

Indian Statistical Institute

Programme: B.STAT III

Batch: 2023-26

Semester: V

Academic Year: 2025-26

Subject: Economic and Official Statistics and Demography

Total marks: 100

Date: 21st November, 2025

Duration: 03 hrs

First Semester Examination: 2025-26

(NOT AN OPEN NOTES EXAMINATION)

Instructions:

- 1) There are 2 groups- Group A and Group B. The answers to each group should be written in separate answer booklets.
 - 2) Answer each sub-question in a new paragraph.
 - 3) Students may use ordinary/scientific calculators.
 - 4) Formulae and detailed steps for calculations are to be shown for all numerical exercises.
 - 5) Final answers should be rounded off to two decimal places.
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Group A: Official Statistics (50 marks)

Answer ANY FIVE Questions:

(10X5=50 marks)

1. State how Semi Physical approach is applied for measuring crop production in Agriculture. In this context, mention the procedure followed for Crop biomass and Crop yield estimation.
(5+5=10 marks)
2. Define Purchasing Power Parity (PPP)? How is it calculated in case of OECD countries?
(3+7=10 marks)
3. State the dimensions and Indicators used for computing Global Multi-Dimensional Poverty Index (MPI). Elucidate the sub-indices of the Indian National MPI?
(7+3=10 marks)
4. Describe the method used for Imputation of value in case of HCES 2022-23.
(10 marks)
5. Explain the methodology of data collection followed to construct Global Findex Data base 2025.
(10 marks)
6. Explain the factors influencing household inflation expectation revealed through Inflation expectation Survey of Households (IESH2016) conducted by Reserve Bank of India taking help of appropriate models.
(10 marks)

7. Elucidate the structure of Sample Registration Scheme adopted by the Office of RGI, Govt of India.

(10 marks)

Group B: Economic Statistics and Demography (50 marks)

All questions are compulsory. Answer all the questions and their sub-parts.

1. In a life table calculated by linear method, prove that $L(x, n) = n \cdot l\left(x + \frac{n}{2}\right)$, where $L(x, n)$ is the total person years spent in the age group $(x, x + n)$ and $l(x)$ is the total number of persons at the beginning of the age interval $(x, x + n)$.

(5 marks)

2. Values of ${}_nq_x$, the probability of dying in the age group $[x, x + n]$ is given by ages. Provide the formulae and calculate the usual columns of a life table; population at the beginning of each age interval, person years lived between ages $[x, x+n]$, total person years lived by the life table population above age x , life expectancy in age intervals $[x, x+n]$. Assume radix to be 90,102 and the age-specific mortality rate for 100+ age category to be 20 per 100 person years/ mid-year population.

Age (x)	10	20	30	40	50	60	70	80	90	100+
${}_nq_x$	0.66	0.60	0.72	0.80	0.90	1.00	11.2	12.3	13.3	100

(10 marks)

3. Answer the following:

- Prove that Net Reproduction Rate (NRR) is Gross Reproduction Rate (GRR) adjusted for female survivorship through the reproductive ages.
- If the survival probability of women in a community in reproductive period of 15-49 years is 95% and the natural sex ratio at birth (105 males for 100 females) prevails, justify why 2.1 is a good measure of “replacement level of fertility”. What is the replacement level of fertility if the survival probability drops to 80%? (Clearly mention any assumption used.)

(5+10=15 marks)

4. Answer the following:

- Define the conditions under which the income distribution of X is said to be Lorenz inferior to the income distribution of Y. What is the expression if the two distribution have equal means?
- Mathematically prove: “The Gini index is equal to one minus twice the area under the Lorenz curve.”

(5+10= 15 marks)

5. Explain the Factor Reversal Test, and evaluate how Laspeyres’ Index, Paasche’s Index, and Fisher’s Index perform with respect to this test.

(5 marks)