3 (Sem-6/CBCS) STA HE 2

2022

STATISTICS

(Honours Elective)

Paper: STA-HE-6026

(Demography and Vital Statistics)

Full Marks: 60 od (iii)

Time: Three hours

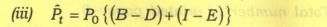
The figures in the margin indicate full marks for the questions.

- 1. Answer the following questions as directed: (any seven) 1×7=7
 - (a) If the last census population, migration births and deaths data for a region in a given time period are given, then the population at the time t can be estimated by the formula (with usual notation) as

(i)
$$\hat{P}_t = P_0 + (B - D) + (I - E)$$

(ii)
$$\hat{P}_t = (B-D)+(I-E)$$

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- (iv) None of the above (Choose the correct option)
 - (b) Infant mortality rate is computed for children
 - above the age of 1 year
 - (ii) under the age of 1 year
 - (iii) between the age of 1 to 3 years
 - (iv) None of the above (Choose the correct option)
- (c) The relation between N.R.R. and G.R.R. Answer the following questions as airected

full marks for the questions.

- (i) N.R.R. and G.R.R. are usually (a) If the last census porlarion, migration births and deaths data for a region in
- od (ii) N.R.R. can never exceed G.R.R. population at the time t can be
- (iii) N.R.R. is generally greater than G.R.R.
 - (iv) None of the above (Choose the correct option)

(d) Which of the following is not a vital the population is regar? theye (i) Birth (ii) Marriage 2. Answer any four of t (iii) Education (iv) Migration (Choose the correct option) (e) Census provides information for the only. (Fill in the blank) (f) The ratio between the number of males and the number of females in a given (Fill in the blank) (g) Vital rates are customarily expressed (Fill in the blank) (h) The probability of living reveals the (Fill in the blank) _____ rate. starffice Anothe usual notations, prove that (i) Female C.D.R. is generally less than male C.D.R. (State True or False)

(j) If vital index is greater than 100, then the population is regarded as having good medical care.

(b) Infant mercandy tagainsMm (d)

(State True or False)

Answer any four of the following:

8=4×2 (m) Education

- Define crude death rate. Is crude death rate an accurate measure of the mortality of population of a country?
- (b) Distinguish stationary and stable population.
- (f) The ratio between the number of males (c) What are the important sources of demographic data?
 - (d) Explicate the method of obtaining crude rate of natural increase.
- (e) What is meant by Pearl's vital index of population and how can it be measured? to villdadoiq adT (dy)
- (f) In the usual notations, prove that

- (g) If nP_x = Prob (a man aged x years survives n years), then prove that $P_{x} = P_{x} \cdot P_{x+1} \dots P_{x+n-1} \cdot P_{x+n-1}$
 - (h) Calculate G.R.R. from the following .efficientlesembertheruses of wital

Total fertility rate = 1070.75 Number of female live birth = 100 Total number of male live birth = 105

- 3. Answer any three questions from the 5×3=15 following:
 - (a) Define and discuss specific death rate. Also mention its merits and demerits. 4. Answer any three of the following
 - (b) What is expectation of life? Distinguish 'curtate expectation' and 'complete expectation' of life. 187 disab
 - Write the uses of life table.
 - (d) Explain infant mortality rate. Also state its advantages and drawbacks.

- (e) The number of persons dying at age 75 is 476 and the complete expectation of life at 75 and 76 years are respectively 3.92 and 3.66 years. Find the numbers griwol living at ages 75 and 76.
 - Describe the uses of vital statistics.
 - (g) In the usual notations, prove that

$$d(i)$$
 $\frac{dT_x}{dx} = l_x$ to reduce leteT

(ii)
$$\frac{d}{dx}(e_x^0) = (-1 + \mu_x e_x^0)$$

- (h) Write a note on standardised birth rate.
- 4. Answer any three of the following questions: 10×3=30
 - (a) What purpose is served by standardised death rates and how are they calculated?
 - (b) Define G.R.R. and N.R.R. in detail with their merits and demerits. Also derive the relationship between them.

(4+4)+2=10

- What is a complete life table? On what assumptions it is based? Describe in detail the construction of a complete 1+4+5=10 life table.
- Discuss different fertility rates comparing their merits and demerits.
- Define central mortality rate and force of mortality in a life table. Show that where : snoitations : eradw

01=(C+C)+(C+C) as in a life table. Find the probability that

$$\mu_x + \frac{1}{2} = m_x$$

(ii)
$$T_x = \frac{1}{2}l_x + l_{x+1} + l_{x+2} + \dots$$

Write notes on the following:

3+3+4=10

- Dependency ratio
- Population composition and characteristic
- (iii) Use of balancing equation

- (g) (i) Write a brief note on shortcomings of vital statistics.
- (ii) With usual notation prove that

$$q_x = \frac{1 - (e_x - e_{x+1})}{1 + e_{x+1}}$$
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Discuss different fertility rates

(h) Given $l_{91} = 871$ and

x: 91 92 93 94 95 96 97 98 99 100 d_x : 296 209 144 93 58 34 18 10 5 3

where l_x and d_x have their usual meaning as in a life table. Find the probability that

- (i) a person aged 93 will die in three years;
- (ii) a person aged 92 will survive up to age 96;
- (iii) three persons aged 92, 93 and 94 will survive 4 years.