

UNIVERSITY OF KERALA
Model Question Paper
First Degree Programme
Semester V Open Course
MM 1551. 3 Actuarial Statistics
(2014 Admission)

Time: 3 hours

Maximum Marks: 80

Section-I

All the first 10 questions are compulsory. They carry 1 mark each.

1. Name the only professional body of actuaries in India.
2. Write the formula for calculating the compound interest.
3. What is the probability mass function of a Poisson distribution?
4. Write the probability mass function of Bernoulli distribution.
5. Define a concave function.
6. State the Balducci assumption on fractional ages.
7. Define the discount in the n^{th} year.
8. Write down the relation between A and \bar{A} .
9. Define an annuity.
10. What do you mean by the survival function?

Section-II

Answer any 8 questions from among the questions 11 to 22.

These questions carry 2 marks each.

11. What is actuarial science?
12. What is the role of IRDA in the insurance business in India?
13. Write the axioms of probability.
14. What are properties of distribution function $F(x)$?
15. State the weak law of large numbers.
16. State the central limit theorem.
17. If $\mu = A + e^x$ and $S(0.05) = 0.5$, calculate A
18. Find the marginal probability density function of Y if
$$f(x, y) = \begin{cases} 2x + y, & 0 \leq x, y \leq 1 \\ 0, & \text{otherwise} \end{cases}$$
19. For the uniform distribution over $(0, 80)$, find the force of mortality.
20. What are the properties of survival function?
21. In how many years will a sum of money double itself at compound interest with effective rate $i = 0.05$?
22. Discuss, briefly, term life insurance policy.

Section-III

Answer any 6 questions from among the questions 23 to 31.

These questions carry 4 marks each.

23. Discuss the characteristics of insurable risks.
24. Illustrate the individual risk model with an example.
25. Define utility function and give two examples of it.
26. Suppose the life length random variable is modelled by Gompertz's force of mortality. Find the probability density function $g(t)$ of $T(x)$. Also check whether it is a density function or not.
27. It is given that deaths are uniformly distributed over each year of age and values of l_x corresponding to $x = 35$ to 39 are given in the following table:

x	35	36	37	38	39
l_x	100	99	96	92	87

- Which of the following are true? (a) ${}_{0.5}p_{36} = 0.091$ (b) ${}_{0.33}q_{35.5} = 0.021$
28. Suppose a dealer wants to start a scheme of selling bikes costing Rs. 60,000 in 10 equal annual instalments. The schedule of instalments is such that the first instalment will be paid at the time of purchase, second will be paid after 1 year and the subsequent 8 instalments will be paid similarly. What will be the instalment if the current rate of interest is 0.06?
29. Suppose the life length random variable X is modelled by a uniform distribution over $(0, 80)$. Find $50,000 \bar{A}_x$ for ages $x = 25, 30, 35, 40, 45$ and $\delta = 0.05$
30. Find the present value and the accumulated value of a 10-year annuity immediate of 1,000 per annum if the effective rate of interest is 5% for the first six years and 6% for the next four years.
31. Rs. 3,000 is deposited in a bank on January 1 of each year from 2001 to 2012. What would be the accumulated value of this fund on December 31, 2012 at 4% annual rate of interest?

Section-1V

Answer any 2 questions from among the questions 32 to 35.

These questions carry 15 marks each.

32. Write a note on:
- Discrete frequency distributions
 - Continuous frequency distributions
 - Multi-variate frequency distributions
33. Suppose life length random variable has a distribution with survival function:
- $$S(x) = 1 - \frac{x^2}{100}; \text{ for } 0 \leq x \leq 10.$$
- Find (i) $F_X(x)$ (ii) ${}_5p_4$ (iii) probability density function of $T(4)$
(iv) median future life time of $T(5)$.
34. Explain in detail the benefit payable at the moment of death.
35. Discuss in detail discrete life annuities.
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