



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – STATISTICS

SECOND SEMESTER – APRIL 2022

PST 2601 – ACTUARIAL STATISTICS

Date: 24-06-2022

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

Section A

Answer ALL questions.

(10 x 2 = 20)

1. Define compound interest.
2. Differentiate between uniform annuity and variable annuity.
3. What do you mean by a deferred perpetuity?
4. Define discount.
5. What is a deferred annuity?
6. Define stationary population.
7. What is the use of mortality table?
8. What is the principle of insurance?
9. What is the difference between annual premium and installment premium?
10. What is a life annuity?

Section B

Answer any FIVE questions.

(8 x 5 = 40)

11. Mr. A deposits annually Rs. 20,000 p.a. for 10 years, the first deposit being made one year from now; and after 10 years the annual deposit is enhanced to Rs. 30,000 p.a. immediately after depositing the 15th payment he closes the account. What is the amount payable to him if interest is calculated at 9% p.a.
12. Derive the expressions for effective rate of interest corresponding to nominal rate of interest and vice-versa.
13. In lieu of a single payment of Rs. 1000 at the present moment a person agrees to receive three equal payments at the end of 3 years, 6 years and 10 years respectively. Assuming a rate of interest of 6% p.a., what should be the value of each of the three payments?
14. Calculate the present value of a deferred annuity payable for 10 years certain, the first payment falling due at the end of 6 years from the present time. The annuity is payable at the rate of Rs.1000 p.a. for the first five years and Rs. 2000 p.a. thereafter at 5% interest.

15. Fill up the blanks in the following portion of a life table:

Age x	l_x	d_x	q_x	p_x
10	1000000		0.00409	
11			0.00370	
12				0.99653
13				0.99658
14			0.00342	

16. Elaborate the contents of all the columns of a mortality table and write a short note on all the probabilities of survival and death.

17. Explain the concept of life annuities and derive the expressions for the present values of immediate life annuity and life annuity due.

18. A fixed term (Marriage) Endowment assurance of Rs.10, 00,000 is taken by a person aged 35 years payable for marriage of his daughter, aged 7 years 15 years hence. Find the value of the benefit at 6% p.a. interest.

Section C

Answer any TWO questions.

(2 x 20 = 40)

19. Derive the expressions for present value and accumulated value of immediate increasing annuity and increasing annuity due.

20. A loan of Rs. 10,000/- is to be repaid with interest at 8% p.a. by means of an immediate annuity for 5 years. Find the level payment. Prepare a table showing the loan schedule. What will be the principal and interest contained in each of the 5 installments?

21. What is the object of constructing a mortality table? Explain the general procedures and stages in the construction of a mortality table.

22. (a) Find the probabilities that,

- a life aged 35 will die between the ages 45 and 50.
- a life aged 35 will not die between the ages 45 and 50.
- a life aged 35 will die in the 10th year from now.
- a life aged 35 will not die in the 10th year from now.

(b) Explain temporary assurance and endowment assurance and derive the expressions for their present values in terms of their commutation functions.

(8 + 12)
