3 (Sem–6/CBCS) STA HE 2

2025

STATISTICS

Paper : STA–HE–6026

(Honours Elective)

(Demography and Vital Statistics)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions as directed :

    1×7=7

    (a) General fertility rates mainly depend on :

    (i) Total female population

    (ii) Total population

    (iii) Female population of child bearing age

    (iv) Number of newly born babies

    (Choose the correct option)

(b) The NRR is always _____ than GRR.
(Fill in the blank)

(c) Most serious drawback of Crude Death Rate is that it does not take into account the age and sex distribution.
(Write True **or** False)

(d) An assumed number of newly born babies at the same time denoted by l_0 is called _____ . (Fill in the blank)

(e) Define stable population.

(f) In life table, l_{x+n} is equal to :

(i) $l_x + {}_nP_x$

(ii) $l_x - {}_nP_x$

(iii) $l_x \cdot {}_nP_x$

(iv) $\dfrac{l_x}{{}_nP_x}$ (Choose the correct option)

(g) Define Expectation of life at age x.

2. Answer the following questions : $2 \times 4 = 8$

(a) Show that,

$${}_nP_x = P_x \cdot P_{x+1} \cdots\cdots \cdot P_{x+n-1}$$

(b) Distinguish between crude and specific death rates.

(c) What interpretation can be made if NRR < 1 and NRR > 1.

(d) Define balancing equation.

3. Answer **any three** questions from the following :
$5 \times 3 = 15$

(a) Explain various rates for measuring fertility of a given population.

(b) In the usual notation, prove that

(i) $\dfrac{dL_x}{dx} = -d_x$

(ii) $l_x = \sum\limits_{i=x}^{w-1} d_i$

(c) Define central Mortality Rate and show that,

$$q_x = \frac{2m_x}{2 + m_x}$$

(d) How the gross reproduction rate (GRR) is calculated ? Why is it considered a refined measure of fertility ? What do you mean by the statement "The gross reproduction rate of population is 0.8."

(e) What is Force of Mortality ? Show that in usual notation

$$\mu_x = \frac{d_{x-1} + d_x}{2l_x}, \quad x \geq 1$$

4. Answer **any three** questions : $10 \times 3 = 30$

(a) What are the usual sources of data on vital events ? Discuss the types of error that are usually found to occur in census and registration data. $2 + 8 = 10$

(b) What do you mean by standardized death rate ? Explain the technique of Direct and Indirect standardisation indicating their merits and demerits.

$$4+6=10$$

(c) What is a life table ? On what assumptions it is constructed ? Explain different columns of life table.

$$2+3+5=10$$

(d) *(i)* Explain the meaning of 'Net Reproduction Rate. How is it calculated ?   5

     (ii) What do you understand by the vital index of population ? Does it correctly measure the population growth of a country ? Discuss.   5

(e) Write short notes on the following :

$$5×2=10$$

     (i) Dependency ratio

     (ii) Crude rates of natural increase

(f) Describe the uses of a life table.

The number of persons dying at age 75 is 476 and the complete expectation of life at 75 and 76 years are 3.92 and 3.66 years. Find the numbers living at ages 75 and 76. $5+5=10$