ACTUARIAL SCIENCE EXAMINATION

FOUNDATIONS OF CASUALTY ACTUARIAL SCIENCE - PART II

Time : 3 Hours   Total Marks : 100

Multiple choice : (All Multiple Choice questions carry 2 marks each).

1. Given that :
    Expected claim count = 0.075
    Expected loss severity = Rs. 90,000
    Expected loss cost factor = 0.375
    Find the Reinsurance expected loss cost (R E L C) assuming that the claim severity including loss adjustment expense follows censored Parets distribution
    A   Rs. 2650.50
    B   Rs. 2531.25
    C   Rs. 2926.75
    D   Rs. 2421.00

2. Which of the following reinsurance categories' statements with respect to claim reporting and development is incorrect?
    A)   Treaty casualty excess are usually long tailed.
    B)   Casualty aggregate excess are usually short tailed.
    C)   Treaty property excess are usually short tailed.
    D)   Treaty property catastrophe are usually short tailed.

3. The observed claim frequency is 175. The credibility to this set of data is 30%. The complement of credibility is given to the prior estimate of 250.
    Which of the following is the new estimate of claim frequency?
    A   227.50
    B   217.50
    C   237.50
    D   207.50

4. A clash treaty may be only exposed by :
    A   Extra contractual obligations
    B   Excess of policy limit damages
    C   Catastrophic workers compensation accidents
    D   The clash of claims arising from loss events involving multiple policies.
    E   None of the above.
    Which of the above alternatives is incorrect?

5. Given that :

N = Catastrophe event count ~ Poisson [5]

X = Catastrophe event severity ~ Parets [6%, 3]

L = Annual aggregate catastrophe loss

Calculate var [L] and choose the correct answer from options below :

   A   0.018

   B   0.09

   C   0.19

   D   0.23

6. The standard for full credibility is 975 claims and 137 claims have been observed. The credibility is assigned to this data is :

   A   37.5%

   B   14.05%

   C   1.97%

   D   42.3%

7. In which of the following credibility is not expected to increase :

   A   Larger quantity of observations

   B   Increase in the prior mean

   C   Increase in the variance of hypothetical mean

   D   None of the above.

8. Which of the following equations is incorrect?

   A   Current Ratio = Current liabilities divided by current assets.

   B   Cash Ratio = Cash + Marketable securities divided by current liabilities.

   C   Asset Turnover = Annual sales divided by assets.

   D   Tobin's Q = Market value of the firm divided by its replacement value.

9. Assume, for a given risk frequency and severity are independent and

   Mean frequency   = 15

   Variance of the frequency = 40

   Mean Severity   = 250

   Variance of the severity   = 150000

Find the variance of the pure premium for this risk?

   A   4750000

   B   4250000

   C   5250000

   D   None of the above

10. Given that :

Reinsurance premium = Rs. 50000

Reinsurance ceding commission rate = 25% of reinsurance premium.

Reinsurer's internal expense loading = 5% of reinsurance premium

Reinsurer's expected loss ratio = 70%

Find, from the alternatives given below, the correct reinsurer's profit from this reinsurance arrangement.

A   Rs. 625

B   Rs. 525

C   Rs. 725

D   None of the above

11. Which of the following is the correct expanded form of I B N E R?

A   Incurred but not expected reserve

B   Implied but not enough return

C   Incurred but not enough return

D   Incurred but not enough reserve.

12. Which of the following statements is incorrect?

A   For Gamma – Poisson distribution the posterior density function is also a gamma.

B   The posterior gamma has a first parameter equal to the prior first parameter plus the number of claims observed.

C   The posterior gamma has a second parameter equal to the prior second parameter plus the number of claims observed.

D   None of the above.

13. If the goal is to generate the most accurate insurance rates with least squares as the measures of fit, which of the following models will be the best choice of an actuary?

A   Biihlmann Credibility Model

B   Classical Credibility Model

C   Bayesian Analysis Model.

14. Under Dynamic Financial Analysis (D F A) model, which of the following variables that can impact an insurer's operating situation, is generally not categorised under underwriting variables?

A   Catastrophe losses

B   Mortgage prepayment patterns.

C   Exposures

D   Loss reserve development.

15. Any strategy that eliminates price risk and coupon reinvestment risk on a fixed income portfolio is known as :
    A   Balancing
    B   Immunization
    C   Securitization
    D   None of the above.

Essay type questions (All questions carry 10 marks each)

16. State and briefly explain the **six** general components of a reinsurer's statutory loss reserve.

17. i)   List the items to consider in determining the credibility of the experience loss cost estimate.
    ii) List the items to consider in determining the credibility of the exposure loss cost estimate.

18. i)   State the Bayes' theorem.
    ii) Three manufacturers supply clothing to a factory outlets. 50% of the clothes come from manufacturer A, 35% come from manufacturer B and 15% come from manufacturer C. 20% of the clothing from manufacturer A is faulty, 10% clothing from manufacturer B is faulty and 15% of clothing from manufacturer C is faulty.

    What is the probability that a faulty cloth comes from the manufacturer B ?

19. The annual number of claims from an individual policy has a Poisson (μ) distribution. The variability in μ among policies is modelled by assuming that over the portfolio individual values of μ have a Gamma (α, λ) distribution. Find the mixed distribution for annual number of claims from each policy in the portfolio.

20. An insured population consists of 15% youthful drivers and 85% adult drivers. The following experience data is available:

Probability of Claim by individual driver.

n	Youthful	Adult
0	0.90	0.95
1	0.05	0.02
2	0.04	0.03
3	0.01	0.00

Where n = claims in a year's time

    i)   What is the expected value of the Process Variance?
    ii) What is the variance of the Hypothetical Means?

21. i) List the major technical problems that make reinsurance loss reserving somewhat more difficult than loss reserving for a primary company.

ii) List the 13 steps in reinsurance pricing exercise.

22. Write short notes on :

i) Macaulay duration and Modified duration

ii) Immunization

.... The End ....