

INSTITUTE OF ACTUARIES OF INDIA

SP7 – General Insurance Reserving and Capital Modeling

November 2025 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)**

- Increase in weather events including heavy rainfall, hailstorms, and flooding
 - Motor insurers are experiencing more frequent weather-related incidents in major urban centers
 - Historical claim frequency data becomes less predictive of future claims
 - Increase in severity of weather events leads to increase in severity of motor claims such as total losses. Proportion of total losses claims can increase.
 - For non-total losses, vehicle repair costs increase due to demand surge after major weather events
 - Development patterns for weather-related claims may be different, can consider separating out weather related claims.
 - Increase in uncertainty loading in pricing or increase in NATCAT cost from Reinsurer
- (max 2 marks)

ii)

- Limit business growth for motor portfolio in areas that are exposed to climate change risks
- Require stress tests / climate risk disclosure
- Impose higher capital charges for catastrophe-exposed portfolios.
- Employ consultants to create a risk management framework that includes climate considerations.
- Demand climate risk assessment reports for portfolios subject to climate risk
- Mandatory training on climate risk for senior management and actuarial professionals
- Independent validation of climate risk models
- Ask for submission of catastrophe modelling report covering losses under different perils and results of different risk assessment tools
- Regulator may ask to purchase reinsurance cover at higher return period
- Company may think of Aggregate excess of loss covers rather than CAT cover if CAT cover is costly
- Exclusion for weather related events though, this may not be practical
- Create pool for such events with a levy on each insurer proportional to the business written
- Establish industry data collection systems for climate-related claims experience
- Regulator can mandate purchase of CAT cover to protect the industry
- Reduce capital charge on reinsurance purchased within country and with better ratings reinsurers to reduce credit risks

(max 3 marks)

[5 Marks]**Solution 2:****i) SME Cyber covers:**

- Data breach costs,
- Restoration of data and systems

- Business interruption,
- Cyber extortion (/ransomware),
- Third-party liability
- Regulatory investigation costs, fines and/or penalties.
- Notification costs mandated by regulators

(max 2 marks)

ii) Unique characteristics of cyber insurance claims making reserving challenging:

- Data quality may be poor (less credibility / relevance / not fully developed).
- It is easy to identify Sum Insured for property policies but difficult to measure exposure accurately for cyber risks.
- Property policies have generally standard wordings. Cyber Policies may be tailormade rather than standard which may pose challenges in reserving using standard / traditional methods.
- Trends: Cyber insurance events and claims are increasing. As a result, figuring out the expected frequency of cyber claims is tough and often relies on broad estimates.
- Payments to hackers after cyber-attacks can involve cryptocurrencies, which may or may not be legal in certain areas. Additionally, the value of these cryptocurrencies can change frequently, increasing the uncertainty in claims.
- Rapidly evolving threat landscape: New cyber-attacks, such as ransomware variants, AI-enabled attacks, and quantum computing threats, pop up often. This makes past data less reliable for predicting future claims.
- Systemic risk and aggregation: A single cyber event, like a software vulnerability, can impact several policyholders at once. This results in related losses that are hard to model with standard reserving methods.
- Latent claims: Unlike property claims, cyber incidents can go unnoticed for months or years. This leads to long reporting delays and uncertainty in IBNR calculations.
- Regulatory and legal uncertainty: Changing data protection laws create confusion about liability and settlement amounts.
- Business interruption quantification: Measuring and proving business interruption losses due to cyber incidents is complicated. It needs a deep understanding of IT systems and digital operations.
- Third-party liability complexity: Figuring out who is liable in data breaches involving various parties, like cloud service providers and vendors, makes settling claims difficult and extends the claims process.
- Correlation between different risks: One cyber event can trigger a series of other cyber incidents that the insurer might cover. This can lead to huge losses since estimating how many risks have been impacted becomes challenging.

(max 3 marks)

iii) Key considerations and challenges when using external data:

- Data quality and relevance: External data may not reflect the specific risk profile of SMEs, potentially leading to incorrect pricing and reserving assumptions.

