



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – STATISTICS

FIFTH SEMESTER – NOVEMBER 2014

ST 5406 / ST 5404 - ACTUARIAL STATISTICS

Date : 10/11/2014
Time : 09:00-12:00

Dept. No.

Max. : 100 Marks

Section – A

Answer ALL the questions:

(10 x 2 = 20)

1. Find the present value at rate of interest of 8% p.a. of Rs.250 payable 7 years hence.
2. What is meant by discount rate?
3. What is the effective rate p.a. corresponding to a nominal rate of 8 % p.a. convertible quarterly?
4. Give the relationship between s_n and a_n .
5. Define : Perpetuity.
6. Show that $i + \frac{1}{s_n} = \frac{1}{a_n}$
7. What is selection?
8. Explain probabilities of survival and death.
9. Define uniform distribution of deaths.
10. Write a short note on term insurance.

Section – B

Answer any FIVE questions:

(5 x 8 =40)

11. Find the value of $(1.03)^{58.4}$.
12. In lieu of a single payment of Rs. 1000, at the present moment a person agrees to receive 3 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 3 payments?
13. Find the amount of an immediate annuity of Rs.600 p.a. payable twice a year for 15 years on the basis of the nominal rate of 6% p.a. convertible six times a year.
14. Find the present value of an immediate annuity of Rs.2400 p.a. payable in equal monthly instalments for 20 years certain at nominal rate of interest of 7% p.a. convertible half-yearly.
15. Derive the formula for present value of increasing immediate annuity and annuity due.
16. Of two persons A aged (35) and B aged (42), find the probability that
 - a. A and B both survive 10 years
 - b. A and B both die within 10 years
 - c. One of the two lives survives 10 years while the other dies within that period.
17. Explain in detail, the force of mortality.
18. A loan of Rs.5000/- is to be repaid with interest at 7% p.a. by means of an immediate annuity for 10 years. Find the level annual payment. What will be the principal outstanding immediately after the 6th payment is made?

Section – C

Answer any TWO questions:

(2 x 20 =40)

19. a) Find the accumulated value of aRs.500 for a period of 20 years 3 months @8% p.a.
 b) Find the present value and accumulated value of an immediate annuity for n years where payments are made at each interval of r years, n being an exact multiple of r and the number of payments being n/r.
20. a) 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.
 Given ($a_5 = 4.3295$, $a_{10} = 7.7217$, $a_{15} = 10.3797$)

- b) Find the present value and accumulated value of an annuity due of Rs.400 p.a. payable in equal quarterly installments for 12 years certain at nominal rate of interest of 8% p.a. convertible quarterly.
- (10 + 10)

21. a) Three persons are aged 30,35,40 respectively. Find the probability that
 (i) one of them dies before age 45 while the others survive to age 55.
 (ii) at least one of them attains age 65.
- (10 + 10)

- b) From the table given below, evaluate ${}_3p_{[21]+1}$ and ${}_{12}q_{[20]}$

AGE AT ENTRY	$I_{[x]}$	$I_{[x]+1}$	I_{x+2}	Age Attained $x+2$
20	495393	494534	493633	22
21	494480	493620	492716	23
22	493566	492702	491795	24
23	492647	491781	490868	25

22. a) Find the probability that the survivors of ages (x) and years (y) will die in the $(t+1)^{th}$ year.
- b) Explain office single premium and annual premium.
- (14 + 6)
