Date: 28-04-2017   Dept. No.   Max. : 100 Marks
01:00-04:00

Section -A

Answer all the questions   **(2 x 20 = 40)**

1. The amount with compound interest of a certain principal at 6% p.a. is Rs.4334. Find that principal when the period is 3 years.

2. Find the nominal rate p.a. corresponding to the effective rate 18% p.a. convertible quarterly.

3. Define accumulated value of annuity due.

4. Find the rate of discount corresponding to a rate of interest 0.06.

5. Give the formula for present value of increasing annuity.

6. What is l_x and d_x in the mortality table?

7. Write the formula for central death rate.

8. What do you understand by expectation of life?

9. Define Endowment assurance with an illustration.

10. What is office premium?

Section –B

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

11. Ram has invested Rs. 4321 at rate of interest 7 % p.a. After 13 years the rate of interest is changed to 12% p.a. convertible half yearly. After a further period of 12 years the rate was again changed to 12 % p.a. convertible quarterly. What is the accumulated value at the end of 30 years from commencement?

12. Calculate the present value of a deferred annuity payable for 15 years certain, the first payment falling due at the end of 13 years from the present time. The annuity is payable at the rate of Rs. 500 p.a. for the first 10 years and Rs.800 p.a. thereafter.

13. Find the accumulated value of the following

     a) Annuity certain (4)

     b) Annuity due (2)

     c) Deferred annuity due (2)

14. 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.

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15. Find the present value and accumulated value of Increasing annuity where in the successive installment form a Geometric progression.

16. Find the probabilities that
    a) a life aged 40 will die between the ages 50 and 55
    b) a life aged 40 will not die between the ages 50 and 55
    c) a life aged 40 will die in the 10th year from now
    d) a life aged 40 will not die in the 10th year from now

17. Derive an expression for Increasing Temporary life annuity.
18. Write short notes on Whole life Assurance and Increasing Temporary Assurance.

Section –C

Answer any two questions (2 x 20 = 40)

19. a) An annuity is payable for 35 years certain, the first payment falling due at the end of first year. The annuity payable at the rate of Rs. 1000 p.a. during the first 28 years and at Rs.800 p.a. during the remaining 7 years. Calculate the present value of the annuity on the basis of interest at 8% p.a.

    b) A bond of Rs.1000 redeemable at par 10 years hence carry interest at rate of interest 9% p.a. payable half yearly

    (i)Find the price which purchaser of the bond must offer if he wishes to realize 10% p.a. on his investment.
    (ii)If the holder of single bond invests the sums of interest on the bond as they are received at a rate of 10% p.a. find the total amount at the end of 10 years.(10+10)

20. a) Find the present value and accumulated value of an immediate annuity of 1 p.a. for term n years under which payment are made p times a year, the rate of interest being i.
    b) Derive the expression to convert effective rate of discount to nominal rate of discount and Vice – Versa. (10+10)

21. a) 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 survives 10 years.
    b) Write down expression and find the probability in the under mentioned cases:
        i. Of the two lives aged 30 and 35 , at least one dies before attaining age 65
        ii. Of three lives aged 40,40 and 45, exactly two lives survive 10 years
        iii. Life aged 28 survives 12 years and dies in the 13th, 14th year.
        (10+10)

22.Derive an expression to finding the present value of for the following assurance benefits in terms of commutation functions
    a) $A_{\ddot{X}:n}$
    b) A_X
    c) $A_{(X:\ddot{n})}$
    d) $A_{X:n}$
    e) $(IA)_{X:n}$
    f) $_t|A_{x:n}$

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