diagram



[Max 5]

- vi) Equity markets could be in uptrend or consolidation / sideways or in down trend. Holding of equities will give positive (negative) returns in uptrend (down trend) but will give close to zero returns in consolidation phase. We have to consider whether to replace a portion of equity allocation to the two traders is beneficial or not.

We can employ both traders subject to regulatory approvals/admissibility, as they have potential to deliver positive returns when XYZ's equity holdings doesn't give positive returns

- first trader in down trend; and
- second trader in consolidation phase

Modifications to first trader:

- Trade more quantity in down trends and less (or nil) in up trends
- For stocks in the top five / ten of XYZ's equity holdings, instead of trading in index futures, trade in the stock futures.
- For other small equity holdings, use appropriate hedge ratio at portfolio level, when determining quantity to be traded in index futures.

Modifications to second trader whose options strategy has limits on maximum profit/loss:

- Instead of holding options positions till expiry, close all positions to avoid gamma risk close to expiry; exit when X% (say 75% - 95%) of maximum profits is achieved; and roll over the option strategy for next month
- Use stop loss for the options strategy and exit when Y% (say 55% - 75%) of maximum loss is achieved; i.e. don't wait for the wrong trade to consume full maximum loss of the strategy
- For XYZ's small equity holdings, use appropriate hedge ratio at portfolio level, to determine quantity of index options instead of trading in stock options.

[1 per point]

[Max 5]

vii) Merits of introducing the PNG guarantee

- XYZ can get more business as it will be attractive for potential DCSs as the members feel that their capital will be safe
- get planned new business at lower marketing costs than required earlier
- retain funds of existing DCSs by allowing them to switch in to PNG funds
- XYZ can make more profits over the long term from any margins in investment guarantee charges (IGC) left in excess of any shortfalls expected to be paid when the PNG guarantees will bite
- FIFO basis for partial withdrawals will protect XYZ; say for e.g. in year 3 in sample calculations; instead of full withdrawal if there was a partial withdrawal of 900 (= 60(15)) 60 units from first contribution will be used.
- Otherwise, on pro-rata basis of 2:1 (1500:750); 600 (= 40(15)) 40 units from first contribution and 300 (= 15(15) + 75) 15 units from second contribution along with a shortfall of 75 would be taken as loss.

Demerits of introducing the PNG guarantee

- Having same IGC of 0.25% p.a. for all three funds doesn't seem justifiable given that they have different risks due to varying equity exposure
- XYZ can make huge losses when IGC is not sufficient to meet any shortfalls when the PNG guarantee bites
- Even with FIFO basis, suppose instead of 900 partial withdrawal in year 3 there was a partial withdrawal of 2000; 1500 (= 100(15)) 100 units from first contribution and 500 (= 25(15) + 125) 25 units from second contribution along with a shortfall of 125 would be taken as loss i.e.
 - Usually, latest contributions have higher chance of PNG guarantee being in-the-money (unless later contributions came in bottom of a recession!);
 - FIFO basis cannot protect from guarantee biting for higher amount of partial withdrawals as it will eat up earlier contributions quickly
- We are not sure whether members would appreciate the fact that PNG guarantee is more beneficial to them and not same as capital guarantee.
- For e.g. in sample calculations, we see that even though the fund value (2250) is more than total contributions (2000), the guarantee is biting with a shortfall (250).
- As four fund switches are allowed per year, administering the members fund and guarantee data would be very difficult if they move from PNG funds to non-guaranteed funds and then back to PNG funds and if we treat switch from non-guaranteed funds to PNG funds as fresh contribution, then guarantee cost would increase significantly
- This fund switching is a problem even if switches occur among PNG funds where we have to maintain the guarantee level; i.e. if a guarantee is in-the-money prior to switch it should also be so post switching to the same extent:

$$NewPNG = \frac{OldPNG}{OldNAV} (NewNAV)$$

- For example, in sample calculations, suppose instead of full withdrawal in year 3 there was a full fund switch (partial fund switch upon multiple switching to and fro between two PNG funds is more complex process with FIFO) in to another PNG fund at current NAV of 30

| Year | Contribution | NAV1 | PNG1 | Units1 | NAV2 | PNG2 | Units2 |
|------|--------------|------|------|--------|------|------|--------|
| 1 | 1000 | 10 | 10 | 100 | NA | 20 | 50 |
| 2 | 1000 | 20 | 20 | 50 | NA | 40 | 25 |
| 3 | Switch | 15 | NA | -150 | 30 | NA | |

