LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SECONDSEMESTER – APRIL 2018

ST 2961- ACTUARIAL STATISTICS

Date: 27-04-2018 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

Section – A

Answer all the questions **(10 x 2 =20)**

1. Find the present value at rate of interest of 6 % p.a. of Rs.18500 payable 8 years and 6 months.
2. Calculate the effective rate p.a. corresponding to the nominal rate 14 % p.a. Convertible quarterly.
3. Find the rate discount corresponding to a rate interest 0.075.
4. Define uniform annuity.
5. Evaluate $(1+i)^6\, a_{10}$ @ 8 %.
6. What is immediate perpetuity?
7. Write the formula for l_x and d_x.
8. Define stationary population.
9. What is whole life assurance and also express the formula.
10. Write the commutation function of D_x and R_x .

Section –B

Answer any five questions **(5 x 8 = 40)**

11. Derive nominal rate of interest corresponding to effective rate of interest and vice –versa.
12. In lieu of a single payment Rs.32651 at the present moment Mr.Darvin agrees to receive three equal payments at the end of 5 years, 7 years and 12 years respectivelyAssuming a rate of interest of 4 %p.a. what should be the value of each of the threepayments?
13. Kumar has taken loan of Rs 58000 at a rate of interest 8 % p.a. payable half yearly. Herepaid Rs 5000 after 3 years, Rs 6000 after a further 3 years and clears all outstanding dues at the end of 10 years from the commencement of transaction. What was the final payment made by him?
14. Calculate the present value of a deffered annuity payable for 20 years certain, the first payment falling due at the end of 7 years from the present time. The annuity is payable at the rate of Rs.800. p.a.. for first 9 years and Rs.1000 p.a. thereafter.(i = 0.07)
15. Calculate the value as at the end $12\frac{1}{2}$ years of an annuity of Rs.420 p.a payable half yearly for 20 years certain, the rate of interest being taken as 8 % p.a convertible half yearly. (Using all the three formulae).

16. Of two persons A aged (36) and B aged (43), find the probability that

    a) A and B both survives 10 years
    b) A and B both die within 10 years
    c) One of the two lives survives 10 years while other dies within that period
    d) At least one survives 10 years

17. Give an expression in terms of l_x function for the probability that, out of three lives aged 40 and four lives aged 50, only two lives aged 40 and one life aged 50 survive 10 years.

18. Derive an expression for the commutation function D_x , C_x, M_x and R_x with illustration

Section – C

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

19. a) Find the present value of the following

    (i) Annuity due

    (ii) Deferred annuity due

    (iii)Perpetuity

    (iv)Deferred perpetuity

    b) An annuity is payable for 25 years certain, the first payment falling due at the end of first year. The annuity payable at the rate of Rs. 750 p.a. during the first 18 years and at Rs.450 p.a. during the remaining 7 years. Calculate the present value of the annuity on the basis of interest at 6 % p.a. (10 + 10)

20. a) Derive an expression to find the present value of Increasing Annuity.

    b)A fund is to be set up out of which a payment of Rs. 1000 will be made to each person who in any year qualifies for membership of a certain profession. Assuming that 10persons will qualify at the end of one year from now, 15 at the end of 2 years, 20 at the end of 3 years, and so on till the number of qualifiers is 50 p.a, when it will remain constant, find at 5 % per annum effective what sum must be paid into the fund now so that it may be sufficient to meet the outgo. (8 + 12)

21. Describe the stages involved in construction of Mortality table.

22. Derive an expression to finding the present value of for the following assurance benefits in terms of commutation functions

    a) Term Assurance
    b) Endowment Assurance
    c) Increasing Temporary Assurance
    d) Increasing Whole life assurance (5+5+5+5)

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