- Currency and jurisdiction differences: International cyber loss data may not be directly applicable due to different legal frameworks, currency variations, and regulatory environments.
- Underreporting and selection bias: External databases may suffer from underreporting of smaller claims or may be skewed toward larger, more publicized incidents.
- Definitional inconsistencies: Different insurers may define cyber claims differently (e.g., what constitutes business interruption, data breach costs), making aggregated data unreliable.
- Confidentiality constraints: Detailed claim information is often confidential, limiting the granularity of available external data for benchmarking purposes.
- Timing and development patterns: External data may not capture the full development lifecycle of cyber claims, particularly for emerging threat types.
- Market maturity differences: Cyber insurance markets in different countries are at various stages of development, affecting the applicability of international benchmarks to a single market.
- Product Structure: Cyber insurance may have different types and different levels of coverages across different markets. Directly applying such benchmarks to a new market may not be appropriate.

(max 3 marks)

iv) Expected Loss Ratio (ELR) Method

Advantage:

- Simple to implement,
- suitable when internal data is limited,
- allows incorporation of expert judgment and external benchmarks

Limitations:

- Highly dependent on the accuracy of the expected loss ratio assumption,
- does not learn from emerging internal experience

BF Method

Advantage:

- Can be used when limited historical data is available
- Smoothes variance from large claims, providing more stable estimates for newer lines of insurance such as cyber
- Gives weight to the underwriter judgement and also places credibility on the emerging loss experience if any

Limitations:

- Highly dependent on the accuracy of the expected loss ratio assumption,

- Given the volatility of cyber claims, it may be difficult to arrive at an initial expected loss ratio assumption.
- Cyber lines is a developing line of business. BF method is not efficient where development patterns change overtime.

Exposure-Based Methods

Advantages:

- Top down method of calculating losses based on information available publicly.
- Links reserves to exposure metrics (number of records, revenue, system downtime),
- intuitive for cyber risks where exposure drives claim potential

Limitations:

- Requires sophisticated exposure measurement,
- may not capture all types of cyber risk,
- difficult to apply policy conditions such as deductibles and limits.

(max 4 marks)

[12 Marks]

Solution 3:

Assumptions:

1. Assuming no Deferred Acquisition Cost (DAC) is not allowed (or $DAC = 0$)
2. Assuming Shareholders' Fund represents available capital

Key financial ratios and analysis:

- Loss Ratio (Net Claims Paid + Change in Net Outstanding Reserves / Net Earned Premium)
 $= (900 + 450) / 1,200 = 112.50\%$
- Commission Ratio (Net Commission / Net Written Premium)
 $= 180 / 1,800 = 10\%$
- Expense Ratio (Operating Expenses / Net Written Premium)
 $= 270 / 1,800 = 15\%$
- Combined Ratio (Loss Ratio + Commission Ratio + Expense Ratio)
 $= 112.50\% + 10\% + 15\% = 137.50\%$

Profitability Ratios:

- Net UW result = Net Earned Premium - Net Claims Incurred - Commission - Operating Expenses

$$= 1,200 - 1350 - 180 - 270 = -600 \text{ crores}$$

$$\text{Net Profit} = \text{Net UW result} + \text{Investment income} = -600 + 360 = -240 \text{ crores}$$

(OR)

- Net Profit
 $= \text{Net Earned Premium} - \text{Net Claims Incurred} - \text{Commission} - \text{Operating Expenses} + \text{Investment Income}$
 $= 1,200 - 1350 - 180 - 270 + 360 = -240 \text{ crores}$
- Return on Equity (ROE)
 $= \text{Net Profit} / \text{Shareholders' Fund}$
 $= -240 / 1,800 = -13.33\%$

Solvency Ratios:

- Retention Ratio
 $= \text{Net Earned Premium} / \text{Gross Earned Premium} \times 100 = 1,200 / 2,000 \times 100 = 60\%$
 (OR)
 Reinsurance cession/RI Ratio: $800/2,000 = 40.0\%$
- Solvency Ratio
 $= \text{Available Solvency Margin} / \text{Required Solvency Margin}$
 Required Solvency margin:
 - $50\% \text{ of NWP} = 50\% * 1800 = 900$
 - $50\% \text{ of the OS claim reserve at end of year} = 50\% * 750 = 375$
 Hence RSM = 900

