Time 2 ½ Hours   **Marks: 75**

Please check whether you have got the right question paper.

Note:

- **All questions are compulsory.**
- **Figures to the right indicate full marks.**

Q1   **A**   Fill in the blanks. **(Any 8)**   **[8]**

1. EOL stands for _____.
   a. Expected opportunity loss
   b. Expected objective loss
   c. Expected occupancy loss
   d. None of these

2. The expected value of a random variable is the _____.
   a. Value that has the highest probability of occurring
   b. Mean value over an infinite number of observations of the variable
   c. Largest value that will ever occur
   d. Most common value over an infinite number of observati0on of the variable

3. Profit made by an investor in a day is an example of
   a. Continuous variable
   b. Discrete variable
   c. Absolute variable
   d. None of these

4. Number of distinct ways to arrange the letters of the word ACTUARY are _____
   a. 5520
   b. 2250
   c. 5250
   d. 2520

5. _____ rate charged reflects the market rate of interest for the maturity of the loan.
   a. Variable
   b. Floating
   c. Fixed
   d. Interest

6. Variable rate loan is also referred to as a _____ loan.
   a. Floating rate
   b. Fixed rate
   c. Both a & b
   d. None of the above

7. A major focus of actuarial science is the quantification of _____.
   a. Risk
   b. Return
   c. Both a & b
   d. None of the above

8. Variance of Binomial (n,p) random variable is equal to _____.
   a. np (1-p)
   b. np (1+p)
   c. n-p (1-p)
   d. n+p (1+p)

9. Life tablecan be used to calculate probabilities of _____.
   a. Survival
   b. Death
   c. Both a & b
   d. None of these

10. During Decision making, decision maker is always aware the all possible _____.
    a. Demand situations
    b. Strategy
    c. Revenue
    d. None of these

Q1 B State whether the statements are true or false. **(Any 7)**   **[7]**
   1. In Decision making under risk problems probability information is always available.
   2. The Stochastic modal predict the outcome of a single experiment prior to its being carried out.
   3. Investors can use the Central Limit Theorem to simplify the analysis of stock returns.
   4. The valuation of contingent cash flows is not a major application in actuarial science of financial and insurance mathematics.
   5. The interest rates vary with the term or tenor of the loan.
   6. Type I error is committed when our hypothesis is true but our test rejected.

7. EMV is the only tool to calculate best decision among the available alternatives.
8. In Binomial distribution the experiment consist of infinite number of trials.
9. Largest sample theory is applicable when n is less than 30.
10. For life insurance key risk factors are age and sex.

Q2 A The average claims cost for two different insurance Classes in a year depend on whether the economy is booming, normal or in a recession. **[15]**

The following table gives the average claims cost for these Classes in each state of the economy along with the probability that the economy will be in the state.

State	Probability of State	Average Claims Cost A	Average Claims Cost B
Boom	0.1	1,500	500
Normal	0.6	1,000	1,000
Recession	0.3	500	1,500

The probability is the probability that the average cost will equal the values shown in the corresponding row.

Calculate the expected value and variance for each insurance class.

OR

Q2 B Explain the concept of Discrete and Continuous Random Variable and give examples of both in actuarial science. **[15]**

Q3 A Explain the basic Principles of Actuarial Modelling. **[7]**

B How would you adjust the mortality rates include a risk loading when calculating the value for a life annuity product? Comment on the difference between this case and the term life insurance case. **[8]**

OR

Q3 C Calculate the annual effective rate corresponding to 6% p.a. normal assuming a compounding frequency of monthly and semi-annual. **[8]**

D Salar deposits Rs. 2, 00,000 annually in a bank for 7 years. The deposit earns 15% interest per year. What is the future value of this annuity at the end of 7 years? **[7]**

Q4 A You have a choice of investing Rs. 10,000 in two potential investments. **[15]**
You must invest in one or the other. The pay-off from the investments are as
follows:

Outcome	Probability	Investment A	Investment B
Good	0.10	50,000	26,000
Middle	0.88	12,500	15,000
Bad	0.02	0	10,000

Which investment would you select?

OR

Q4 B Describe the properties of the statistical distributions which are suitable for **[15]**
modelling individual and aggregate losses.

Q5 A The random sample of 100 articles selected from a batch of 2000 articles shows **[8]**
the average diameter of the articles is 0.354 with standard deviation 0.048. Find
95% confidence interval for the average whole batch.

B Derive maximum likelihood estimators for transition intensities. **[7]**

OR

C Write a short note: **(Any 3)** **[15]**
1. Central Limit Theorem
2. Binomial model of Mortality
3. Markov process
4. Process of Graduation
5. Types of Decision Criteria

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