2026
(Regular)
Statistics (Core)
Paper Code : ST-CE-4234
Paper Name : Applied Statistics-I

Time : 2 hours ***Full Marks : 45***

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

1. Answer the following questions as directed : 1×4=4

a) If we have the last census population, migration, births and deaths data for a region in a given period, the population at the time 't' can be estimated by the formula (Using usual notations):

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

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

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

iv) None of the above (Choose the correct option)

b) A life -table constructed for an age interval of 5 to 10 years is specially known as :

i) grouped life table

ii) interval life table

iii) abridged life-table

iv) None of the above (Choose the correct option)

c) What is cost of living index number ?

d) If NRR>1, the population of country will very likely _____.
(Fill in the blank)

Contd...

2. Answer the following questions : 2×3=6

a) What is dependency ratio ?

b) Why IMR is not a probability rate ?

c) Distinguish between rates and ratios of vital events.

3. Answer ***any three*** of the following questions : 5×3=15

a) What is family budget enquiry ? Discuss the construction of cost of living index number by family budget enquiry. 2+3=5

b) Prove that , (with usual notations)

i) $l_x = \sum_{i=x}^{w-1} d_i$ if $l_w = 0$

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

c) Distinguish between GRR and NRR. Show that NRR ≤ GRR. 3+2=5

d) Describe coverage and content errors in demographic data. 5

e) Write short note on population composition. 5

f) Define force of mortality. Show that $\mu_{x+\frac{1}{2}} = m_x$. 2+3=5

4. Answer ***any two*** of the following questions : 10×2=20

a) i) Describe various measures of fertility with their merits and demerits. 10

b) i) What are Marshall-Edgeworth, Laspeyre's and Paasche's index numbers ? Prove that Marshall-Edgeworth index number lies between Laspeyres and Paasche indices. 1+1+1+3=6

ii) Explain the chain base and the fixed base method of constructing an index number. 4

c) i) Explain the procedure for standardising death rates. 6

ii) Show that (with usual notations)

(A) $m_x = \frac{2q_x}{2-q_x}$ (B) $\frac{dL_x}{dx} = -dx$ 2+2=4

d) i) Describe Crude rate of natural increase and Pearle's Vital index. 2+2=4

ii) Show that $GRR = \frac{Number\ of\ female\ births}{Total\ number\ of\ births} \times T.F.R.$ 4

iii) Define stationary population. 2

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