 Solvency Ratio = $1,800 / 900 = 200\%$ (or 2.0x)

Liquidity Ratios:

- Current Asset Ratio
 $= (\text{Cash} + \text{Current Investments}) / (\text{Technical Reserves} + \text{Other liabilities})$
 $= (400 + 3,000) / (1,500 + 700) = 1.545 \text{ times}$
 (considering other liabilities as short-term liabilities)

 Alternatively,
 $= (\text{Cash} + \text{Current Investments}) / \text{Technical Reserves}$
 $(400 + 3,000) / 1500 = 2.267 \text{ times}$

Other Key Ratios:

- Investment Yield: $360/3,000 = 12.00\%$

(max 7 marks)

ii) Comments

Underwriting:

- Combined ratio of 137.5% indicates underwriting loss of 37.50%.
- Loss ratio of 112.50% shows that the company may be undercutting the market or writing business on competitive terms. This should be benchmarked with the market by considering the business mix the company is underwriting.
- This is probable since the company is new and may want to acquire new customers.
- Reinsurance cession at 40% ($800/2,000$) for both written and earned premium may indicate quota share cession....
....which is reasonable to expect as the company is in its first year of operation and needs capital relief to fund expansion.
- This might mean that the company may be more focused on retail business or small commercial risks.
- 60% retention may limit profit potential if the lines of business the company is writing usually has underwriting profit.
- Commission ratio of 10% seems low but depends on distribution mix.
...If the company majorly writes business through the online channel, the commission ratio maybe low but the marketing expense maybe high.
...However, the expense ratio of 15% may actually indicate that the operations are efficient.
....The commission ratio may also be low because the regulator might limit the commission on certain lines of businesses that the company maybe writing.
... alternatively, the company may be earning good ceding/reinsurance commission
- High cession may limit investment flexibility but the company may focus on growing the business sustainably rather than optimizing investments.

Financial Health:

- Overall yield looks at 12% on investments looks good. Also, when compared with the risk-free rate of 5% the excess returns the company has generated seems reasonable.
- However, this may also be a one-off instance.
- The investment income does not subsidize the underwriting losses.
- Shareholder returns are negative at -13.33%. However, the shareholders may be looking at long term growth.
- Good liquidity position with liquid assets at 1.545 (or 2.267) reserves (or liabilities)
- Solvency ratio of 200% looks strong. Since the company is new the shareholders may have infused capital for a long-term period and expenses may increase.
....The sustainability of this solvency needs to be monitored over a longer period as business volume increases.
While the company may be writing business at competitive prices to acquire business, the long term value created by the business underwritten needs to be studied to understand whether this is sustainable to continue underwriting.

(max 5 marks)

[12 Marks]**Solution 4:**

i) Differences between losses-occurring and claims-made basis:

Feature	Losses-Occurring Basis	Claims-Made Basis	Illustration / Comments
Coverage trigger	Covers events that occur during the policy period, regardless of when the claim is reported.	Covers claims first made or reported during the policy period, regardless of when the event occurred (subject to retroactive date).	Example: A negligent act in 2022 but claim reported in 2025 <i>Losses-occurring:</i> 2022 policy pays out. <i>Claims-made:</i> 2025 policy responds.
Exposure period	Tied to the date of loss occurrence.	Tied to the date the claim is reported.	Claims-made aligns exposure with report year.
Tail length	Long-tail exposure – claims can emerge many years after policy expiry.	Short-tail exposure – claims must be made within the policy term (or limited extended period).	PI or D&O losses may take years to emerge → much shorter tail under claims-made.
Retroactive cover	Not applicable – policy triggered only by events within its term.	Often includes a retroactive date to define earliest date of covered acts.	Retroactive date manages insurer's exposure to old incidents.
Reporting extensions	Not needed (coverage already fixed by date of loss).	May include extended reporting period after expiry.	E.g., 30–90 days to notify claims post-expiry.
Reserving characteristics	Longer development pattern, greater IBNR and parameter uncertainty.	Faster claim emergence, smaller IBNR, more stable reserves.	Easier reserving and pricing for claims-made.
Pricing impact	Higher uncertainty → needs higher margins for tail risk.	More predictable loss ratio → lower capital strain.	Claims-made often priced more competitively.
Reinsurance structure	Aligns naturally with occurrence-based treaties.	Needs claims-made reinsurance to match exposure timing.	Must align treaty basis with policy basis.
Capital implications	Larger reserve risk and longer duration of liabilities.	Lower reserve risk and shorter liability duration.	Claims-made reduces required solvency capital.
Typical products	Public liability, employers' liability, motor, property.	Professional indemnity, D&O, medical malpractice.	Long-tail liabilities often written on claims-made to manage exposure.

