

# Actuarial Society of India

## EXAMINATIONS

16<sup>th</sup> June 2005

*Subject ST3 – General Insurance*

**Time allowed: Three Hours (2.15\* - 5.30 pm)**

### *INSTRUCTIONS TO THE CANDIDATE*

- 1. You have 15 minutes at the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only but notes may be made. You then have three hours to complete the paper.*
- 2. You must not start writing your answers until instructed to do so by the supervisor.*
- 3. 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.*
- 4. Mark allocations are shown in brackets.*
- 5. Attempt all questions, beginning your answer to each question on a separate sheet.*
- 6. Fasten your answer sheets together in numerical order of questions. This, you may complete immediately after expiry of the examination time.*

### **Professional Conduct:**

*“It is brought to your notice that in accordance with provisions contained in the Professional Conduct Standards, If any candidate is found copying or involved in any other form of malpractice, during or in connection with the examination, Disciplinary action will be taken against the candidate which may include expulsion or suspension from the membership of ASI.”*

***AT THE END OF THE EXAMINATION***

***Hand in BOTH your answer script and this question paper to the supervisor.***

- Q.1 i)** An insurer finds from his personal accident (PA) portfolio that out of the accident claims from Metro-city policyholders, 80% are in respect of accidents taking place in Metro-city areas and 20% are in respect of accidents taking place in other cities and towns. Similarly, the figures for policyholders from other cities and towns are: 30% Metro-cities and 70% other cities and towns. The insurer's PA portfolio comprises of 75% living in Metro-cities and 25% living in other cities and towns.

A claim is notified in respect of an accident, which took place in an area falling under other cities and towns. What is the probability that the policyholder lives in a Metro-city area?

[3]

- ii) a)** An insurer has been operating an experience rating system with credibility factors equal to 75% of the values derived from the EBCT Model 1 and rounded to two decimals for its group health business portfolio where group size is above 999 and below 9999. For group size 10000 and above, the 75% reduction factor does not apply and for groups below 1000 there is no experience rating facility. The insurer is now in its fourth year of business with the first one being a partial year. The experience rating system is recognized in all policy contract documents issued by the insurer. A small number of clients who have taken policies with the insurer in its very first year have complained about the reduction in the credibility factor during the current year under their policies.

Suggest possible reasons as to why such a reduction in the credibility factor could have arisen.

[4]

- b)** The management of the insurer in part (a) above have felt that there is a good untapped market potential for group health business where group size is 100 or more but less than 1000. In order to tap this market they have decided to extend the experience rating system to such groups also. They have sought your advice on a review and modification of the existing system and desire that the new system should achieve the twin objectives of premiums reflecting the risk more closely and no reduction in profitability. Set out the aspects you would consider before you send a response containing your interim recommendations for discussion and finalization.

[7]

**Total [14]**

- Q.2 i)** An insurer has reinsurance arrangements operating in the order given below:

- Surplus: Maximum retention of Rs. 30,00,000, maximum 7 lines
- QS: 70% of risk is retained on all risks
- XOL: Rs.100,00,000 in excess of Rs. 30,00,000 on individual claims and covering all risks
- Stop Loss: 90% of aggregate losses between 120% and 150% of original premiums

There were 3 claims as stated below:

- A.** Sum Insured Rs. 200,00,000 EML: Rs. 40,00,000 Claim:Rs. 25,00,000
- B.** Sum Insured Rs. 300,00,000 EML: Rs. 125,00,000 Claim:Rs.175,00,000
- C.** Sum Insured Rs. 225,00,000 EML: Rs. 80,00,000 Claim:Rs.75,00,000

Calculate the total claim amount recoverable from stop loss reinsurer. The total premium for the portfolio was Rs.35,00,000 and the retention under the surplus arrangement has always been the maximum. [4]

ii) An insurer operating in one of the countries affected by Tsunami of 26 December, 2004 is now in its 4<sup>th</sup> year. As at the end of the last financial year as on 31 March 2004, the insurer was 9<sup>th</sup> in rank by premium volume out of 14 companies operating in the country and its actual solvency margin was 220% of the statutory required minimum margin. During the financial year ended 31 March 2005, there is a marginal loss in the company's accounts compared to a modest profit in the previous financial year.

(a) List possible classes of business and nature of claims, which the insurer would have received because of the Tsunami event. [5]

(b) The reinsurer who has a treaty with this insurer recently served a notice for a substantial increase in its premium rates for Catastrophe excess of loss (CAT) cover. All policy decisions on reinsurance are taken by the insurer's Board. The reinsurer's notice was discussed by the Board in a special meeting and they decided not to renew the CAT cover and instead set up internal reserves in the company's accounts. The Board have asked your opinion in the matter and also to suggest an appropriate level for the internal reserves to be set up over the next 3 years.

i) Set out the points for your opinion on setting up internal reserves in stead of renewing the CAT cover. [5]

ii) Outline steps you would go through in order to arrive at an appropriate figure for the internal reserves. [8]

**Total [22]**

**Q.3 i)** An insurer has on its books a small number of "contractors-all-risks" (CAR) policies. Under these policies, insurance is provided for a defined period against material damage and third party liability. The period of cover is defined in the policy based on expected time to complete the project. Risk expires on earlier completion of work and no refund of premium is made in such a case. Extension of period of cover is possible with additional premium. Termination of policy is allowed if the incurred claim ratio is less than 60% and if unexpired period is at least 3 months or 25% of the original period, which generally ranges from 18 months to 9 years. Sum insured is the expected value of the property but adjustable by declaration of policyholder on actual values. Premium is allowed to be paid in instalments with an initial instalment large enough and appropriate for the policy and the balance is payable in equal monthly or quarterly instalments ending at least 6 months before the policy contract period ends.

