

Institute of Actuaries of India

Subject SA3 – General Insurance

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)

- a) Factors impacting claims development pattern of turnover based Trade Credit Insurance
- Credit period / extended credit period / maximum credit period / maximum extension period
 - Claims waiting period
 - Case reserving philosophy – strength of case reserves, allowance for expenses
 - Recoveries made against net debt – delays attributed to the judicial/court system
- [1 mark for any point, **Max 3**]

b) Factors impacting the eventual liability under turnover based Trade Credit Insurance

- General economic conditions under which buyers operate [1]
Interest rates, Business environment / cyclical demand, political stability, country credit rating
 - Quality of Approved buyers [1.5]
 - Their credit rating, profitability trends, operating cash flows, promoters – market information on promoters, other activities undertaken and market standing
 - Estimated turnover
 - Industry in which they operate
 - Geographic region in which they operate
 - Credit control [1.5]
 - Approved credit limits granted to buyers
 - Cancellation of credit line – automatically in case of insolvency of buyer / provisional claim filed
 - Suspension of credit limits – premium paid exhausted through turnover declaration
 - Deductibles [0.5]
 - Maximum liability as specified in the policy [0.5]
 - Net debt
Insured % of debt / credit limit – after application of deductibles subject to maximum liability [1]
 - Recoveries made against net debt / payment received by the insured (shared in proportion) [0.5]
- [Max 5]**

ii)

a) Insurer's liability as per PLI Act, 1991

- Maximum liability under any one accident - INR 5 crores
 - Maximum liability under (more than one accident) any one year - INR 15 crores
- [0.5 marks per point subject to a maximum of 1]

As per the Act, where the claim award is greater than the sum insured under the policy, the insurer's liability is capped at the sum insured. The shortfall is then paid to the insured under the Environment Relief Fund (ERF). [1]

Immediate relief as per PLI Act, 1991

- Fatal accident – INR 25000 (plus medical expenses up to INR 12500)
- PTD/ PPD/ other injury / Sickness – medical expenses up to INR 12500 + cash relief based on extent of disablement where INR 25000 is payable in the event of permanent total disability
- Loss of wages due to temporary disability (minimum 3 days hospitalisation and age > 16 years) - monthly relief not exceeding INR 1000 up to 3 months
- Property damage - up to INR 6000

[1 mark per point subject to a maximum of 3]

Standard exclusions

- Damage to natural resources
 - Damage to Government property
 - Relief to workmen
- [1 mark for exclusions]

[6]

b) Stress test scenario

Assumptions

- Claims made against 10 different policies
- Sum insured is assumed to be INR 15 crores for all the 10 policies which gave rise to claims
- No reinsurance treaty apart from the 4% obligatory treaty
- All claim awards beyond INR 5 crores
- No additional expenses considered for simplicity
- All claims assumed to occur within a 12-month period
- No other liability insurance product is sold by the insurer

[0.5 marks for any point subject to a maximum of 1]

Scenario

Claims made under this portfolio is greater than the underwritten premium.

As there is no reinsurance apart from the obligatory cessions, net claims will determine the capital requirements as per Solvency regulations

Claims impact

Gross claim amount = 10 * INR 5 Crores = INR 50 crores

Net claim amount = 0.96 * 50 Crores = INR 48 crores [0.5]

Required solvency margin is calculated as

RSM = max(RSM1, RSM2) = RSM2 = 0.3 * max (48 Crores, 50 Crores *0.75) = INR 14.4 crores [0.5]

To meet the minimum solvency ratio of 150%, the capital requirement for this portfolio will be INR 14.4 *1.5 = INR 21.6 crores over and above the losses already incurred under this portfolio

Internal solvency thresholds maintained by the company will be higher than the minimum ratio of 150%, say 170% for example and this will further increase capital requirements for this portfolio. [1]

As claims exceed underwritten premium, additional capital would be required under this scenario, if the company is to maintain its target solvency ratio [1]

[4]

iii)**a) The factors to be considered when deciding whether or not to underwrite Crop and Weather insurance are:**

Tender based

- Business volumes depend on the outcome of the bidding process which could lead to significant variations against budget
- Tenders are usually awarded to the lowest bidder
- Due to the competitive nature of the bidding process, loss ratios may be unacceptably high
- Limited diversification or concentration of risk in a few districts (in case of 1 cluster) or few small states

