



Date:

Registration number:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27
M.Sc. STATISTICS – IV SEMESTER
SEMESTER EXAMINATION: JULY 2022
STDE – 0620: ACTUARIAL STATISTICS

Time: 2½ Hours

Max: 70 Marks

This question paper contains TWO printed pages and TWO parts

PART A

I Answer any SIX from the following **3 x 6 = 18**

1. Define utility function. Explain the role of utility function in insurance.
2. Write a brief note on survival function.
3. Derive the relation between force of mortality and survival function.
4. Define joint survival function. Explain how to evaluate functions for a special mortality law?
5. Define Interest rate, nominal interest rates and continuous compound interest rates.
6. Explain beneficial of payment premiums during stipulated duration.
7. Explain Claim ladder method in evolution of claims and reserves
8. Explain the role of recursive formulas and rate of change of premiums during allocation of loss to policy years.

PART B

II Answer any FOUR from the following **13 x 4 = 35**

9. A) Explain the role of Compound Poisson distribution while claiming policy of portfolio.
B) If the number of claims N being random variable, then prove that the numbers of claim follows either Poisson, Binomial or negative binomial. (5+8)
10. A) Find the rate of return from an investment that, for an initial payment of 100, yields return of 60 at the end of each of the first two periods.
B) The yearly cash flows of an investment are as follows: $(-1000, -1200, 800, 900, 800)$. Is this a worthwhile investment for someone who can both borrow and save money at the yearly interest rate of 5.2%? (6+7)
11. A) What is loss function? Derive how loss function help while predicting survival life time?
B) Let $u(\omega) = \sqrt{\omega}$, and if the random loss follows $U(0, 10)$, find the maximum pay for complete insurance against the random loss. (6+7)
12. A) Define Curtate future life. Derive the distribution of integer part of number of future claims completed.
B) Define net returns, gross returns and log returns. Derive log returns for most recent k periods. (6+7)

13. A) Define Annuities and life annuities. Suppose an insured gets Rs. 20000/- every end of the year for 15 years starting from now, find the current value by compounding annually with an interest rate 10%.

B) Drive the equation for life annuities with mth yearly period. (6+7)

14. A) Derive the relation $a_{n|} < \bar{a}_{n|} < \ddot{a}_{n|}$

B) Define the discrete time surplus process. Find the bounds for adjusted coefficients in the discrete time surplus process. (7+6)