- Operational risk with Day2 features: in administering FIFO along with fund switches; to do manually is a tedious process and more prone to mistakes where more than required

value paid to members cannot be recouped

- Automating PNG feature in the admin system and testing at unit /functional level; doing UAT by preparing test cases covering all possible combinations is a challenging task
[1 per point Max 3 (5) for merits (demerits)]

[Max 8]

viii) Ways to modify proposed PNG guarantee structure

- Perform ALM exercise to determine appropriate IGC for the three PNG funds
- If IGC comes out to be very high for PNG steak fund that has highest equity allocation, consider skipping the PNG guarantee for this fund since members opting Steak fund have high risk appetite
- Introduce a lock-in-period of say 3 to 5 years post which PNG guarantee gets activated on each contribution since latest contributions have higher chance of PNG guarantee being in-the-money. Use longer lock-in-periods for funds with higher equity allocation
- Introduce cap on amount of partial withdrawals (say 20% of fund value) that can be made in a year since FIFO basis cannot protect from guarantee biting for higher amount of partial withdrawals
- If members perceive PNG guarantee as capital guarantee then replace PNG guarantee with capital guarantee that will be less onerous. In capital guarantee, growth of past contributions can be used to offset any shortfalls from recent contributions directly entering in to market fall whereas in PNG guarantee each contribution's capital guarantee is to be met by itself or from XYZ pocket.
- Once switched out of guaranteed funds to non-guaranteed funds do not allow switch back in to guaranteed funds.
- Do not allow fund switches among PNG funds to remove complexities of applying FIFO and need to maintain guarantee levels; or limit the number of switches allowed, say to one or two per year.
- To avoid operational risks, though a challenging task, it is better to automate the admin systems for all fund transactions before launch of the PNG guarantee feature. If required employ / outsource the task to technical specialists.

[1 per point]

[Max 5]

ix) ALM process to determine Investment Guarantee Charge (IGC) for the PNG funds

Determine realistic values for all key asset parameters:

- Individual bond data of existing / to be purchased bonds like face value, coupon rate, frequency, maturity date / term etc.
- Amounts invested currently and future allocation rates (mid values of target allocations) in to the two asset classes namely debt and equities
- Consider current yield curve and equity return's mean, variance and correlation with bond yields for future projections.
- MF of respective funds without IGC plus X% IGC [$X = 0.00\% + n(0.05\%)$]; where $n = 0, 1, 2, \dots, 10$]

Determine realistic values for all key liability parameters:

- individual member data like age, years to retirement, past contributions etc.
- future contribution rates from employer and employee depending on current salaries and future growth in salaries
- partial withdrawal rates relating to:
 - pre-retirement cash lump sums for exigencies; or
 - income drawdown post retirement
- full withdrawal rates relating to:
 - transfer of assets to new scheme elsewhere on change in employment of members;
 - death benefit to nominees of pre-retired deceased members;

- purchase of annuity and/or cash lump sum at retirement

We should also consider dynamic interaction (or correlations) of liabilities and assets like increase in partial withdrawal rates during recession where asset returns are negative.

Model the key features of the asset and liability for the PNG funds' projections in to the future. The modelling can be done deterministically or stochastically.

In a deterministic framework, we can decide the nature and extent of the scenarios to be tested for determining the IGC. As a base case for asset projections consider

- future bond yields that are implied by current yield curve up to certain point of time (say for 5/10 years) in future;
- post which yields gliding (in say 5/10 years) to a long-term level yields (say 6% p.a.) and post gliding period remain at that level; and
- a long-term equity growth rate (say 12% p.a.).

We might consider various scenarios with the impact of the following shock(s) at various points of time in future. say after 1, 3, 5, 7, 10 ...years

- increase/decrease of 100 / 200 basis points in bond yields; and / or
- 30% / 40% / 50% fall in equities
- 10% / 20% extra partial withdrawal rate

Then compare value of assets and liabilities at each future time for each scenario to determine the shortfalls.

In a stochastic framework, we can make multiple (few thousands) projections, starting with the fund's current asset distribution and assumed future allocations, to generate many possible future economic scenarios.

