

2020

STATISTICS — HONOURS

Paper : CC-6

(Demography and Vital Statistics)

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

1. Answer **any ten** questions from question nos. (a) to (o) : 1×10
- (a) What is a vital event?
 - (b) Write one difference between rates and ratios of vital events.
 - (c) How is the sex ratio measured in India?
 - (d) “The Maternal Mortality Rate (MMR) in India has declined to 113 in 2016-18 from 122 in 2015-17.”— Explain.
 - (e) “Life expectancy at birth for males in India in 2018 is 69.42 years.”— Explain.
 - (f) For what purpose is Meyers’ Blended Index used?
 - (g) Is CBR a probability rate?
 - (h) Write one difference between a cohort and a current life table.
 - (i) Which measure should be used to compare Covid-19 death rates of USA and India?
 - (j) “Neonatal mortality rate of West Bengal is 15.5.”— Explain.
 - (k) Define total fertility rate.
 - (l) Distinguish between intercensal and postcensal estimates.
 - (m) Define Crude Rate of Natural Increase. Why is it used?
 - (n) What is the implication of a higher value of Age Dependency Ratio?
 - (o) What is meant by radix of a life table?
2. Answer **any four** questions from question nos. (a) to (f) :
- (a) State two sources of raw data in Demography. Distinguish between errors of coverage and errors of content in registration and census data. 2+3
 - (b) Discuss the structure of the age-sex pyramid for an expanding population and a constant population. 5
 - (c) State the importance of Infant Mortality rate. How is it different from Age Specific Death rate at 0 I.b.d? 3+2

Please Turn Over

(d) For the logistic curve $P(t) = \frac{L}{1 + e^{r(\beta-t)}}$, $t \geq 0$, show that $\frac{dP(t)}{dt} = rP(t) \left[1 - \frac{P(t)}{L} \right]$. Also show that the curve has a point of inflexion at the point $t = \beta$. 2+3

(e) Distinguish between a stable and a stationary population. Show that for a stationary population, $CDR = \frac{1}{e_0}$. 3+2

(f) Show that, under suitable assumption.

$$\left(\frac{1}{2} P_x + \frac{3}{2} P_x + \frac{5}{2} P_x + \dots \right) - (1P_x + 2P_x + 3P_x + \dots) = 1/2 \text{ where } {}_tP_x = \frac{l_{x+t}}{l_x}; \text{ symbols have their usual meaning.} \quad 5$$

3. Answer **any two** questions from question nos. (a) to (c) :

(a) Why is CDR not always a good measure to compare mortality situation of two different countries? Suggest a suitable measure in this case. Explain why the fertility measures CBR, GFR and ASFR each can be considered as an improvement over the preceding one. 2+4+4

(b) Distinguish between a complete life table and an abridge life table. Show that for a complete life table, under suitable assumption, $\frac{e_x}{1 + e_{x+1}} = \frac{l_{x+1}}{l_x}$ where symbols have their usual meaning. 5+5

(c) Distinguish among population estimation, projection and forecasting. Describe AP and GP methods of population estimation. Suppose you want to estimate the population of Kolkata by adding the estimates of the population of the East, West, North and South Kolkata. Which method would you use and why? 4+5+1