Reinsurance

- Due to large premium volumes involved and high propensity for claims, there will be capital constraints for any insurer and hence insurers rely on competent reinsurers for pricing support or support in claims servicing in case of yield based schemes.
- Increased credit risk if a reinsurer decides to withdraw support
- Retention may be selected so as to achieve optimum capital levels
- Risk appetite of the insurer and need for Stop Loss cover, if any, depending on expected business volumes, premiums and maximum loss based on sum insured exposure

Data risk

- Basis risk – granularity of the data not at the desired level for the scheme being implemented
- Lack of data and dependency on weather patterns translates to increased pricing / reserving risk
- Past claims data may not be representative of the future and hence not suitable for pricing and reserving purposes
- On the ground presence and/or satellite monitoring is essential to assess expected claims

IT systems

- Difficult to develop IT systems for claims computation especially under index-based schemes due to the uniqueness of terms for any State – Crop combination
- The insurer would therefore have little choice but to have manual processes to assess claims resulting in additional operational risk

Manpower

- Availability of manpower to service policies
- Availability of in house expertise to underwrite such policies and service claims
- Existence of contact centre where staff are fluent in the local language – will vary depending on state/district where business is underwritten

Premium uncertainty

- Uncertainty in premium volumes as farmer enrolment may not be as expected
- Change in cropping pattern may lead to actual premiums being very different from that expected
- In case business volumes are higher than anticipated, additional reinsurance cover may be required and it may be under more restrictive terms than those offered at inception. This will further impact the net loss ratio of the insurer

Capital / Solvency

- Significant impact on solvency capital requirements immediately upon premium booking
- Shareholders' may be required to infuse capital to support premium volumes / accelerated claim payments in case of weather events leading to say mid-season adversity declaration by the State for some insured unit – crop combination
- Capital locked in for three years in case of a bad Kharif / Rabi season under existing factor-based solvency regulations (holds good even in the case of exit from Crop insurance)
- Long delays in actual receipt of premium from State / Central Governments
 - If delay in premium receipt is beyond 365 days then the corresponding overdue amount is disallowed from solvency margin calculations
 - Limited opportunity to earn investment income due to delayed premium receipt

Contract terms

- Lock in period of 3 years (or earlier in case Government decides to change scheme rules /design)
- Penalty clauses / terms for non-adherence to TATs
- No guarantee that State Governments will opt for a scheme like 80% -110% (where the insurer will refund premium if the loss ratio turns out to be less than 80% / State Government will pay additional premium if the loss ratio exceeds 110%)
- Compulsory requirement to spend 0.5% of the premium underwritten for this line of business to increase insurance awareness

Profitability

- Can result in volatile profits due to underlying nature of the product and dependency on weather events
- Shareholders and investors may not be comfortable with such volatility in the underlying business as it may impact dividend payouts.

- Schemes like 80% - 110% will limit losses as well as any opportunity for profit which will in turn impact the return on capital

Second order effects

- May assist the insurer with rural and social sector business obligations
- With increased business volumes under Crop, Motor Third Party minimum business obligations may increase if this results in increased market share for the insurer (as Third Party obligations depend on the insurer's market share of Motor insurance business and overall direct insurance business share)
- Higher liquidity required in the investment portfolio to allow for the uncertainty in timing and amount of Crop claim payments. This will result in lower investment returns for the insurer
- Crop insurance business being politically sensitive, may lead to adverse publicity / media coverage in the event of declined/delayed claim payments which in turn will impact the insurer's standing in the market

[1 mark per point, **Max 10**]

b) Reasons an actuary cannot rely on the Basic Chain Ladder method to estimate reserves for the unfinished cropping season:

- In Crop and Weather business, claims are not independent.
- Claims are usually reported only after premium payment from the concerned Government and this is subject to significant delay
- Claims are usually reported only at the end of a season for yield-based schemes after results from crop cutting experiments are available (or even for index-based schemes, insurer may not be reporting phase wise claim amounts)
- Mix of index – yield based schemes may change over time
- Localised claims, prevented sowing, mid-season adversity etc may contribute to volatility in the claims development pattern. As a result, prior season's development cannot be used as an indicator for future claims development
- Delayed claims reporting requires the actuary to depend on inputs from the Agri team for feedback from ground staff and hence the loss ratio method is used (with allowance for reinsurance)

[0.5 marks for any point subject to a maximum of 2]

Qualifications required in an actuarial report if reliance is placed on the expected loss ratio for the unfinished cropping season while estimating IBNR provisions for this line of business.

