LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **STATISTICS**

SECOND SEMESTER – **APRIL 2015**

ST 2961 - ACTUARIAL STATISTICS

Date : 25/04/2015 Dept. No. Max. : 100 Marks

Time : 01:00-04:00

SECTION – A

Answer ALL the questions: **(10 x 2 = 20)**

1. The amount with compound interest of a certain principal at 6% p.a. is Rs. 5987. Find the principal when period is 3 years.
2. Find the effective rate p.a. corresponding to the nominal rate 16% p.a. convertible quarterly.
3. Find the rate of interest corresponding to a rate of discount of 0.10.
4. A sum of money is invested at 6% p.a. effective. How long will it take to double itself?
5. What is deferment period?
6. Find the present value of perpetuity due of Re.1 p.a.
7. Write the formula for the probability that a person aged **x** survives **n** years**.**
8. Define Stationary population.
9. What is Double Endowment Assurance?
10. Define fixed term endowment.

SECTION –B

Answer any FIVE questions: **(5x 8 =40)**

11. Raja has invested Rs. 8500 at rate of interest 7 %p.a. After 12 years the rate of interest is changed 8% p.a. convertible half yearly. After a further period of 6 years the rate was again changed to 8 % p.a. convertible quarterly. What is the accumulated value at the end of 25 years from commencement?

12. Kumar has taken loan of Rs 5643 at a rate of interest 7 % p.a. payable half yearly. He repaid Rs 1200 after 3 years, Rs 1500 after a further 3 years and clears all outstanding dues at the end of 8 years from the commencement of transaction. What was the final payment made by him?
13. Calculate the present value of a deferred annuity payable for 10 years certain, the first payment falling due at the end of 8 years from the present time. The annuity is payable at the rate of Rs. 300 p.a. for the first 5 years and Rs.500 p.a. thereafter. (i = 0.08).
14. Find the present value and accumulated value of Increasing annuity where in the successive installment form a arithmetic progression.
15. Derive relation between S_n and a_n.

16. Find the following probabilities

    a) that a life aged 50 survives 10 years

    b) that a life aged 50 dies within the next 10 years

    c) that a life aged 50 dies after 10 years

17. Explain L_X and T_X.

18. Write short notes on Pure Endowment Assurance and Term Assurance.

SECTION – C

Answer any TWO questions **(2x 20 = 40)**

19. a) A series of 10 annual sums of money is payable. A first payment taking place of the end of 1 year from now. The first 6 payments are Rs. 700 each and the last 4 payments are Rs. 200 each. Find the present value and accumulated value of the 20 payments at 10 % p.a.

    b) Two loans of 500 each are made out to Sam three years ago and 2 years ago respectively and an interest of 6 % p.a. was agreed upon. Sam could only make a repayment of Rs.400 at the present moment. He promises to clear the dues at the end of 2 years from now. How much will he have to pay then? (10 + 10)

20. a) Find the present value and accumulated value of an immediate annuity for n years where payments of 'r' made at each interval of 'r' years, n being an exact multiple of 'r' and the number of payments n/r.

    b) A fund is to be set up out of which a payment of Rs. 500 will be made to each person who in any year qualifies for membership of a certain profession. Assuming that 15 persons will qualify at the end of one year from now, 30 at the end of 2 years, 45 at the end of 3 years, and so on till the number of qualifiers is 120 p.a, when it will remain constant, find at 7% per annum effective what sum must be paid into the fund now so that it may be sufficient to meet the outgo. (10 + 10)

21. Describe the methods of construction of Mortality table.

22. a) Explain the use of Commutation functions D_x, C_x , M_x and R_x giving examples.
    b) Derive an expression for $a_{x:\overline{n}|}$ and $\ddot{a}_{x:\overline{n}|}$ (10 + 10)

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