Seat No. : _______________

XZ-113

April-2013

M.Sc. (Sem.-IV)

508 : Statistics

Econometrics

Time : 3 Hours] **[Max. Marks : 70**

Instructions : (1) **All** questions carry equal marks.
(2) Scientific calculator is permitted to use.
(3) Statistical table will be supplied on request.

1. (a) For the following general linear model $\underline{Y} = X\underline{\beta} + \underline{U}$, in usual notations show that

   (i) If $\underline{U} \sim N_n(0, \sigma^2 I_n)$ then $\hat{\underline{\beta}} \sim N_k(\underline{\beta}, \sigma^2(X'X)^{-1})$

   (ii) The residual terms $\underline{e} = Y - \hat{Y}$ are uncorrelated with $X\underline{\beta}$.

OR

(a) For the linear model $\underline{Y} = X\underline{\beta} + \underline{U}$, such that $E(\underline{U}) = 0$ and $E(\underline{U}\,\underline{U}') = \sigma^2\,\Omega$, where $\Omega \neq I_n$. Discuss the problem of estimation of $\underline{\beta}$.

(b) What is hetroscadasticity ? Discuss briefly popular tests for detection of hetroscadasticity.

OR

(b) Explain how linear stochastic constraints imposed upon the parameters lead to hetroscadasticity. Discuss in brief how would you tackle the problem of hetroscadasticity.

2. (a) Explain the term "Ridge Regression". Show that ridge regression estimators are biased but can be made more efficient than OLS estimators.

OR

(a) What is Multicollinearity ? Explain how would you judge about multicollinearity in the given model. Examine the effect of multicollinearity in the linear model.

(b) Discuss fully Silve's approach to tackle the problem of multicollinearity.

OR

(b) What is autocorrelation ? Describe the test for the presence of autocorrelation.

3. (a) Write note on Cochran-Orcutt iterative procedure.

OR

(a) What are the consequences of auto correlation ? Illustrate by considering two variable model.

(b) Discuss how dummy variable technique can be used to deal with qualitative and quantitative explanatory variables in the data.

OR

(b) Discuss some applications of dummy variables technique.

4. (a) What is identification problem ? Explain with illustration rank and order conditions for identification.

OR

(a) Show that OLS estimator for the system of simultaneous linear equations gives biased and in consistent estimator.

(b) Discuss in brief the indirect least square method for solving a system of linear equations.

OR

(b) Write a note on 2-SLS method.

5. Answer the following :

(1) Consider the linear model

$$Y_1 = \theta_2 + \theta_3 + \in_1,\ Y_2 = \theta_1 + 2\theta_2 - 2\theta_3 + \in_2 \text{ and } Y_3 = \theta_1 + 3\theta_2 - \theta_3 + \in_3$$

State unbiased estimator of $\theta_1 - 4\theta_3$.

(2) In the general linear model with k parameters, multicollinearity arises when $\rho(X)$ _________.

(3) State the expression for R^2 in terms of sum of squares.

(4) State the use of Park's test.

(5) State the use of D-W test.

(6) State the rank condition to check the identifiability of the given equation of the system of linear equations.

(7) An equation of the system of linear equations is said to be over identified when __________.

(8) The estimates obtained by 2-SLS method are identical with those of obtained by __________ method.

(9) For a fitting a piecewise linear regression model __________ variables are used.

(10) State Theil-Nagar formula to estimate auto-correlation coefficient when sample size is very large.

(11) When D-W test fail to test the hypothesis of no positive auto-correlation between the disturbance terms.

(12) "Inertia" is one of the cause for occurrence of __________.

(13) Grouping of observations that gives rise to __________.

(14) Ridge regression is used to tackle the problem of __________.