The ESG (Economic Scenario Generator) should generate random bond yields and equity growth rates consistent with forward looking means, variances and covariance. The stochastic element of the projections would apply

- directly to the asset portfolio and investment returns, in order to assess exposure to systematic risk.
- indirectly to liabilities in the form of dynamic partial withdrawal rates

Results are ranked in terms of a target measure - shortfall of assets relative to liabilities at a specified future date; The assessment of the results is done in two forms

- 99-Percentile: shortfall of top 1% of worst case; for e.g. in case of 10,000 scenarios 100th worst shortfall
- 95-CTE (Conditional Tail Expectation): average shortfall of the top 5% worst cases; for e.g. in case of 10,000 scenarios average of top 500 worst shortfalls

For both approaches deterministic as well as stochastic:

Select minimum X% IGC that gives acceptable levels of shortfall keeping in mind marketability of the product feature i.e. comparing with what competitors are charging.

Include impact of varying investment strategy (changing allocations within range specified rather than using mid values for the funds) has on the level of shortfalls of the fund.

Include sensitivity analysis e.g. how will changes in parameter values affect the results.

[0.5 per point]

**[Max 12]
[50 Marks]**

Solution 2:

Topics/concepts to be included in the curriculum of Retirement Advisors:

I. Fundamental Concepts in Retirement Planning

1. Need for Retirement Planning
2. Basic financial concepts associated with retirement planning
3. Features of the retirement goal
4. Advantages and importance of starting retirement savings early
5. Risk of Underestimating Retirement Goals
6. Emotional Aspects of Retirement

II. Financial Markets and Investment Products

1. Need for Making Investments to Reach Retirement Goals
2. Difference between Savings and Investments
3. Asset Class and Sub-Asset Classes
4. Features of Different Asset Classes
5. Asset Class Returns
6. Common Risks in Investments
7. Matching Investor Needs to Asset Class Features
8. Impact of Macro-Economic Factors on Asset Classes
9. Asset Allocation
10. Financial System and Investment Products

III. Retirement Planning

1. Evaluate Client's Current Situation
2. Learn the Process of Setting the Retirement Goal
3. Investing for Accumulation
4. Post-retirement Stage
5. Risks in Distribution Stage
6. Monitor and Update the Retirement Plan
7. Behavioural Bias in Decision Making

IV. Retirement Planning Products:

1. National Pension System (NPS)
2. Working of NPS
3. Subscribing to the NPS
4. Investing in the NPS
5. Tax aspects of subscribing to the NPS
6. Minimum Assured Returns Schemes (MARS)
7. Accumulation phase Active investment fund options: Debt/Equity/Hybrid/AIFs
8. Accumulation phase Passive investment Life Cycle options: Conservative/Moderate/Aggressive
9. Payout phase various Annuities' options offered by ASPs (Annuity service providers) :Life/Certain/Increasing/Joint Life/RoP (Return of Premium) or not

V. Evaluating Fund Performance and Fund Selection

1. Return on Investment
2. Different types of return calculations
3. Measures of risk in an investment
4. Benchmarks
5. Performance Evaluation
6. Matching investor's retirement needs to product

VI. Other Investment Products

1. Mandatory Retirement Benefit Schemes
2. Voluntary Retirement Products

VII. Retirement Planning Strategies

1. Bridging Shortfall in Retirement Corpus
2. Periodic Investments
3. Retirement Income from Multiple Sources
4. Bucket Strategy: Short/Medium/Long term bucketing

5. Tax Advantages in Different Stages of Retirement
 6. Automating Investments
- VIII. Special Situations in Retirement
1. Debt Obligations in Retirement
 2. Documents for Effective Retirement Planning
- IX. Regulations and Regulators
1. Country's Regulatory System
 2. Role of Regulators
 3. Role of Pension Funds Regulator
 4. Regulations for Retirement Advisers
 5. Ethics beyond Regulations
 6. Subscriber Grievance Redressal Mechanism

[0.5 per point]

[Max 15]

Solution 3:

- i) Large fund caps employs people that could vary significantly in their geographical locations(remote vs populous areas, urban vs rural, mountainous vs desert etc), nature of work (white collared vs blue collared), occupational hazard, nature of employment (long term vs short term) and thus have diverge demographics(mortality and morbidity) and behaviour(early leaving). Therefore, there exist a possibility of under/over subsidy of these risks that may not be suitable for diverge mix of population across multi cap sponsors and sponsors may want a customized plan as per their risk profile.

