

Register Number :

Name of the Candidate :

**6 1 9 0**

13. (a) Describe a continuous model for population theory.

(OR)

(b) Examine in detail the various aspects of stationary population and stable population.

**P.G. DIPLOMA EXAMINATION, 2008**

(ACTUARIAL STATISTICS)

(PAPER - III)

**130. ADVANCED TOPICS IN ACTUARIAL STATISTICS**

December ] [ Time : 3 Hours

Maximum : 100 Marks

**SECTION - A** (8 × 5 = 40)

*Answer any FIVE questions.*

*All questions carry equal marks.*

1. Explain equivalence principle used in premium calculations.
2. Write a note on the fully continuous premiums.
3. Examine the salient features of benefit reserves based on time monthly benefit premiums.
4. Explain benefit reserves on a semi - continuous basis.

**Turn over**

5. The annual benefit premiums for a fully discrete whole life insurance with a unit benefit issued to  $(x)$  are  $\pi_j = \pi w_j$ , where  $w_j = (1 + r)^j$ . The rate  $r$  might be selected to estimate the expected growth rate in the insured's income. Develop formula for  $\pi$ .
6. Explain joint distribution of future life time.
7. Describe Gompertz and Makeham laws.
8. Write a note on Lexis diagram.
- (b) Derive the premium difference formula and explain its importance.
11. (a) Describe benefit reserves at fractional durations.  
(OR)
- (b) Obtain the differential equations for fully continuous benefit reserves.
12. (a) Derive the distribution of the time - until - failure of joint life status.

**SECTION - B** (3 × 20 = 60)

*Answer any THREE questions.  
All questions carry equal marks.*

9. (a) Explain in detail true monthly payment premiums.  
(OR)
- (b) If the force of mortality strictly increases with age, show that  $\bar{P}(\bar{A}_x) > \mu_x(0)$ .
10. (a) Derive the formula for fully continuous benefit reserves.  
(OR)
- (b) The future life times  $T(x)$  and  $T(y)$  are independent, an each has the distribution defined by *p.d.f.*
- $$f(t) = \begin{cases} 0.02(10-t) & 0 < t < 10 \\ 0 & \text{elsewhere.} \end{cases}$$
- Determine the distribution function, survival function and force of mortality of this distribution.

**Turn over**