May, 2013

FOUNDATION OF CASUALTY
ACTUARIAL SCIENCE PART - II

[Time : 3 Hours]  [Total Marks:100]

All Questions are compulsory.

Multiple-Choice Questions (All Multiple-choice Questions carries Two marks each)

Q.1 In the event of default by insurer, policyholder can approach the reinsurer directly for recovery if the treaty has:
   a) sunset clause
   b) hours clause
   c) stability clause
   d) cutthrough clause

Q.2 CRESTA stands for:
   a) Catastrophic risk elimination and standard target aggregates
   b) Catastrophic review and stabilising total aggregates
   c) Catastrophe risk evaluation and standard total accumulations
   d) Catastrophe risk evaluating and standardizing target accumulations

Q.3 An investment has following cashflows:

<table>
<thead>
<tr>
<th>Time (in years)</th>
<th>Amount (INR thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-15</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
</tr>
</tbody>
</table>

What is the IRR?
   a) 0.2727
   b) -0.2727
   c) 0.3030
   d) 0.3333

Q.4 Suppose \( x > 0 \), Parameter \( \lambda > 0 \)
Distribution function: \( F(x) = 1 - e^{-\lambda x} \)
Probability density function: \( f(x) = \lambda e^{-\lambda x} \)
This relates to:
   a) Binomial distribution
   b) Exponential distribution
   c) Poisson distribution
   d) Pareto distribution

Q.5 Sliding scale commission means:
   a) commission varies with loss ratio
   b) commission increases at a constant rate
   c) commission decreases at a constant rate
   d) minimum commission is always nil

Q.6 Which of the following statements is incorrect:
   a) Binomial distribution has a mean greater than or equal to variance
   b) Negative binomial has a mean less than or equal to variance
   c) Gamma is conjugate prior distribution for poisson
   d) Gamma - Poisson has a prior density function of gamma too
Q.7 Standard for full credibility is 3000 claims. How much credibility is assigned to 1000 claims?
   a) 0.333  
   b) 0.500  
   c) 0.167  
   d) 0.575

Q.8 Which of the below is Main use of Finite Reinsurance:
   a) To protect from large one-off losses  
   b) To manage financial result  
   c) To provide capacity  
   d) To provide stabilization

Q.9 Bonds that have no maturity date are called -
   a) Zero coupon bond  
   b) Variable interest rate bond  
   c) Perpetuities  
   d) Convertible bond

Q.10 In time of recession, which of the below scenario will be true:
   a) decrease in value of interest rate & increase in value of bond.  
   b) increase in value of interest rate & increase in value of bond.  
   c) increase in value of interest rate & decrease in value of bond.  
   d) No change in value of interest rate & value of bond.

Q.11 As per ALM, if Assets & Liabilities are not matched, then banks would be exposed to:
   a) Interest Rate Risk  
   b) Underwriting Risk  
   c) Expense Risk  
   d) Solvency Risk

Q.12 | Column “A” | Column “B” |
     | (Liquidity Ratio) | (Formula) |

Which of the below match is correct:
   a) A(4) - B(2)  
   b) A(1) - B(2)  
   c) A(3) - B(4)  
   d) A(2) - B(2)

Q.13 For capital Asset - Pricing Model, which of the below formula is correct:
   a) \( E(r_n) = \beta(r_f) + \beta[E(r_m) - E(r_f)] \)  
   b) \( E(r_m) = r_f + \beta[E(r_n) - r_f] \)  
   c) \( E(r_n) = r_f + \beta[E(r_m) - r_f] \)  
   d) \( E(r_n) = \beta(r_f) + \beta[E(r_m) - E(r_f)] \)
Q.14 Which of the below statement is false - As per the statutory valuation rules :
   a) Bonds are valued at “Book Values”.
   b) Loss reserves are not discounted to reflect the time value of money.
   c) Expenses are recognized on a cash basis.
   d) Common stock values are based on “Book Values”.

Q.15 Which of the below statement is False -
   a) Surplus treaty reinsurance a fixed percentage of each subject policy, but the percentage varies by policy according to the relationship between policy limit & the treaty’s specified net retention.
   b) Stop Loss Cover provides very strong stabilization,
   c) PML (Probable Maximum Loss) is very conservative estimate of maximum loss possible on the policy & MPL is less conservative estimate.
   d) Loss Portfolio transfer is a type of Finite Reinsurance.

(Essay type questions : All essay type questions carries Ten marks each.)

Q.16 a) Briefly discuss roles that reinsurance play in successfully running a general insurance company.
   b) Explain the reinsurance term “Clash Treaty”

Q.17 a) State the concepts of risked based capital (RBC)
   b) Discuss the suitability of “Real Estate” as an investment instrument for a property & casualty company.
   c) Compare Classical Credibility & Buhlman Credibility.

Q.18 Write a short note on :
   a) CAPM
   b) Simple Regression
   c) Immunization

Q.19 a) Claims frequency per policy is expected to follow a poisson process with mean 0.05. Claims severity is expected to follow lognormal distribution with mean of ₹ 1200 and variance of (₹)² 22,45,000. Compute the expected number of claims for full credibility of 98%. Probability of being within 6% of the true premium is observed.
   b) Bond XYZ has a face value of INR 12,000. Term to maturity of 5 years and annual coupon rate of 6%. The yield to maturity is 9%. Calculate the Macaulay duration of the bond. The 9% above is reflecting the current interest rates on five - year bonds. Compute the modified duration.

Q.20 a) Explain :
   i) Per-risk excess treaty
   ii) Catastrophe excess of loss
   iii) Stop Loss Covers
   b) Briefly explain what are catastrophe models ?
      Describe the three major components of these models.

Q.21 a) What is Asset Liability Matching (ALM)
   b) Financial institutions such as banks & life insurance companies utilize ALM more heavily than Property - liability insurers. Why ? Briefly discuss .

Q.22 a) Explain New money rate of return & Portfolio rate of return.
b) There are two types of Urns, each with many balls labeled ₹ 1000 & ₹ 2000

<table>
<thead>
<tr>
<th>Type of Urn</th>
<th>A Priori chance of</th>
<th>Percentage of ₹ 1000 Balls</th>
<th>Percentage of ₹ 2000 Balls</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>80%</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td>II</td>
<td>20%</td>
<td>70%</td>
<td>30%</td>
</tr>
</tbody>
</table>

i) Pick Urn at random and pick one ball, If the ball is ₹ 2000, what is the expected value of the next ball picked from the same Urn?

ii) Pick an Urn at random (80% chance it is of Type I) and pick 3 balls, returning each ball to the Urn before the next pick. If two of the balls were ₹ 1000 and one of the ball was ₹ 2000, what is the expected value of the next ball picked from the same Urn?

END