- Disclose in the report that the expected loss ratio for ongoing cropping season is based on inputs from the Crop team.
- Crop team's inputs are based on results of crop cutting experiments, satellite images of latest crop position (in case of yield-based schemes) and phase wise known claims based on actual index data received (for index-based schemes)
- Loss ratio is in line with / better than / worse than pricing loss ratio and reflects latest available information from multiple sources
- High loss ratio in a given district is in line with media reports citing crop loss. Similarly, low loss ratio is in line with media reports citing bumper yield of a particular insured crop
- For district – crop combinations, where data is not available, average loss observed in nearby districts for that crop is used. Similarly, in the case of yield-based schemes, yield assumed is based on the relativity observed over a certain period of time
- As per standard actuarial practice, reserves include allowance for possible litigation in future and must include a margin for adverse deviation.

[0.5 marks per point subject to a maximum of 3]

[5]

[33 Marks]

Solution 2:

i) Pools in operation in India are:

- Terrorism Pool – Capacity INR 2000 Crores
- Nuclear Liability Pool – capacity INR 1500 Crores
- Fertiliser Pool – capacity INR 500 Crores

[0.5 mark for each stating each Pool and 0.5 marks for stating each Pool's capacity]
[3]

Insurer's liability in case of a claim payout from the Pool

If the Pool has non-Proportional reinsurance cover and the insurer is not a participant in the non-Proportional cover, then Pool retention is less than Pool capacity.

Thus the insurer's liability equals minimum (claim amount, Pool retention) * Share of insurer in the Pool [1]

If the Pool has non-Proportional reinsurance cover and the insurer is a participant in any layer and if the loss falls within the layer or goes beyond the layer width, then the end point of layer in which the insurer participated would be less than the Pool capacity.

Thus the insurer's liability equals min (claim amount, end point of layer in which the insurer participated) – start point of layer) * Share of insurer in the layer [1]
[5]

ii)

a) IBNR allocation to individual distribution channels – issues to be considered

- underlying loss ratio variation by distribution channel
 - this may be due to differences in the mix of new/ renewal / rollover business
 - mix by geographical region
 - demographic profile of the customer base – age, gender, occupation etc
 - differential level of risk inspection, underwriting controls in place
 - anti -selection risk
- underlying business volume growth
 - different distribution channels at different growth stages
 - higher level of IBNR will get allocated to distribution channels that constitute a larger proportion of the GWP, even if they have a low expected loss ratio
- reporting speed
 - few channels might be experiencing faster claim reporting
 - few channels might be prone to fraudulent claims
 - litigation experience might be different across channels depending on the net worth of its customer base

[1 mark for any suitable, **Max 3**]

b) Alternative factors influencing investment income allocation

- underlying profitability e.g. a highly profitable product may have a shorter tail, shorter average policy duration and will have lower levels of technical reserves and hence will be allocated lower level of investment income
- reinsurance arrangements e.g. a highly profitable product can have high reinsurance commission but lower technical reserves and hence still be allocated a lower level of investment income
- reinsurance account settlements (e.g. quarterly) e.g. product with low retention may have low level of technical reserves but it may be contributing more than expected cashflows due to delayed settlement
- Cashflow delays e.g. Crop insurance is subject to long delays in premium receipt from the concerned Government and may have high technical reserves due to which it may be allocated a high level of investment income

- Expense levels may be different across products/distribution channels and the allocation of overhead expenses may have an impact on available cashflows for actual investment
 - Tail of the product e.g. long tail lines of business benefit from longer investment periods and have a higher proportion of technical reserves in comparison to lines of business with shorter reporting/settlement lags.
 - Year in which investment was made and associated interest rates
 - Mismatch between asset and liability duration which helps generate higher investment income
- [0.5 marks for any point, **Max 4**]