The insurer is planning to increase its business under this type of policies. The insurer uses 365ths method for all its other types of policies to provide for UPR. For the CAR policies, the underwriter's opinion is sought every time UPR is provided. The Finance department of the insurer has sought your help in developing a formula to be incorporated in to the computer programs to generate the UPR automatically for each policy at the end of each month and for incorporation in the company's accounts.

- a) Defining any symbols you use and giving reasons, suggest such a formula. [6]
  - b) Discuss briefly limitations of the method you suggest and steps to be taken to improve the usefulness of the formula. [4]
- ii) An insurer who is in its fifth year of operation has a motor portfolio growing at around 15% over last 3 years. The break-up of the gross written premiums has been as follows:

Vehicle type	Previous year	Current year
2-wheeler	60%	35%
Private car	30%	50%
Other	10%	15%

The insurer has been using case estimates to set up outstanding claims reserves under its motor portfolio. As soon as a claim is notified over telephone, on line or other mode quick steps are taken to obtain preliminary data and a provision, which considers all known individual aspects of the claim, is raised in the accounts. As the claim progresses towards settlement, any new and material information coming up is immediately considered and the provision revised upwards or downwards, as necessary. IBNR is separately provided every quarter using an actuarial method. To cover all expected delays in settlement 5% inflation is assumed. The Chief of the claims department also organizes a review conference of estimators every half-year to review the estimating procedures, discuss for use market information and internal trends.

Recently as a first step towards introducing statistical methods for claim estimation, the basic chain ladder method using paid claims data drawn from IT systems claim file, was tried by the chief of claims and the results were as follows:

Description	Previous year	Current year
Total claims paid ÷ total claim estimated	91%	93%
Reserve brought out by basic CL method ÷ provision made in accounts	85%	82%

- List reasons why the basic CL method has given a lower claims provision. [6]  
**Total [16]**

- Q.4** i) The marine insurance in a country’s market includes marine cargo and freight for any transit by one or more of land, air or water and also includes warehouse risks or similar risks. In respect of marine cargo business in this market, describe briefly measure of exposure, risk factors, rating factors and underwriting methods including exclusions, if any. [6]
- ii) A motor insurer is considering offering the following add-on benefits on an optional basis to its private car motor policyholders.
- A. Emergency medical attention in the event of an accident to driver and/ or occupants
  - B. Cover against loss of or damage to personal belongings in the car
  - C. Provision of an alternative car in case of theft of or accident to car for a suitably predefined period

In respect of each of the above three benefits, discuss the following aspects:

- response of customers/ policyholders
- advantages to insurer
- disadvantages to insurer

[9]

**Total [15]****Q.5**

The following is an extract from the Motor portfolio of an insurer, for the current year. The figures do not include any fleet policies.

Description	Private car	Other vehicles	Total
Number of policies	15065	262840	277905
Gross written premium in Rupees (000s)	127800	228500	356300
Acquisition costs in Rupees (000s)	20000	44700	64700
Fixed costs in Rupees (000s)	NA	NA	113474
Net reinsurance costs in Rupees (000s)	NA	NA	7125
Claim frequency	0.375	0.25	
Mean claim amount in Rupees	15000	11000	
SD of claim amount	17000	20000	
Rate of inflation in claim frequency p.a.	3%	5%	
Rate of claim amount inflation p.a.	9%	11%	
Expense inflation	NA	NA	6%

NA= not available

Given the above information, calculate the rate of office premium per private car, which is to remain valid for one year, stating any other assumptions you make.

[6]

**Q.6**

An insurer writes only 1 year travel and pet care insurance policies. It started business on 1 Jan 2004 with a capital of Rs. 10mn. An extract from business operations for 2004 is given below.

Description	Travel	Pet care	Total
Gross written premium	Rs. 40mn	Rs. 11mn	Rs. 51mn
Average start date of business	1 April	1 July	
Loss ratio	65%	80%	
Initial commission	20%	20%	
Other expenses			Rs. 2mn
Investment income			Rs. 1.7mn
Tax on premiums	5%	5%	
Tax on profits	10%	10%	

The insurer stopped writing new business on 31 Dec 2004.

The following further data for year 2005 is available:

Other expenses: Rs. 1mn

Investment income: Rs. 2mn

Taxes are at the same rates as in 2004.

Assuming that claims are reported one month after they occur and are settled one month from reporting, calculate the profit at the end of 2004 and 2005 and prepare a balance sheet as at 31 Dec 2004. [10]

**Q.7** A medium sized insurer’s portfolio is divided, by class, as follows:

Class of business	Gross written premium to total premium (%)
Motor	35
Property	25
Health & PA	15
Liability	10
Others	15

Currently, it ranks 12 out of a total of 15 companies in the country. The Chairman of the company has recently conveyed that over the next 5 years, the company would expand its activities so as to reach the rank of 5 or 6. The regulator of the country has made it mandatory on all companies to invest at least 50% of the total assets in government securities.

- i) The Chief Financial Officer (CFO) of the company has sought your views on policy objectives for investment of funds of the company over the next few years without any adverse impact on company’s solvency. Set out important aspects of such policy. [5]
- ii) In the context of the proposed expansion of the company, the CFO has prepared a corporate plan for 5 years with figures, by class of business, of premiums, claims, expenses including capital expenses, investments and investment income and dividends to shareholders; the CFO has also included a few cases of “what-if” scenarios. He has now sought your help in presenting to the company’s Board a robust model of the corporate plan in order to bring out the various risk features and make it a dynamic tool to help the company reach its goals.

Describe briefly the type of model you would suggest, components you would incorporate to run the model as an ongoing and monitoring process and state the financial issues concerned with profit measures.

[12]  
**Total [17]**

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