[0.5 per point]

[Max 1]

- Smoothed bonus funds pool the investment and insurance risk across all participants.
- Pooled funds work best when the nature of the participating funds is similar.
- If a fund experiences very different patterns of leavers/joiners, for example, this can result in large cross-subsidies that are inequitable.
- Such distortions could be quite material in relation to the other participants.
- All smoothed bonus funds feature some cross-generational subsidies; some sponsors may prefer to align their funds within a single large fund than spread it across multiple funds.
- In particular, smaller sponsors benefit from better asset diversification in pooled vehicles
- Even a large sponsor may have higher concentration of risk in a standalone fund and thus want to participate in smoothed fund.

[0.5 per point]

[Max 2]

- A segregated plan can customize its arrangements in areas like:
 - Investment policy; specify exclusions, special constraints (provided these do not impair the insurer's ability to provide the underwriting)
 - Policy conditions; e.g. extent to which market value adjustment (due to reduced investment return of selling bonds in high interest rate environment) are applied to mass leavers
- It will require more effort from the sponsors / trustees who will have no fellow participants
- But the fund will shoulder the burden of managing its funding level alone given that the insurer is unlikely to give onerous guarantees to a single plan fund given it bears some of these risks
- For example, a standalone fund experiencing mass retrenchments at a time when funding levels are low would get no cross subsidy and entire risk will be borne by sponsor and insurer
- The termination conditions are likely to be more onerous as the insurance risk will be higher for a single fund.
- There will be greater transparency of the internal workings of the fund as experience is directly related to sponsors fund and no discretion is left to insurer.

[0.5 per point]

[Max 2]

- ii) The fund operates on segregated basis for a sponsor plan but share demographic, behavioral and limited investment risk in proportion to profit sharing arrangement. There is an asymmetrical profit profile for insurer, who may only earn profits via expense charges and only post run offs but have to contribute funds to meet solvency / liquidity requirements. Under specific situations, it may have to contribute large amount of money if actual assets fall below notional solvency fund. Even if the experience turns favorable in future, the profits can only be recouped through an expense charge and post run off. Even though the reversionary bonus depends on 10 yr G sec rate, but smoothed mechanism did permit to have formula that pays lower bonus in years having high interest rates and low bonuses in low interest rate regime.

[0.5 per point]

[Max 1]

The following situations are particularly stressful to the insurer:

- High interest rate environment followed with mass leaving/terminations/deaths: The market value of bonds will be quite low and there may already have solvency gap. The bonds need to be sold to payoff the accumulated benefits. This will exacerbated with with lower future contributions (new money) coming in for investment at higher rates in current market. Had new been higher, as is the case for matured funds with stable employee base, the new money would have absorbed the volatility in returns.
- Persistent low rate environment – Even though the previously accumulated fund may have increased but persistently low interest rate will start biting for new money invested at lower rates and for some funds, the accumulated earnings may be lower than gauranteed 3% for longer period. This will particularly be worst for matured funds with stable employee base.
- The corpus and employees fund will accumulate at minimum rate of 3 % with solvency deficit being funded by sponsor and insurer.
- If mass exists happen at this stage, the fund may experience liquidity issues for some of the funds whose major chunk of contributions have been received during the low interest rate regime.
- Funds with higher corpus prior to start of low interest rate regime and having lower contributions in this regime (due to declining employee base) may however be impacted less.
- Lower expenses charged to fund: If expense charges are lower for certain funds, then profit profile becomes even more skewed. In the event of adverse experience, the insurer may have to continue part funding the portfolio till the run off.
- Persistent low reversionary bonus declaration may create cross subsidy between generations of policyholders and complaint may taken up by regulator to not meeting PRE/TCF regulations. If such recouped returns are not shared with fund as per smoothing policy, these profits may be shared between policyholder and sponsor post run off. Press may also try to ascribe lower reversionary benefits as collusion between sponsors and insurer making profits (at least in run off and lower solvency contributions) at employees expense.
- If sponsor is unable to meet solvency funding requirements or files for bankruptcy then the insurer is at risk of undertaking full responsibility of obligations towards members.

