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2509N498

Candidate's Seat No :_____

M.Sc Sem.-4 (Rep) Examination

508

Statistics

September-2024

Time : 2-30 Hours] **[Max. Marks : 70**

Note: Attempt all questions.

Q.1

(i) Define multiple linear regression model. Explain least-squares estimation of the regression coefficients. [7]

(ii) Explain analysis of variance for significance of regression in multiple regression. [7]

OR

(i) Explain Mallow C_p statistic. [7]

(ii) Explain test for regression coefficients. [7]

Q.2

(i) Describe sources of multicollinearity. [7]

(ii) What is meant by heteroscedasticity? Draw a figure showing homoscedastic disturbances and the various forms of heteroscedastic disturbances. [7]

OR

(i) What are the rules for detection of multicollinearity? Explain any one rule in detail. [7]

(ii) Explain, how can heteroscedasticity be corrected? [7]

Q.3

(i) What do you mean by autocorrelation? Draw a figure showing positive and negative first-order autocorrelation. [7]

(ii) Explain Durbin-Watson test for first-order autocorrelation. [7]

OR

(i) Define Dummy variables and describe applications of dummy variables. [7]

(ii) Explain, how can autocorrelation be corrected? [7]

Q.4

(i) Explain indirect least squares method. [7]

(ii) Explain: (a) Simultaneous equations system (ii) Reduced-form equations. [7]

OR

(i) What do you understand by Identification? When is an equation of a system exactly identified , overidentified and underidentified? [7]

(ii) Explain two stage least squares method. [7]

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Q.5 Answer any seven: [14]

(i) In usual notations, which of the following is correct for hat matrix?

(a) $H = X(X'X)^{-1}X'$ (b) $H = (X'X)^{-1}X'$ (c) $H = X(X'X)^{-2}X'$ (d) $H = X(X'X)^{-3}X'$

(ii) Define adjusted R^2 .

(iii) Explain Variance Inflation Factor.

(iv) Multicollinearity can be detected if the regression function has

(a) high R^2 with all coefficients having high t ratios

(b) may not have high R^2 but all coefficients have high t ratios

(c) high R^2 with very few or no coefficient having high t ratios

(d) low R^2 with almost all coefficients having low t ratios

(v) Estimation of regression coefficients in presence of high but not perfect multicollinearity may result in all of these except

(a) high confidence intervals for the estimates (b) a high R^2

(c) almost all the estimates are statistically significant (d) estimates are all BLUE

(vi) Define condition index.

(vii) Dummy variables can

(a) only take values 0 and 1

(b) any positive value

(c) any linear transformation of 0 and 1 such that C = a + bD1 where b $\neq$ 0 & D1 is either 0 and 1

(d) any integer value

(viii) If a qualitative variable has 'm' categories, we can introduce

(a) only 'm - 1' dummy variables (b) only 'm' dummy variables

(c) only 'm + 1' dummy variables (d) only 'm^2' dummy variables

(ix) With autocorrelation, the OLS parameter estimates are

(a) unbiased (b) consistent (c) biased (d) both (a) and (b)

(x) What do you mean by simultaneous equations bias?

(xi) What do you mean by structural equations?

(xii) Define Exogenous variables.

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