LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **STATISTICS**

FIFTH SEMESTER – NOVEMBER 2011

ST 5404 - ACTUARIAL STATISTICS

Date : 10-11-2011 Dept. No. Max. : 100 Marks

Time : 9:00 - 12:00

Section – A
(Answer all the questions)

1. Find the present value at rate of interest of 6% p.a. of Rs. 300 payable 5 years hence.
2. Find the rate of discount corresponding to a rate of interest 0.06
3. Evaluate v^{82} @ 6.2%
4. What is annuity due?
5. Given the formula for a_n
6. What is perpetuity?
7. Define d_x
8. How do you define Central Death Rate?
9. What is a Pure Endowment Assurance?
10. Obtain ${}_{10}q_{30}$, ${}_{10}p_{40}$.

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

11. The amounts for a certain sum with compound interest at a certain rate in two years and three years are Rs. 8820 and Rs. 9261 respectively. Find the rate and sum.

12. A series of 8 annual sums of money is payable, the first payment taking place at the end of one year from now. The first five payments are Rs 300 each and the last three payments are Rs. 200 each. Find the present value of eight payments @ 8% p.a.

13. 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. 100 p.a. for the first 5 years and Rs.200 p.a. thereafter.
($a_5 = 4.3295$, $a_{10} = 7.7217$, $a_{15} = 10.3797$)

14. Write the present value of perpetuity of rupee one per annum for the following
(i) Immediate perpetuity
(ii) Perpetuity due
(iii) Deferred perpetuity (3 +3+2)

15. Derive the expression for present value and accumulated value of an immediate annuity certain.

16. Find the present value of an increasing annuity for 10 years under which the successive payments are 4, 7, 10…..p.a. Assume rate of interest of 7% p.a.

17. Of three persons A, B & C, aged 40, 45 and 50 respectively find the probability that at least one of them will not die between the ages 65 and 70.

18. Write short notes on Temporary Assurance.

Section – C
(Answer any two)

19. Derive the expression and find the present value for the following:

(i) Immediate Increasing annuity

(ii) Increasing annuity due

(iii) Increasing perpetuity due

(iv) Increasing annuity where in the successive installment form a geometric progression.

(6 + 3 + 5 +6)

20. a) A loan of Rs.15000 is repayable by 5 uniform installments to be made every 2 years, the first installment being due at the end of 2 years from the present time. Calculate the uniform installment and draw a schedule showing interest and principal contained in each installment. The rate of interest is 8% p.a. effective.

b) A has a right to receive an amount of Rs. 10000 at the end of 12 years from now. This right has been sold to be for a present value calculated at the rate of 8% p.a. The money thus received was invested by invested by A in a deposit account at 9% p.a. payable half yearly. After 8 years the account had to be closed and A then invested amount available at 6% p.a. in another bank. How much has A gained or lost in this transaction, at the end of 12 years?

(10 +10)

21. **a)** Write down expression for probability in the under mentioned cases:

(i) Life aged 25 dies between ages 60 and 65

(ii) Of the two life aged 25 and 30, at least one life dies before attaining age 70

(iii)Of three lives aged 40, 40 and 45, exactly two lives survive 10 years

b) Write short notes on:

(i) Exposed to risk

(ii) Graduation. (12 + 8)

22. **a)** A person aged 30 years has approached a life office for special type of policy providing for the following benefits:

(i) Rs. 1000 on death during the first 5 years
(ii) Rs. 2000 on death during the next 5 years
(iii) Survival benefit of Rs. 500 at the end of the 5^{th} year
(iv) Further payment of Rs. 2000 on survivance to 20 years.
(v) An annuity of Rs. 200 per annum payable in his life time, the first such payment falling due along with the survival benefits of Rs. 2000.

b) Derive the expression for A_x and $A_{x:n}$ (10 + 10)

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