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. Actuaries commonly use the following distributors to model the number of claims
   a)   Normal distribution
   b)   Poisson distribution
   c)   Binomial distribution
   d)   Negative binomial distribution

   Which of the above is not commonly used?

2. Given the following information, determine the indicated rate per unit.
   i)   Frequency per exposure unit   0.40
   ii)   Severity   200
   iii) Fixed Expenses   125
   iv)   Variable Expense factor   20%
   v)   Profit and Contingency factor   10%

   The answer is :
   a)   Less than 250
   b)   250 to 500
   c)   500 to 750
   d)   Above 750

3. Financial Statements useful in the evaluation of a general insurance company are the following :
   a)   Balance Sheet
   b)   Income Statement
   c)   Statement of Cash Flow
   d)   Details of Shareholding

   Which one of the above, if any, is not relevant ?

4. Basic Concepts from credibility are as follows :
   a) How to determine the criterion for full credibility while estimating frequencies.
   b) How to determine the criterion for full credibility when estimating severities.
   c) How to determine the criterion for full credibility when estimating pure premiums.
   d) How to determine the amount of partial credibility when one has more data than is needed for full credibility.

   Which of the above four, if any, is wrong?

5. Financial Statements that provide the financial activities of an insurance company can be utilised by the following interested parties.
   a) External investments
   b) Municipal Corporations
   c) Regulators
   d) Internal Decision Makers.

   Which of the parties, if any, has least interest in the statement.

6. Which of the following is the correct expanded form of IBNER?
   a) Incurred but not expected reserve
   b) Implied but not enough return
   c) Imprest but not enough reserve
   d) Incurred but not enough reserve

7. Assume, for a given risk frequency and severity are independent and
   Mean frequency   = 15
   Variance of frequency = 40
   Mean Severity   = 250
   Variance of Severity   = 1,50,000

   The variance of the pure premium for this risk
   a) 4750000
   b) 4250000
   c) 5250000
   d) None of the above.

8. Given that :-

   Reinsurance premium   = 50,000

   Reinsurance ceding commission rate   = 25% of reinsurance premium

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

   Reinsurer's Expected Loss Ratio   = 70%

   Find the correct reinsurer's profit from this reinsurance arrangement

   a) Rs. 625

   b) Rs. 525

   c) Rs. 725

   d) None of the above

9. The following are the components of general insurance company investments

   a) Government Bonds

   b) Agricultural forms

   c) Real Estates

   d) Equities

   Which of the above, if any, is normally not a component?

10. A clash treaty may be only exposed by :

   a) Extra Contractual obligations

   b) Excess of policy limit damages

   c) Catastrophic worker compensation accidents

   d) The clash of claim arising from loss events involving multiple policies

   e) None of the above

   Which of the above alternative is incorrect?

11. Of the ratio listed below, which may not be classified as leverage test

   a) Ratio of premium to surplus

   b) Change in premium writings

   c) Ratio of agents' balances to surplus

   d) Ratio of surplus aid to surplus

12. Suppose, $x > 0$, parameter $\lambda > 0$

Distribution function $F(x) = 1 - e^{-\lambda x}$

Probability density function $= F(x) = \lambda e^{-\lambda x}$

The variable x is one of the below mentioned distribution.

Select the correct Distribution :

a) Poisson Distribution
b) Exponential Distribution
c) Lognormal Distribution
d) None of the above

13. The 2010 pure premium underlying the rate equals Rs. 1000. The loss experience is such that the observed pure premium for that year equals Rs. 1,200 and the number of claim equals 600. If 5,400 claims are needed for full credibility and the square root rule of partial credibility is used, estimate the pure premium underlying the rate in 2011. (Ignore Inflation)

a) 1067
b) 1057
c) 1022
d) 1042

14. What is the correct formula for CAPM (Capital Asset Pricing Model)

a) $E(r_A) = r_F + \beta[E(r_m) - r_f]$

b) $E(r_m) = r_F + \beta[E(r_A) - r_f]$

c) $E(r_A) = \beta[r_f + E(r_m) - r_F]$

d) $E(r_A) = \beta(r_f) + \beta[E(r_m) - E(r_f)]$

15. Select the correct duration for a Bond with Rs. 1,000 face value with an annual coupon rate of 6%. The bond has a yield to maturity of 9%, reflecting current interest rates on five year bonds.

a) 4.426
b) 4.326
c) 4.416
d) 3.426

Essay type questions (All questions carry 10 marks each)

16. a) State and briefly explain four steps involved in a reinsurance loss reserving.
    b) Discuss the reserve estimation method for the different exposure categories according to the length of the average claim dollar report logs.

17. There are 3 types of drivers with the following characteristics:

Type	Portion of Driver of this type	Poisson Annual claim frequency	Pareto Claim Severity	
Good	60%	5%	$\alpha = 5$	$\lambda = 10,000$
Bad	30%	10%	$\alpha = 4$	$\lambda = 10,000$
Ugly	10%	20%	$\alpha = 3$	$\lambda = 10,000$

   a) What is the expected value of the process variance of the claim severities (for the observations of a single claim)?
   b) What is the variance of the hypothetical mean severities (for the observation of a single claim)?
   c) What is the expected value of the process variance of the pure premium (for the observation of a single exposure)?

18. Write short notes on :
    a) Internal Rate of Return
    b) Immunisation

19. a) Enlist the various form a reinsurance treaty can take.
    b) Describe the concept of facultative certificate in detail.
    c) What role can Actuary play in faculty certificate pricing?

20. a) What do you understand by the term 'net worth' in the context of a general insurance (property and casualty) Company ?
    b) Describe broadly how 'net worth' is measured?
    c) Why 'net worth' is required to be determined?

21. There are different methods for including investment income in rate making. List and explain each of them.

22. Describe different perspectives to measuring surplus (or net worth) of a General Insurance Company. Also describe the specific orientations and users of each measure of value, and discuss their attributes and differences.

.... The End ....