- c) Additional monetary components that need to be considered by Finance in its allocation methodology
- Treatment of orphan claims e.g. may be mapped against dummy policies and particular risk parameters which will impact the reported net loss ratio for that combination
 - Treatment of risk XL premium e.g. may be charged against policies with low sum insured as well as in proportion to say NWP but may never give rise to a recovery
 - Treatment of Cat XL premium e.g. return period assumed in purchasing Cat XL cover and exposures in cat prone regions
 - Excess of loss cost associated with error in PML – may be charged only to large Commercial insurance policies
 - Treatment of reinstatement premiums – can be charged only to policies giving rise to claims
 - Treatment of minimum deposit premium – e.g. actual premium volumes lower than that projected when purchasing Cat XL cover. Should a larger proportion of the premium be allocated to products which under performed against budget as opposed to penalizing products which over performed
 - Allocation of TPA fees e.g. fixed per member or in proportion to the propensity to claim
 - Allocation of clean cut settlement impact e.g. how to identify policies which would not be allocated their share of recoveries owing to delayed reporting/settlement
 - Allocation of Cat IBNR e.g. allocated only to policies in cat prone regions or distributed across the portfolio
 - Allocation of margin for adverse deviation e.g. should this be allocated across accident years in proportion to reported/pending claims
- [0.5 marks for any suitable, **Max 5**]
[17 Marks]

Solution 3:

- i) Types of Insurance products required by online gaming companies:

- Cyber risk insurance
- Intellectual property insurance
- Public liability insurance
- Product liability insurance
- Employer liability insurance
- Professional Indemnity insurance

Cyber risk insurance:

- As there is lot of data (both financial and personal data) being handled by gaming companies, it is essential that the company takes Cyber risk insurance.

The perils covered are:

- Physical damage/fire or bodily injury caused by faulty electronic steering of systems (especially consoles, VR devices).
- Financial consequences of loss or misuse or corruption of data of end users.
- Fraudulent fund transfer
- Liability from the failure to maintain confidentiality/integrity.
- Business interruption – own or dependent organisations (both the gaming firm and any of the contractors)
- Extortion or ransomware

- Monetary damage for reputational harm
- Regulatory fines and penalties
- Restoration of data costs
- Financial losses and legal expenses due to cyber incidents. [2]

Intellectual Property Insurance:

- It takes a couple of years to develop a gaming software / tool which becomes intellectual property of the gaming company that developed it. In view of the same, intellectual property insurance is required for such gaming companies.

The perils covered are:

- **Infringement Defence coverage:** This policy provides compensation for defence costs, where a company is accused of infringing another enterprise's intellectual property (IP) rights. The insurance company underwrites the litigation and settlement of any disputes.
- **Coverage for enforcement of IP Rights:** This policy helps the insured party take pre-emptive actions and expeditiously enforce their rights. This helps in building an offensive approach, where the infringers are sued at the earliest sign of illegal IP infringement and use. The litigation will be funded by the insurance company.
- **Commercial General Liability Insurance:** the exclusions of Liability insurance are usually covered under this benefit. [2]

Public Liability Insurance:

- This covers the gaming company against legal liability for bodily harm to a third party or for damage to property belonging to a third party.
- This could cover the risks posed to neighbours / third party property due to Virtual Reality devices, peripherals etc., [1]

Product liability insurance:

- This cover protects the gaming Company against legal liability arising from defective products, faulty design and faulty manufacture.
- It also covers the legal expenses incurred by the insured in respect of claims against them. [1]

Employer liability insurance:

- It is designed to pay for legal costs and subsequent settlement of a claim from an employee due to injuries sustained at work.
- Though gaming companies are not as risky as manufacturing companies with respect to sustaining physical injuries, there is still a possibility for claims to arise due to continuous exposure to computers and software [1]

Professional indemnity insurance:

- Professional indemnity insurance provides cover to professionals (developers, interface providers etc.,) and gaming companies against negligence claims from clients or customers (both errors and omissions).
- This is essential to gaming companies as some games may be viewed as causing violence / offence to the users. This covers both financial and legal costs to the insurer. [1]

[8]

ii) Risks to an insurance company from launching products for gaming companies:

Design Risk:

- As this is a new industry and there have not been many insurance products specifically tailored for this industry, the nature of risk is difficult to be determined.
- Perils to be insured are also difficult to be determined.
- Loose policy terms and conditions may lead to disputes between the insurer and insured at the time of a claim.

