



लोक सेवा आयोग

राष्ट्रिय जीवन बीमा कम्पनी लिमिटेड, प्राविधिक सेवा, एकचुरी समूह, तह ६, सहायक व्यवस्थापक पदको खुला प्रतियोगितात्मक लिखित परीक्षा

चरण:

पत्र: द्वितीय

समय: ३ घण्टा

विषय:

पूर्णाङ्क: १००

प्रत्येक खण्डको उत्तर छुट्टै उत्तरपुस्तिकामा लेख्नुपर्नेछ । अन्यथा उत्तरपुस्तिका रद्द हुनेछ ।

खण्ड "क"

७० अङ्क

1. An insurance company must pay Rs. 100,000 after 2 years, Rs. 150,000 after 4 years, and Rs. 200,000 after 6 years. The annual effective interest rate is 7%.
 - (a) Find the present value of the liabilities.
 - (b) Find the amount that must be invested today to meet these liabilities.
 - (c) Find the accumulated value of these liabilities at the end of year 6.
2. (a) An insurer offers the following contracts to a 35-year-old policyholder:
 - 15-year term assurance: Rs. 1,000,000.
 - 15-year pure endowment: Rs. 1,000,000.
 - 15-year endowment assurance: Rs. 1,000,000.

5+1+4

Suppose ${}_{15}A_{35}=0.12$ and ${}_{15}E_{35}=0.35$. Calculate the actuarial present value of each contract and explain the relationship among them.

5

- (b) An insurer proposes a 10-year term assurance with:

Sum assured = Rs. 2,000,000

Annual gross premium = Rs. 80,000

EPV of future benefits at a particular valuation date = Rs. 900,000

EPV of future expenses = Rs. 100,000

EPV of future gross premiums = Rs. 650,000

The present value of expected future profits at issue is estimated to be Rs. 160,000 and the present value of future premiums is Rs. 800,000.



- i. Calculate the gross prospective reserve.
ii. Calculate the profit margin.
iii. Explain what the results indicate. 2 + 2 + 1
3. An insurance company observes the number X of claims made by a policyholder during one year. The probability distribution is
- $$P(X=x) = \frac{x+1}{15}, \quad x = 0, 1, 2, 3, 4.$$
- Verify that this is a valid probability distribution. Find $E(X)$, $\text{Var}(X)$, and $P(X \geq 2)$. 3+3+3+1
4. The following are claim severities in Rs. '000:
- 10, 12, 15, 16, 18, 20, 21, 22, 24, 25, 27, 30, 35, 40, 75,
10, 12, 15, 16, 18, 20, 21, 22, 24, 25, 27, 30, 35, 40, 75.
- (a) Find Q_1 , median and Q_3 .
(b) Calculate the interquartile range.
(c) Determine whether 75 is an outlier using the $1.5 \times \text{IQR}$ rule.
(d) Explain why outlier detection is important in insurance data. 5+1+2+2
5. An actuary models annual claim cost Y using $X_1 = \text{age}$ and $X_2 = \text{number of previous claims}$. The estimated model is $\hat{Y} = 10 + 0.6X_1 + 4.5X_2$.
- (a) Interpret each regression coefficient.
(b) Predict the claim amount for a 40-year-old policyholder with 3 previous claims.
(c) Explain the advantage of multiple regression over simple regression. 3+4+3
6. Suppose mortality follows Makeham's law: $\mu_x = A + Be^{cx}$, where $A = 0.001$, $B = 0.0001$, $c = 0.08$.
- (a) Find μ_{50} .
(b) Find the probability of surviving from age 50 to age 60.
(c) Explain the significance of the parameter A . 4+4+2
7. A company expects a temporary working-capital requirement of Rs. 5 million for six months and plans to purchase machinery costing Rs. 30 million, which will be used for five years.
- (a) Suggest suitable financing methods for the two requirements.
(b) Explain why the financing sources should differ.
(c) Distinguish between short-term and medium-term finance. 4+2+4



खण्ड "ख"

૩૦ અક્ક

8. A government agency makes a decision that appears to violate a citizen's fundamental right. The citizen approaches the court seeking constitutional protection.
- (a) Identify the constitutional principle involved.
 - (b) Which institution provides judicial protection?
 - (c) Explain why judicial review is important.
 - (d) State the broader constitutional principle involved.
- 2+2+3+3
9. (a) RJBCL wants to expand into a business activity that is not covered by its existing objectives. The management argues that approval by the Chief Executive Officer is sufficient. Is the management's argument correct? Explain.
- (b) Explain the purpose and importance of the Employee Service, Conditions and Facilities Bylaw, 2082.
- 5+5
10. (a) Explain the objectives of the Corporate Governance Directives, 2080.
- (b) Explain the three stages of money laundering.
- 5+5

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