(max 5 marks)

ii) Advantages of claims-made basis:

- Claims emerge quickly after being reported hence reserves are less volatile.
- Since the loss experience develops faster, the feedback to the pricing and underwriting teams is faster. This can help repricing quicker and the company can be more competitive in the market.
- limits exposure to unknown, long-term latent claims.
- IBNYR component is nonexistent in claims made and only IBNER component is needed.
- Easier pricing feedback loop – since experience develops quicker, premiums can be recalibrated quickly.
- Easier capital modelling – shorter payout tail reduces reserve risk and volatility.
- Easier reinsurance purchasing – ceded exposures align with policy period, reducing overlap.

Disadvantages of claims-made basis:

- Competitive disadvantage – some insureds prefer losses-occurring for broader long-term coverage.
- Coverage gap risk – if an insured switches carriers or fails to renew, potential uncovered periods.
- Complex retroactive date management – insurer must track prior coverage histories.
- Regulatory or client resistance – in some jurisdictions, clients or contracts may require occurrence coverage.
- Need for strong claims notification process – insurer relies on timely reporting; delayed reporting can cause disputes.
- Potential for fraud - Policyholders may delay reporting to shift claims into a future policy year (anti-selection risk).
- Potential mis-selling - Clients may not fully understand claims-made features (retroactive dates, extensions), leading to disputes and reputational damage.

(max 5 marks)

iii) Reserving implications:

- Reserves likely to increase materially due to longer reporting and settlement lags.
- IBNR proportion rises, as claims may take longer to emerge.
- Need for longer development patterns in reserving models.
- Greater sensitivity to inflation and judicial trends over time.
- Historical data from claims-made business not directly usable for new loss-occurring reserving models.
- Latent claims might emerge when moving to a losses occurring basis
...hence increased margin requirements in reserves

Reinsurance implications:

- Existing reinsurance structures (claims-made basis) may not align with occurrence coverage.
- Need to negotiate new treaty terms (e.g. occurrence-based liability treaties).
- Risk of uncovered gaps during transition years.

- Aggregate exposures per accident year increase, possibly requiring higher limits or new attachment points.
- Reinsurer's capital loading and premium rates may increase due to longer exposure tail.

Capital modelling implications:

- Longer tail → higher reserve risk component under Solvency II / RBC frameworks.
- Diversification benefit may reduce if long-tail dominates portfolio mix.
- Premium risk horizon longer – need to model future inflation and delay risk.
- Greater parameter uncertainty due to lack of credible loss-occurring history.
- Capital held against liability line likely to increase materially to reflect tail risk and model uncertainty.
- Credit risk of reinsurer because of longer tail of losses occurring claims
- Market risk arising from longer term assets because of increase in longer tailed liability

(max 5 marks)

[15 Marks]

Solution 5:

i) Comparison of deterministic vs. stochastic approaches:

Deterministic	Stochastic
Tests only specified scenarios	Tests a broader range of scenarios
Cannot explore effects of one scenario on another	Easier to explore knock-on effects
Easier to design and quicker to run	Time consuming and costly
May not capture tail risks adequately	Can capture tail risks through simulation of edge cases
It can be easier to communicate the results of stress and scenario tests to senior management	Complex to explain the methodology to senior management
Same method used across all companies in the market make them more comparable	Capital requirements better aligned with actual risk profile
May be sufficient in a small market where the mix of business does not vary significantly by company	Consistency with international best practices (Solvency II), thus easier to compare companies across geographies

