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3 (Sem–6/CBCS) STA HE 1

2024

STATISTICS

(Honours Elective)

Paper : STA–HE–6016

(Econometrics)

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) Population census data is an example of cross-sectional data.

   (State True ***or*** *False)*

   (b) Studying the dependence of a variable on only a single explanatory variable is known as

   (i) One-variable regression analysis

   (ii) Two-variable regression analysis

Contd.

(iii) Three-variable regression analysis
(iv) Multiple regression analysis
(Choose the correct option)

(c) The number of degrees of freedom for a simple bivariate linear regression with 100 observations is _____.
(Fill in the blank)

(d) In classical linear regression model, X_i and U_i are positively correlated.
*(State True **or** False)*

(e) Heteroscedasticity means that
(i) All X variables cannot be assumed to be homogeneous
(ii) The variance of the error term is not constant
(iii) The observed units have no relation
(iv) X and Y are not correlated
(Choose the correct option)

(f) The fitted regression equation is given by :

$$\hat{Y}_i = -12 + 0 \cdot 5X$$

What is the value of the residual at the point $X = 50$, $Y = 70$?

(g) Multiple linear regression models are linear in parameters and linear in variables. *(State True **or** False)*

2. Answer the following questions : 2×4=8

(a) Define econometrics.

(b) Define simple linear regression model.

(c) Write *any two* consequences of multicollinearity.

(d) Suppose β_2 is the slope coefficient of a regression model. What does it indicate ?

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

(a) Write a note on the limitations of econometrics.

(b) Define time series data and cross-section data.

(c) Write a note on multicollinearity.

(d) Write an explanatory note on coefficient of determination.

(e) Describe multiple linear regression model.

4. Answer the following questions : 10×3=30

(a) What are the statistical assumptions in linear model ? Describe the least square estimation method. 5+5=10

Or

State and prove Gauss-Markov theorem.

(b) Prove that ordinary least square estimators are best, linear and unbiased estimators.

Or

What do you mean by hypothesis testing? How will you test the significance of regression coefficient in the linear model $Y = \alpha + \beta X + U$?
Also construct 95% confidence interval for α and β. 3+4+3=10

(c) Discuss about the scope of econometrics. Also describe the methodology of an economic model. 5+5=10

Or

Write short notes on : 5×2=10

(i) Autocorrelation

(ii) Heteroscedastic

3 (Sem–6/CBCS) STA HE 2

2024

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. Answer the following questions as directed : $1\times7=7$

(a) Infant mortality rate (IMR) is defined as

(i) $\text{IMR} = \dfrac{\text{Number of deaths}}{\text{Total population}} \times 1000$

(ii) $\text{IMR} = \dfrac{\text{Number of deaths}}{\text{Total number of live births}} \times 1000$

(iii)

$$\text{IMR} = \frac{\text{Number of deaths among children of age 0 l.b.d}}{\text{Number of live births}} \times 1000$$

(iv) $\text{IMR} = \frac{\text{Number of births}}{\text{Number of deaths}} \times 100$

(Choose the correct option)

(b) If the age distribution of the two populations being compared are not similar, the comparison based on crude death rate may be misleading.

*(Write true **or** false)*

(c) Define dependency ratio.

(d) Population census is usually conducted at an interval of _____ in our country.

(Fill in the blank)

(e) Different methods of obtaining vital statistics are

(i) registration method

(ii) census enumeration method

(iii) Both (i) and (ii)

(iv) None of the above

(Choose the correct option)

(f) Births, deaths etc. are _____ events of human life.

(Fill in the blank)

(g) The principal drawback of GRR is that it does not take account the mortality of mothers.

*(Write true **or** false)*

2. Answer the following questions : 2×4=8

(a) Distinguish between rates and ratios of vital events.

(b) What is the meaning of the statement 'NRR = 1'?

(c) What is a life table?

(d) Define central mortality rate in a life table.

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

(a) Prove that

(i) $e(x) = \frac{\sum_{n=1}^{\infty} l(x+n)}{l(x)}$

(ii) $e_x^0 = \frac{1}{2} + e_x$

(b) Explain the coverage and content errors in demographic data.

(c) Discuss in brief the uses of life table.

(d) "CBR is not a probability rate but CDR is." Explain.

(e) Write the difference between stationary population and stable population.

4. Answer ***any three*** questions : 10×3=30

(a) Discuss in detail about the factors involved in the growth of a population.

(b) Is crude death rate an accurate measure of mortality of population of a country ? If not, how will you modify it to give reliable results ? 2+8=10

(c) *(i)* Explain why TFR, GFR and NRR are regarded as hypothetical figure.

(ii) Show that NRR cannot exceed GRR. 6+4=10

(d) Define CBR, GFR and ASFR and indicate why each is considered as the improvement on the preceeding measure of fertility. 6+4=10

(e) Discuss the assumptions used in the construction of a life table. Explain in brief how different columns of a life table may be computed on the basis of the observed age-specific death rate. 4+6=10

(f) Write notes on the following : 3+4+3=10

(i) Population composition

(ii) Use of balancing equations

(iii) Infant mortality rate
