

INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

24th November 2023

**Subject SP7 – General Insurance Reserving and
Capital Modelling**

Time allowed: 3 Hours 15 Minutes (14.45 – 18.00 Hours)

Total Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. *Please read the instructions inside the cover page of answer booklet and instructions to examinees sent along with hall ticket carefully and follow without exception.*
2. *The answers are not expected to be any country or jurisdiction specific. However, if Examples/illustrations are required for any answer, the country or jurisdiction from which they are drawn should be mentioned.*
3. *Attempt all questions, beginning your answer to each question on a separate sheet.*
4. *Mark allocations are shown in brackets.*
5. *Please check if you have received complete Question Paper and no page is missing. If so, kindly get new set of Question Paper from the Invigilator.*

AT THE END OF THE EXAMINATION

Please return your answer book and this question paper to the supervisor separately. You are not allowed to carry the question paper in any form with you.

- Q. 1)**
- i) What is Parametric Insurance? (2)
 - ii) Discuss the advantages and disadvantages of Parametric Insurance. (6)
- [8]**

- Q. 2)** An insurer who is in his its 6th year of operation has a motor portfolio growing at around 15% over the last 3 years. The break-up of Gross Written Premium (GWP) is as below:

Vehicle-Type	Previous Year	Current Year
Two-Wheeler	65%	35%
Private Car	30%	50%
Other	5%	15%

The Insurer sets outstanding claims reserves using case estimates and an actuarial method is used to estimate Incurred But Not Reported (IBNR). The case estimates are revised as and when new material information is available and to cover all the delays in settlement, an inflation assumption of 5% is used. This approach is used to estimate claims provision in accounts. Recently, as an additional approach, the Insurer has started using basic chain ladder method to estimate its claims provision.

In a recent review, following results were observed:

Description	Previous Year	Current Year
Total Claims paid/Total claims estimated	87%	91%
Reserves using Chain ladder method/Reserves in Insurer's Accounts	75%	72%

- i) Explain the likely reasons leading to selection of chain ladder method giving a lower claims provision? (6)
 - ii) The Insurer wants to expand its medical business and is preparing to launch a new medical product. For this product, the Insurer wants to vary the policy excess to optimize its experience. The Chief Actuary of the Insurer has asked you to investigate, using a stochastic approach, the likely effect on the claim experience of the Insurer of varying the policy excess and ignoring all other factors.
 - a) Outline the steps that you will take when carrying out the analysis. (3)
 - b) Discuss other factors that would be considered before implementing any changes to the excess levels. (7)
- [16]**
- Q. 3)** A large General Insurance company operates in the Indian insurance market in which solvency is currently calculated on Simple formula-based approach. The company writes all types of business and has significant amount of equity in its investment portfolio which is valued on Book value for the calculation of Solvency. The solvency of the company has recently breached control level of regulatory requirement.
- i) Suggest the suitable actions that can be taken on immediate basis by the company to avoid regulatory actions. (4)

ii) Suggest the actions the Regulator may take in this situation. (10)

[14]

Q. 4) You are Senior Actuary of a general insurance company in India. The following cumulative claims paid data and the earned premium for each calendar year is available for its domestic household building insurance business. (Amount in INR crores)

Accident Year	0	1	2	3	4	Ultimate	Earned Premium
2015	8,789	9,645	10,066	11,892	12,672	12,672	25,500
2016	9,768	10,678	10,999	11,237	12,379	12,379	28,970
2017	9,980	10,567	12,489	13,300	14,678	14,678	34,650
2018	10,890	11,890	12,360	13,505	14,890	14,890	42,665
2019	11,999	12,764	13,876	15,890			40,905
2020	15,500	21,890	24,745				45,895
2021	18,768	19,765					51,895
2022	20,897						52,545

i) Estimate the reserve required as at end of 2022 using paid Bornhuetter-Ferguson method. State the assumptions you make in your calculations. (9)

ii) The Chief Financial Officer of the company has asked you to calculate a technical discounted reserve. Discuss the main issues that need to be considered. (4)

[13]

Q. 5)

i) What are the coverage's provided by the Overseas Travel Insurance? (5)

A newly launched General Insurance company is looking to sell Overseas Medclaim policy with exhaustive coverages.

ii) Outline risks and mitigation measures for respective risk in launching this product. (8)

[13]

Q. 6) An old large General Insurance Company in India is writing mainly short tailed business except Motor Third Party (TP). Motor TP constitutes around 25% of its business. Recently Motor TP reserve has significantly increased. Board Members have suggested to Reinsure its past written Motor TP business to avoid surprise movements.

What are the methods by which the same can be executed and comment on which method the company is likely to choose with reasons thereof. (15)

[15]

Q. 7) You are advising a consortium of insurance professionals who wish to set up a new reinsurance company. The business plan is to write professional indemnity covers and employer's liability covers on a non-proportional basis. The company will be able to accept business from any territory. The financial backers require a return on capital of 30% per annum on average. The company wants to write INR 1000 crores of premium income for each of the two types of cover.

i) Describe why would the company require capital? (7)

(7)

ii) Describe the modelling necessary to quantify the required capital. (9)

(9)

- iii)** Using a stochastic model, you determine that professional indemnity reinsurance is a more volatile class of business, and requires 50% more capital to support every INR 1 of premium underwritten than employer's liability reinsurance. The business plan shows that the profit available (after allowing for investment returns) on employer's liability reinsurance is 12% of the premiums written, and it is intended that all lines of business produce the same return on capital. Calculate the profit on Professional indemnity business and total capital required for the business based on the business plan if the financial backers target is to be achieved.

(5)
[21]
