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3 (Sem-6/CBCS) STA HE 2

2023

STATISTICS

(Honours Elective)

Paper : STA-HE-6026

(Demography and Vital Statistics)

Full Marks : 60

Time : Three hours

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

1. (a) Answer the following questions as directed : $1 \times 7 = 7$

(a) The death rate obtained for a segment of a population is known as
(i) crude death rate
(ii) specific death rate
(iii) standard death rate
(iv) foetal death rate

(Choose the correct option)

Contd.

(b) Define cohort.

(c) Vital statistics rate are generally expressed as

(i) fraction of population

(ii) per hundred of population

(iii) per thousand population

(iv) None of the above

(Choose the correct option)

(d) There is no relationship between gross reproduction rate and net reproduction rate. (Write true or false)

(e) If P_1 and P_2 are the population in two successive censuses, the mid period population is equal to _____.

(Fill in the blank)

(f) The ratio of the number of children of age less than five years to the total number of women of 15-49 years of age is called

(i) net reproduction rate

(ii) vital index

(iii) gross reproduction rate

(iv) replacement index

(Choose the correct option)

(g) A population maintaining a constant growth rate is said to be a stationary population. (Write true or false)

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

(a) How can you calculate the specific death rate for a specific section of the population ?

(b) On what factors do the crude birth rate and crude death rate mainly depend ?

(c) What is meant by vital index of population and how can it be measured ?

(d) Discuss the rates and ratios of vital events.

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

- What are vital statistics? Describe the use of vital statistics. $2+3=5$
- Explain why TFR, GRR and NRR are regarded as hypothetical figures.
- Show that an approximate value of force of mortality is

$$\frac{8(l_{x-1} - l_{x+1}) - (l_{x-2} - l_{x+2})}{12l_x}$$

(d) What is meant by the statement "NRR of a country is 1.201"? Show that for any community, the NRR is necessarily less than the GRR. Can they be looked upon as indices of population growth? $1+3+1=5$

(e) Prove that

$$(i) \quad l_x = \sum_{i=x}^{w-1} di \quad \text{if } l_w = 0$$

$$(ii) \quad T_x = \frac{1}{2}l_x + \sum_{t=1}^{\infty} l_{x+t} \quad 2+3=5$$

4. Answer the following questions : $10 \times 3 = 30$

(a) Describe three measures which are in use for determining the fertility trend in a population and discuss their utility as indices of population growth.

6+4=10

Or

Explain why the mortality situation of two places should not be compared on the basis of 'crude death rate'. Describe the construction of 'standardised death ratio' and indicate why they are considered to be better for the said comparison. $4+(4+2)=10$

(b) Define force of mortality and central mortality rate in a life table. Show that with usual notation

$$(i) \quad m_x = \frac{2q_x}{2 - q_x}$$

$$(ii) \quad \mu_x + \frac{1}{2} = m_x \quad (2+2)+(3+3)=10$$

Or

Give the concept of a life table. On what assumption or factors is the construction of life table based? Explain how different columns of a life table may be computed on the basis of observed age-specific death rates.

$$1+4+5=10$$

(c) (i) Is it true that when the expectation of life is 67 years then the expectation of life of a person aged 65 years is 2 years?

Discuss the concept of expectation of life with a view to throwing light on this.

(ii) Show that, with usual notation

$$e_x = \left(\frac{\sum_{n=1}^{\infty} l_{x+n}}{l_x} \right) \quad 5$$