- This will damage the insurer's reputation as it will bring negative publicity. [2]

Pricing risk:

- Lack of historical claims data will pose a significant pricing risk for this product
- Reinsurer's data and other industry data may also be limited.
- High premiums will lead to loss of market share and low premiums will lead to anti-selection and reduction in profits [1.5]

Reserving risk:

- Due to the possibility of latent claims, which have both reporting and settlement delays, it will be difficult to quantify the reserves.
- Also, it may be difficult to choose development factors and tail factors for the Liability line of business, due to lack of historical experience, which in turn will lead to uncertainty in reserves.
- Due to uncertainty in reserving, this line of business may prove to be capital intensive, in which case the return on equity will reduce, which is not optimal from an investor's perspective. [1.5]

Lack of Reinsurance risk:

- Reinsurer's support may not be available for these products. Where it might be available, the cost of reinsurance may be prohibitive.
- Reinsurance support may not be available especially for latent claims for which the insurer may require reinsurance support on a claims made basis. [1]

Lack of Expertise:

- Insurer may lack expertise both at the time of underwriting the risk and at the time of claim assessment. [0.5]

Others:

- Insufficient business volumes sold, which may lead to high fixed expenses per policy, which will drive profits down. [0.5]
[Max 7]

iii) Latent claims are those claims that result from perils or causes that the insurer is not aware of at the time of underwriting the policy and for which the potential for claims to be made many years into the future has not been factored in pricing or reserving [1 mark]

For the gaming industry, the latent claims may arise from product liability when the users suffer health problems (including mental health issues) due to prolonged exposure to gaming. Similarly, latent claims may also arise from Employer's Liability where developers suffer debilitating illness due to working conditions. [1 mark]

[2]

iv) Reserving approach for latent claims:

- The methodology which has to be adopted for reserving depends on the availability of data, which may be limited and the stage of emergence of the latent claim. [1]
- Chain ladder method may not be suitable given the non-availability of data. [0.5]
- Reserves derived using top down and bottom up approaches should be the same. [0.5]
- Reserving depends on the stage at which the latent claim is at - unknown/potential/emerging/emerged or closed [0.5]
- For a claim at the unknown stage, pricing basis can be used for reserving. [0.5]
- For a claim at the potential stage, benchmarks against similar events across the world, may be used. [0.5]
- For a claim at the Emerged stage, a combination of the top down and bottom up approach along with market models may be used. [0.5]

- For a claim at the Closed stage, a combination of Cape Cod and Bornhuetter Ferguson may be used. [0.5]
- Top down approach uses high-level methods and the same is reliant on external benchmarking, market information, actuarial research on Liability claims, claims under Errors and Omission and global reports on the estimate of the cost to the economy/insurance market. [0.5]
- After arriving at the global estimate, basis published reports, the cost to the individual insurer is arrived at. [0.5]
- Survival ratio indicates number of years that current reserves will suffice if the current speed of settlement continues. [0.5]
- Market indications of survival ratios can be applied to the company's average payments to get a range for the reserves. [0.5]
- Less useful if payments have been nil/near-nil or significantly volatile. [0.5]
- If market benchmarks regarding the cumulative development factor is available, the same may be applied to paid, outstanding or incurred claims. [0.5]
- Bottom up reserving on the other hand is more elaborate. [0.5]
- For example, the Average Cost Per Claim (ACPC method) may be used if credible data is available [0.5]
- Depending on available data, reserves can be determined in aggregate across the whole book or by considering each insured risk separately. [0.5]
- May be feasible in the event of the same peril affecting multiple policyholders. For example, same malware impacting multiple policyholders etc. [0.5]
- Stochastic approaches / ranges may be used. [0.5]
 - Stochastic models could be incorporated by introducing distributions and variables for the key inputs. [0.5]
 - This would require appropriate data, systems, testing and understanding of the model and parameter error. [0.5]
- Any modelling / analysis would need to factor in or consider:
 - thresholds
 - class actions
 - coverage issues particularly policy wording, trigger point issues
 - basis of claim - Claims made vs occurrence basis [1]
- Legal costs will be a significant component of claims cost. [0.5]
- Also internal claims handling and other management costs should be considered in reserving. [0.5]
- Some claims will include large international risks; hence there should be suitable allowance for exchange rate impacts. [0.5]
- Assumptions such as economic factors need to be considered. e.g. inflation [0.5]
- Legal / regulatory issues [0.5]
- Reinsurance default / dispute [0.5]
- Sparse data may necessitate approximations [0.5]
- Given the uncertainty around the quantum of liability, sensitivity and scenario testing should be carried out to produce a range of reasonable estimates. [0.5]
- Likely to also be material data issues with the original insured. For example, clearcut exposure (SI) at any given point of time. [0.5]

[Max 15]

v) Risk mitigation from the perspective of an Insurer:

- Initiatives may be taken to improve the reserve and capital position e.g. negotiations with reinsurers for a more advantageous basis for recoveries. [0.5]
- Quicker claims settlement initiatives – close claims more quickly and more aggressively. [0.5]
- Early closing of claims may lead to increased re-opened claims, and delayed cost recognition. [0.5]
- Additional claims activity may lead to increased claims handling costs. [0.5]

