

**M.Sc. Examination, 2018**  
**Semester-IV**  
**Statistics**  
**Course : MSC-41**  
**(Demography)**

**Time : 3 Hours**

**Full Marks : 40**

Questions are of value as indicated in the margin

Answer **any four** questions

1. (a) Assuming an exponential distribution for time to first conception and choosing an appropriate prior for the parameter involved show that the resulting distribution is DFR.  
(b) Starting from suitable assumptions derive the distribution of time to the nth child birth. 5+5=10
  2. Derive Lotka's integral equation for birth function and hence explain a method of solution. 6+4=10
  3. (a) Distinguish between curtate expectation  $e_x$  and complete expectation of life  $e_x^0$  at age x. Find the approximate relation between them.  
(b) Write down the probability generating function of Life table values  $l_1, l_2, \dots, l_w$  given the cohort  $l_0$ . Discuss its application. 3+(5+2)=10
  4. How one can adjust age data? Discuss the uses of (i) Whipple's index, (ii) Meyer's blended index and (iii) Age dependency ratio. 2+(3+3+2)=10
  5. What is social mobility? How can one define the special situations of 'perfect mobility' and 'perfect immobility'? Discuss some possible measures of social mobility when the socio-economic categories can be ordered in some sense. 3+3+4=10
  6. (a) Give the Logistic equation for population growth and interpret the parameters involved.  
(b) Describe a method for fitting this equation to observed population data. 6+4=10
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