LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – **NOVEMBER 2013**

ST 5404 - ACTUARIAL STATISTICS

Date : 15/11/2013 Dept. No. Max. : 100 Marks

Time : 9:00 - 12:00

Section A

Answer all questions. **(10x2=20)**

1. Define interest
2. Define present value.
3. Find the accumulated value of principal of Rs. 250 invested for 10 years at compound interest of 6% p.a.
4. Find the present value at rate of interest of 6% p.a. of Rs. 300 payable 5 years hence.
5. Define effective rate of interest.
6. A sum of money is invested at 4% p.a. effective. How long will it take to double itself?
7. Differentiate between immediate annuity and annuity due.
8. What is perpetuity?
9. What is the use of mortality table?
10. What is a stationary population?

Section B

Answer any FIVE questions. **(5x8=40)**

11. Delwin promises to pay Balaji a sum of Rs. 2000 at the end of 3 years and another Rs. 4000 at the end of 5 years from now. What immediate cash payment should Balaji accept in lieu of the above payments, if interest is reckoned at 5% p.a.
12. Differentiate between effective and nominal rate of interest and derive the expressions for effective rate corresponding to nominal rate 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. A man wishes that Rs. 2,50,000/- be paid to his daughter after 10 years. A bank agrees to pay this for a lump sum invested now. If the rate of interest is 10% p.a. for first 3 years, 7.5% p.a. for second 3 years and 6.26% p.a. for the last 4 years, find the lump sum to be invested by the man.
15. Explain deferred annuities and derive expressions for present value and accumulated value of deferred annuities.

16. 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.

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

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

18. What is the object of constructing a mortality table? Give the general procedure and stages involved in the construction of mortality table.

Section C

Answer any TWO questions. **(2x20=40)**

19. (a) Explain in detail the classification of annuities.

(b) 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 5 payments are Rs. 3000 each and the last 3 payments are Rs. 2000 each. Find the present value and the accumulated value of the 8 payments at 8% p.a. (12 + 8)

20. (a) Show that $(1+i)^t a_n = v^{n-t} s_n = s_t + a_{n-t}$.

(b) Derive the expressions for present value and accumulated value of immediate increasing annuity. (10 + 10)

21. (a) A loan of Rs. 10,000/- is to be repaid with interest at 6% p.a. by means of an immediate annuity for 5 years. Find the level payment. What will be the principal and interest contained in each of the 5 installments?

(b) Derive expressions of present value of immediate perpetuity, perpetuity due, deferred immediate perpetuity and deferred perpetuity due. (10 + 10)

22. (a) Find the probabilities that,

(i) a life aged 35 will die between the ages 45 and 50.

(ii) a life aged 35 will not die between the ages 45 and 50.

(iii) a life aged 35 will die in the 10^{th} year from now.

(iv) a life aged 35 will not die in the 10^{th} year from now.

(b) Explain in detain the columns of a mortality table. (8 + 12)

****