(max 4 marks)

ii)

a) Correlation structures:

- Intra-risk correlations: Within insurance lines, between market risk factors

- Inter-risk correlations: Between risk categories (e.g., market conditions affecting underwriting)
 - Modeling approaches: Copula functions, correlation matrices, time-varying correlations
 - Validation requirements: Historical back-testing, stress testing correlation assumptions
- (max 2 marks)

b) Model validation requirements:

- Back-testing: Comparing model predictions with actual outcomes over time
 - Sensitivity analysis: Testing model response to parameter changes and extreme scenarios
 - Peer benchmarking: Comparing results with industry peers and regulatory benchmarks
 - Independent review: External validation by qualified actuaries and risk professionals
 - Documentation: Comprehensive model documentation including assumptions, limitations, and use cases
- (max 2 marks)

iii) Assumptions:

- These are the only 2 LoBs
- The correlation coefficient of 0.25 is constant across all scenarios and time periods, including in tail events.
- There are no other diversifiable risks or dependencies with operational, market, or credit risks
- The loss distributions for Property and Liability risks are approximately normal or can be approximated as normal for aggregation purposes.

$$\text{Combined Capital} = \sqrt{(120^2 + 100^2 + 2 \times 0.25 \times 120 \times 100)}$$

$$= \sqrt{(14,400 + 10,000 + 6,000)}$$

$$= \sqrt{30,400}$$

$$= 174.36 \text{ crores (or) } 174 \text{ crores}$$

(3)

iv) Diversification benefit = $120 + 100 - 174.36 = 45.64 \text{ crores (or) } 46 \text{ crores}$ (1)

v) Two alternative methods for modelling dependency between risks in capital models

Method 1: Copula-Based Approaches

Copulas are mathematical functions that link individual marginal distributions to their joint distribution

They separate the modeling of individual risk distributions from the dependency structure between them thus allowing for flexible modeling of complex, non-linear dependencies

Common copulas include:

- Gaussian copula: Similar to correlation but more flexible
- t-copula: Allows for tail dependency

- Gumbel copula: Captures upper tail dependency (useful for catastrophes)

Methodology:

- Model each risk distribution independently - Property and Liability
- Select an appropriate copula function to link them together

Advantages:

- Can model tail dependencies explicitly
- More accurate representation of extreme event correlations
- Flexible framework accommodating different dependency structures

Disadvantages:

- More complex to implement and validate
- Requires expertise to select appropriate copula
- Parameter estimation can be challenging with limited data
- Can be difficult to explain to non-technical stakeholders

Method 2: Scenario and Stress Testing

Description:

- Develop explicit scenarios where multiple risks are impacted simultaneously
- Test the capital model under these combined stress events
- Can be deterministic scenarios or stochastically generated

Advantages:

- Intuitive and easy to communicate to management
- Can capture specific accumulation risks relevant to the portfolio
- Explicitly models extreme events that historical correlation may miss
- Allows incorporation of expert judgment

Disadvantages:

- May not capture the full probability distribution
- Subjective in scenario selection and probability assignment
- Risk of missing important scenarios (events not in data)
- May be difficult to be comprehensive across all possible scenarios

(5)

[17 Marks]

Solution 6:

i)

- Signal of weaker case reserves: An increasing P/I ratio may mean that paid claims are rising faster than incurred (reported) claims, or that case estimates are systematically understated.
- Potential under-estimation of ultimate incurred: If case estimates are too low, chain-ladder and other incurred-based methods too will project low reserves.