[0.5 per point]

[Max 2]

The fund may alleviate some of this risk by :

- increasing the expense charge to maximum allowed by regulators; the sponsors and policyholders may oppose such high charges and other competitors may be offering plans with lower charges
- Decrease its profit share to lowest levels; this may pass on risk to sponsors but competition may not permit such actions without losing business.
- The declared reversionary bonus may be lowered; but this creates cross subsidy between generations of employees, some getting lower bonuses in adverse years

(investment returns are retained in fund and not shared with employees) but and others getting higher benefits.

- The insurer may allow cohorts of employees within same fund into sub fund, so that run off for cohort does not keep moving perpetually due to additions of new employee. However, it may reduce cohort specific diversification of risks.
- Persistent low reversionary bonus may make selling new business extremely hard due to bad publicity and employee unions pressuring sponsors to keep away from insurers offering low reversionary bonus.
- Allowing sponsors with similar risk profile to participate single fund. But such fund may become prone risk of sectoral economic cycles.
- Clarify the risk assumed by insurer in the event of sponsor facing financial difficulty and put caveats to safeguard insurers position.
- Reinsure the risk or purchase hedging instruments (if available)
- Develop investment strategy that gives return better than 10 yr G sec rate and guarantees returns of at least 3% in certain economic situations

[0.5 per point]

[Max 2]

[Max 5]

- iii) The fund operates on segregated basis for a sponsor plan but share demographic, behavioral and limited investment risk in proportion to profit sharing arrangement. Similar to risks borne by insurer, there is an asymmetrical profit profile for sponsor but unlike insurer, any solvency contribution early on is recouped only post run offs but have to contribute funds to meet solvency / liquidity positions before run offs.

Under specific situations, it may have to contribute large amount of money if actual assets fall below notional solvency fund. Even if the experience turns favorable in future, the surplus can only be recouped post run off. Such possibilities have been discussed in part ii.

[0.5 per point]

[Max 1]

- Higher expenses charged to fund: If expenses are higher for certain funds, then it may slowly erode the fund and may cause solvency deficit and sponsor may have to contribute major part of it. In the event of adverse experience, the sponsor may have to continue part funding the portfolio till the run off.
- Persistent low reversionary bonus declaration may create cross subsidy between generations of policyholders and complaint may taken up by regulator to not meeting PRE/TCF regulations. If such recouped returns and not shared with fund as per smoothing policy, these profits may be shared between policyholder and sponsor post run off. But this may be raising eyebrows from corporate governance perspective and employee unions may oppose this and force sponsor to negotiate with insurer to increase reversionary rates. Its necessary to have smoothing mechanism that creates equity between various cohorts/generations of employees.
- Press may also try to ascribe lower reversionary benefits as collusion between sponsors and insurer making profits (at least in run off and lower solvency contributions) at employees expense.
- Bad reputation due to lower bonus rates may cause issues in attracting and hiring right talent as post retirement benefits looks less attractive.
- If insurer is unable to meet solvency funding requirements or files for bankruptcy, the sponsor may have to undertake full responsibility of members obligations.

[0.5 per point]

[Max 2]

The sponsor may alleviate some of this risk by:

- Decreasing the expense charge or switch to insurer offering lower charge products.
- Decrease its profit share to lowest possible levels;
- Participate actively in with profit committees to declare sustainable bonus rates, a delicate balance between low rates with higher solvency positions to reduce solvency contributions but still giving best package
- Move the fund to insurer offering better terms to sponsors and employees
- Clarify the risk assumed by sponsor in the event of insurer facing financial difficulty.

- Maintain a buffer to pay meet solvency requirement (either in cash or through debt borrowing).

[0.5 per point]

[Max 2]

[Max 5]**iv) Sponsoring employer**

- Low return on smoothed bonus product in future will put them under pressure from unions
- May have to provide funds to increase solvency position of the fund as most of the risk lies with the employer.
- Reversionary bonuses in future years may be reduced if market does not correct but capital requirement is still required to meet 3% guarantee.