- Challenging more claims in court, though there are possibilities that the same may go against the insurer, which in turn may lead to increased cost and reputation risk. [0.5]
- Transfer of some or all of the latent liabilities using reinsurance e.g. adverse deviation cover. This may extinguish some or all of the company's liabilities depending on the terms of reinsurance, if the reinsurer assumes responsibility to administer and settle all pending liabilities. The reinsurer may however require claims to be capped or may only wish to cover claims once they exceed a lower limit in aggregate or a proportion of the claims between specified thresholds [2]
- Reinsurance terms and options will depend on market appetite and capacity, negotiating power of the insurer. [0.5]
- However the insurer still remains ultimately liable for all claims e.g. in the event of reinsurer insolvency/default. [0.5]
- Cost of the reinsurance may be significantly higher than the provisions held reflecting
 - reinsurance market premium
 - supply/demand for such transactions
 - investment conditions
 - uncertainties in the book [1]
- RI cost will have an impact on the P&L. [0.5]
- Complete transfer of a ring-fenced section of the business pertaining to the latent claims. However, transfer of only latent claims may not be permitted under regulations. [1]
- Policy terms and conditions can be made tighter. [0.5]

[Max 5]

vi) How to consider latent claims in capital modeling?

- Under the Economic Capital (EC) approach, latent claims will be considered under several heads:
 - EC (Underwriting risk) - As reserve risk
 - EC (Market risk) – As Interest risk, Credit risk.
 - EC (other risk) – Liquidity risk, Expense risk [1]
- While allowing for the best estimate liability under EC, reserve for latent claims may be allowed for explicitly, either as individual potential claims or in aggregate as emerging claims. High level approach, using market information and considerable actuarial judgement will be required for the same. [1]
- Implicit allowance to the extent that the historic triangles may capture emergence of now known latent claims. [0.5]
- Latent claims are likely to be stripped from the data and analysed separately therefore the implicit allowance will not likely be made. [0.5]
- Premium Deficiency Reserve (PDR) also needs to be accounted, in case suitable assumptions for latent claims are not considered at the time of pricing. [0.5]
- EC for non life reserve risk contains the volume measure of reserve risk, which in turn considers the reserve for latent claims. [0.5]
- Reserves for latent claims, if material will impact EC for interest rate risk, as the settlement time for the same is quite high, there by being sensitive to changes in interest rate. [0.5]
- Depending on the insurance contracts of the insurer (if the same has exposure to foreign currency), EC requirement for currency risk will exist. [0.5]
- EC for credit risk is due to counterparty risk of reinsurers failing to make settlements. Suitable modelling for reinsurer default has to be undertaken. Correlation coefficients with other risks are essential especially at the tail of the distribution e.g. accumulation of cyber risk for the reinsurer which in turn leads to reinsurer default. However given the current regulations which require the reinsurer to be rated BBB and above, the same may not be material. [1]
- Though there is no current requirement for EC for liquidity risk, the same may be considered if liabilities are volatile due to latent claims. [0.5]
- EC for expense risks remains at 0.5% of technical provisions and the same holds true for latent claims and it is part of the total EC. [0.5]

- Correlation matrix across lines of business and between risks remains the same as stipulated in the EC circular, though some may have to change if latent claims are material, thereby leading to accumulation risk. [1]

[8]

vii) Disadvantages of using cyber risk model:

- Cyber threats are relatively new risks in comparison to other catastrophe events. [0.5]
- Catastrophe cyber models are in the early stages of development; hence the same will not be sophisticated. [0.5]
- Very few Cyber risks have been studied. Hence, Cyber risk models are not comprehensive. [0.5]
- The choice of models available in the market will be limited due to limited expertise. [0.5]
- The event module database will be relatively small due to the limited number of historic cyber events [0.5]
- There are challenges with extrapolating a reliable and comprehensive set of theoretical events, due to this being a relatively new and developing field of academic research. [0.5]
- Cyber risk is constantly changing with time. [0.5]
- It is even harder to study the correlations between policies. [0.5]
- Insurance companies have limited exposure to assist in parameterisation and validation of the models. [0.5]
- It is difficult to obtain market level data as cyber events are often not publicised by targeted companies, owing to reputation risk. [0.5]

[5]

[50 Marks]