- Changes in claims settlement patterns: Rising P/I ratios might also indicate quicker settlement or a change in claims mix; incurred-based methods assume stable development so projections may be biased.
- Need for recalibration of development factors: Standard link ratios derived from historical incurred data may no longer be appropriate if the paid/incurred relationship has shifted.
- Inexperienced handlers may set case reserves inconsistently or use different assumptions from their predecessors, introducing noise into incurred data.
- Systematic bias (low or high): New staff may under-reserve to appear efficient or over-reserve due to caution; either way incurred-based projections become less reliable.
- Distortion of IBNR estimates: Since $\text{incurred} = \text{paid} + \text{case}$, biased case estimates distort the base for calculating IBNR using incurred triangles.
- Incurred-based methods assume stable claims handling and reporting practices.
.... Both observations suggest this assumption no longer holds, so projections may be materially mis-stated.
- Need for alternative / cross-checking methods: Greater reliance on frequency–severity models, or case-by-case reviews to validate incurred-based estimates.
- Need for diagnostic analysis and adjustments: Adjust historical data for known changes, such as initial reserve, or adjust development factors before applying incurred methods.
- Faster settlements due to regulatory changes may have coincided with induction of new claim handlers
- Reduction in business also may lead to increase in paid to incurred ratios.
- Point at which claim is recognized into the insurer’s system can also lead to change in P/I ratio
- The Company may be repudiating more claims leading to no payment but initial reserves may be set
- Changes in reserving philosophy

(max 7 marks)

ii) Paid reserves (770) are significantly higher than incurred reserves (198)

For liability business, incurred method is typically more reliable as it incorporates case reserves

Large differences in recent years (2023-2024) suggest either inadequate case reserving or volatile paid patterns. *(for instance, there could have been a few quick settlements / payments in recent years)*

This is also evidenced in the Paid/Incurred comment earlier in the question in more recent years of 2023-2025 which suggests a systemic change to the way the claims are reported/reserved.

Liability lines such as Professional indemnity claims often have long reporting delays, making incurred triangles more stable.

There could be an error in either/both of the methods

Preferred method: Incurred Chain Ladder due to better stability and incorporation of case reserve information for liability business

(max 3)

iii) Bornhuetter-Ferguson method with 45% Expected Loss Ratio:

BF Calculation Formula: $\text{Ultimate} = \text{Incurred} + (\text{ELR} \times \text{EP}) \times \text{Undeveloped \%}$

AY	Incurred Ult (A)	Incurred (B)	EP	ELR×EP	Unreported% (1-B/A)	BF Ultimate	BF Reserve
2020	94	94	180	81	0%	94	0.00
2021	100	99	195	88	1%	100	0.88
2022	108	100	210	95	7%	107	7.00
2023	127	102	225	101	20%	122	19.93
2024	185	95	240	108	49%	148	52.54
2025	149	75	255	115	50%	132	56.99
Total							137.34

(max 4)

iv) Comment:

- The incurred loss ratios already exceed 45% hence, the IELR looks low.
- Applying BF method to developed years does not change the chain ladder results, hence it's not appropriate for older years.
- Where a year is reasonably developed and where the incurred loss ratio is already above 45%, using a 45% may not be reasonable.
- Should question the underwriter on reasons for expecting a low loss ratio such as changes in business mix or rate changes, changes in reinsurance structure

(2)

v) Comparison with Chain Ladder:

BF reserves (137) lower than both Paid CL (770) and Incurred CL (198)

BF method relies heavily on pricing assumption (45% LR)

Significant differences suggest either pricing assumptions are optimistic or chain ladder is overstating reserves

For recent years with limited development, BF provides more stable estimates however the BF estimate seems to be optimistic.

Large differences warrant investigation of pricing adequacy and case reserving practices

(2)

[18 Marks]

Solution 7:

Event/Loss	Gross Loss	RI A	Net loss after QS recov	RI B	Net loss after QS & XoL recov	RI C	Net loss to insurer
		QS		Per Risk XL		CAT XL	
Attritional	45	18	27				27
Event X	3	1.2	1.8	0.8	1.0	2.6	5.0
	4	1.6	2.4	1.4	1.0		
	6	2.4	3.6	2.6	1.0		
	8	3.2	4.8	0.2	4.6		
Isolated LL	8	3.2	4.8	0	4.8		4.8
	1.5	0.6	0.9	0	0.9		0.9
Total	75.5	30.2	45.3	5.0		2.6	37.7

Net underwriting result

Assumptions:

- No reinsurer default,
- No Operating expenses
- No direct commission
- Assume all losses fall under the reinsurance treaty.

