ACTUARIAL SCIENCE

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Principles of Insurance & Life Insurance - Paper - I

Part - I - Principles of Insurance

I. Types of risks, contingency impact on economic life.
II. Risk management.
III. Insurance in the RM scheme, insurance as financial category.
IV. Significance of insurance, macro and micro consequences, segmentation of Insurance.
V. supply of insurance products, insurance density.
VI. Forms of insurance, size of insurance premium.
VII. Calculation, tarif models, rating principles.
VIII. Insurance branch, insurers, brokers.
IX. Legal framework, supervisory body.
X. Enterpreuner technique risk of insurers.
XI. Technical reserves, insurers protfolio, investments politics.
XII. Reinsurance, significance, kinds methods, alternative transfer of risk.
XIII. Products of life insurance.
XIV. Rating principles in life insurance.
XV. Products of non-life insurance, property and liability.
XVI. Rating Principles in non-life insurance.
XVII. Economics of insurers, solvency.
XVIII. Insurance market.
XIX. Pension insuratnce.

Part - II - Principles of Life Insurance

UNIT I

Principles of insurance

Life, Health and Annuities

Nature of Insurance - advantages of life insurance - Principles of life insurance - objects of life insurance.

UNIT II

Term Insurance - Kinds of polices and plan available - Annuity contracts and their uses.

UNIT III

Group and Individual Health Insurance Products - Nature of group insurance - types of
group insurance.

UNIT IV

Special need plans - Industrial life insurance - Salary saving schemes - Personal
accident insurance - Basic principles - Coverage and benefits.

UNIT V

Mediclaim beefits - Deferred mediclaim - Overseas medical benefit conditions.

Reference Books

1) Modern Economic Problems book, by Frank A. Fetter.
2) Insurance Principles and Practices by. M. N. Mishra
3) Principles and Practices of Insurance by Kothari & Bahl
4) Principles and Practices of Insurance by. G. S. Panda
5) Elements of Business Law by N. D. Kapoor
6) Principles and Practices of Insurance by P. Periyasamy
7) Insurance Principles and Practice - M. N. Mishra
8) Principles and Practices of Law - Kothari & Bahl
9) Elements of Business Law - N. D. Kapoor
10) Principles of Insurance and Risk Management - Alka Mittal and S.L. Gupta

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Actuarial Models and Actuarial modeling - Paper - II

A) Survival models

1. Define survival - time random variables
a) for one life, both in the single - and multiple - decrement models
b) for two lives, where the lives are independent or dependent (including the common shock model.)

2. Calculate the expected values, variances, probabilities, and percentiles for survival- time random variables.
3. Define the continuous survival- time random variable that arises from the discrete survival - time random variable using a :
a) uniform distribution;
b) constant force of mortality ; or
c) hyperbolic assumption.

B. Markov Chain Models

1. Define non-homogeneous and homogeneous discrete-time Markov Chain models and calculate the probabilities of
a) being in a particular state;
b) transitioning between particular states.

C. Life insurances and annuities

1. Define present-valu-of-benefit random variables defined on survival-time random variables:
a) for one life, both in the single- nad multiple-decrement models:
b) for two lives, where the lives are independent or dependent (including the common shock model).

2. Define and calculate the expected values, variances nad probabilities for:

a) present-value-of-benefit random variables ;
1
b) present-value-of-loss-at-issue random variables, as a function of the considerations (premiums) and
c) present-value-of-loss random ariables, as a function to the considerations (premiums).

3. Caluculate considerations (premiums) for life insurances and annuities,

a) using the Equivalence Principle ; and
b) using percentiles.
4. Calculate liabilities, analyzing the present-value-of-future-loss random variables:
a) using the prospective method ;
b) using the retrospective method;

c) using special formulas.
5. Calculate
a) gross considerations (expense-loaded premiums)
b) expense-loaded liabilities (rserves)
6. Using recursion, calculae expected values (reserves) and variances of present-value - of future - loss random variables for general fully-discrete life insurances written on a single life.
7. Extend the present-value-of-benefit, present-value-of-loss-at-issue, present-value-of- future-loss random variables and liabilities to discrete-time Markov Chain models, to calculate.
a) actuarial present values of cash flows at transitions between states;
b) actuarial present values of cash flows while in a state;
c) considerations (premiums) using the Equivalence Principle;
d) liabilities (reserves) using the prospective method.

D. Poisson processes
1. Define Poisson process and compound Poisson process.
2. Define and calculate expected values, variances, and probabilities for Poisson process,
a) using increments in the homogeneous case;
b) using interevent in the homogeneous case;
c) using increments in the non-homogeneous case.

Refernce Books :

1. Actuarial Mathematics (Second Edition), 1997, by Bowers, N.L. Gerber, H. U. Hickman, J.C.Jones, D.A. and Nesbitt, C.J. pater 15, Sections 15.1-15.2.1, 15.4, 15.6- 15.6.1.
2. Models for Quantifying Risk, Second Edition, 2006, by Cunningham, R., Herzog, T. and London.