[0.5 per point]

[Max 1.5]

The plan and its trustees

- Even though the fund's liabilities are matched by the insurance contract, in terms of the smoothed bonus product the plan may experience a long period of low bonuses from now on and corrective action may be required
- May have to decrease benefits or increase contributions in future if situation does not improve and returns make current structure unaffordable.
- The trustees do not carry any of the financial risk and risk is borne by sponsor and insurer.
- However, as they are responsible in law for the fund's investments they will be very anxious to resolve the underfunded position
- In particular they will want to re-evaluate the appropriateness of the investment strategy and the investment manager(s)
- They cannot easily move the assets to another provider; will forfeit the guarantee, because the insurer will apply a market value adjustment as a result of the underfunding, and so crystallise the losses.
- The plan may be in pressure if the equity drop have direct impact on operations of either sponsor or insurer.

[0.5 per point]

[Max 2.5]

Members

- None immediately as their benefits are fixed,
- But may have problems if employer cannot afford them anymore
- And if all remedies fail may see a reduction of benefits in future especially other discretionary benefits like increases for pensions in payment
- This may impact more on active members future prospects than existing benefits in payment and could cause changes to prevent new members joining on the current terms.
- The members however bears the risk of consistent lower bonus payouts and inflation higher than expected as purchasing power will go down and they will not have sufficient funds to meet post retirement expenses.
- They also bear the risk of both insurer/ sponsor facing financial difficulty and on their ability to pay future contributions.

[0.5 per point]

[Max 2.5]

Insurer

- Capital at risk to the extent that the low funding level cannot be repaired within the terms of the product;
- Reputation risk to the extent that the investment policy is seen to have been inappropriate to the objectives of the product and bonuses cannot be lowered than 3% leading to injection of funds.
- May have to take such corrective action (e.g. remove non-vesting bonuses) as is permitted by the contract to restore funding levels; this will not be well received

[0.5 per point]

[Max 1.5]

Asset manager

- **Reputation:** If the under performance is as a result of poor performance relative to mandate
- the asset management agreement might be terminated
- Difficulty in securing new clients due to bad past performance

[0.5 per point]

[Max 1]

Regulator

- If certain critical funding levels have been breached the regulator will require that management implement actions to restore the balance and will monitor progress
- If the benefits paid are too low to meet post retirement benefits, than public may criticise poor product designed by regulator.

[0.5 per point]

[Max 1]

[Max 10]

v)

a) Short term alleviation

- Inject capital to rectify the underfunded position, but this will have implications on how the money will be recouped in future.
- Change the asset manager to one with a better track record
- Change the asset allocation by making it more aggressive to make up the shortfall when the markets recover by increasing equities.
 - This carries a lot of risk for the insurer, and it may make the smoothed bonus product more expensive.
 - It also carries a lot of risk for the employer as the shortfall could increase at a time when he can least afford it
- Invest in sectors that are likely to over perform the marker due to their cyclical nature
- Change the bonus formula to repair the funding level before declaring bonuses again or by declaring lower bonuses, if permitted
- Stop plan for new employees, if permitted
- Reduce minimum guaranteed returns for existing / new employees
- Remove non-vesting bonuses, if any
 - However, this step may be opposed by unions and may draw press attention thus having impact on new business for insurer and talent acquisition for sponsors
- Introduce Market Value Adjustments for leavers, if permitted

[0.5 per point]

[Max 5]

b) Long term steps

- Decrease bonus declarations (especially vesting) in future; this could be done by arriving at a smoothing mechanics that allows for smoothing across various economic cycle.
- Change the product when fully funded to another provider or multiple providers to diversify investment the risk, reduce insurer specific risk
- Change the product to another type of product/asset solution; though this requires regulatory changes
- Enter into hedging instruments and derivatives to controls excessive volatility of asset returns
- Introduce a hedging strategy to prevent further falls in funding levels
- Change the asset allocation by making it more conservative, but this will reduce overall return and make product less competitive
- Reduce equities, decrease volatility to provide more certainty and stability in uncertain times. However, equity provides upside potential and hedge inflation to an extent. Removing equity will reduce long term returns, will have benefits that may be deflated w.r.t inflation and less useful in meeting investor needs.
- Also, this might not be within policyholder reasonable expectations
- Reduce offshore holdings, reduce currency risk, if any

- Introduce other asset classes to increase diversity and reduce volatility, ie ILB's, Property, Hedge Funds that provides higher returns but are less correlated to equities
- Enter into alternative reinsurance that enhances balance sheet positions
- Insurer can sold the block to another insurer.

[0.5 per point]

[Max 5]

[Max 10]

[35 Marks]