Per Risk XOL premium = $5 * 10\% = 0.50$ cr

CAT premium = $40 * 6\% = 2.4$ cr

Net retained losses = Gross – Ceded = $75.50 - (30.20 + 5 + 2.60) = 37.70$ Cr

OR

$27 + 5 + 4.8 + 0.9 = 37.70$ Cr

GEP	120.00
Less: QS Reinsurer Premium	-48.00
Less: Per Risk XOL premium	-0.50
Less: CAT XL premium	-2.40
NEP	69.10
Add: Commission Received	9.60
Less: Net claims	37.70
Net Result	41.00

(10)

ii) Key differences between proportional and non-proportional reinsurance:

Criteria	Proportional Reinsurance	Non-Proportional Reinsurance
Transfer mechanism	Transfers fixed percentage of all risks regardless of size for the same percentage of premium	Provides protection only above specified retention levels
Portfolio coverage	Consistent risk reduction across entire portfolio such as motor	More effective for catastrophic and large loss protection such as commercial property
Small-to-medium loss protection	Limited protection against accumulation of small to medium losses	Ceding company retains full exposure up to retention level
Tail risk management	Less effective for managing tail risks	Better suited for managing tail risks and volatility
Capital relief distribution	Reduces required capital proportionally across all business	Reduces capital requirements primarily for large loss scenarios
Cost-effectiveness	Provides steady capital relief but may be expensive for profitable business	More cost-effective when large losses are infrequent
Profitability impact	May reduce profits on profitable business due to premium cession	Preserves more profit on profitable business
Administrative burden	Simpler to manage due to aggregate bordereaux reporting	More complex with event-based claims reporting
Business type	Growing insurers; new product lines; high exposure portfolios	Established insurers; catastrophe risk management

(5)

iii) Impact on investment strategy

Heavy reinsurance cession means significant premium outflow to reinsurers

....Reduces the float available for investment by the insurer

Which leads to....

- Smaller investment portfolio thus limiting diversification opportunities
- Lower absolute investment income even if returns are healthy

Changed Liability Profile and Duration Matching

- Reinsurance changes the timing and quantum of net claim payments
- Reinsurer recoveries reduce gross liabilities but may have time lags
- Net liability profile becomes shorter-tailed due to reinsurance coverage With reinsurance covering long-tail or large claims
- Investment strategy must shift toward shorter duration, more liquid assets
...which reduces scope for investing in longer-term, higher-yielding instruments like infrastructure bonds or long-dated government securities

- Insurer must pay gross claims first, then recover from reinsurers leading to increased need for liquidity
- Timing mismatch between claim payment and reinsurance recovery requires maintaining higher cash buffers or readily liquid investments
- Reinsurance premiums paid upfront (annual or installment basis)
.... Creates immediate cash outflow affecting liquidity planning

Counterparty Credit Risk Considerations

- Heavy reliance on reinsurance means significant exposure to reinsurer's financial strength
- Insurer may need to monitor and potentially invest in understanding reinsurer creditworthiness
- May need to hold additional capital buffer for reinsurer default risk
- If reinsurers are offshore or lower-rated, may require collateral arrangements
... which tie up funds and thus reduces flexibility in investment strategy
- May need to maintain higher-quality, lower-yielding bond portfolios to demonstrate financial strength to reinsurers (reinsurer's requirements)

Profit Share and Commission Structures

- Profit commission arrangements create variable cash flows. Variable nature affects investment planning and forecasting.
- Fixed commission provides upfront liquidity boost
- With reduced underwriting float, insurer becomes more dependent on investment income to achieve profitability targets
- May push toward higher-risk investments to compensate for reduced premium base
- It can be noticed that per risk XL is completely burnt and recovery is more than premium paid in cat XI treaty. This is can be better than investment income generated, however this may not be sustainable over long term as reinsurer may increase rates

Benefits of reinsurance may outweigh the additional investment income

- Reinsurance reduces capital requirements. There may be significant capital requirements if there is no reinsurance which depends on jurisdiction....
...which may lead to a more restrictive investment
- A cost benefit analysis is required between Investment income generated and efficiency of RI treaty.
- While the particular year's (in question) results for the insurer are favorable, in bad years reinsurance reduces volatility of results and helps improve solvency

(6)

[21 Marks]
