b. What are Random Effects in panel data models? Why is it called an error components models? Suggest an appropriate test for the presence of correlated random effects. 7

10. Write short notes on any two of the following: 7x2=14

a. Seemingly Unrelated Regression Equation.

b. Within and between estimators

c. Switching regression

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PG Even Semester Exam, May 2025

Economics

4th Semester

COURSE NO. ECO-653 (C)

[Advanced Econometrics]

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer five questions, taking one from each Unit

UNIT-I

1. a. Distinguish between structural and reduced from models in simultaneous equation system. 4

b. What do you mean by Indirect Least Squares (ILS)? Illustrate the application of ILS for the following 2 equation simple Keynesian Model. 8

$$C_t = \alpha + \beta y_t + u_t$$

$$Y_t = C_t + P_t$$

c. Point out the conditions under which ILS is an appropriate estimation method. 2

2. What are instrumental variables (IV) and why are they required? Outline the IV method of estimation of parameters of simultaneous equation models. Can you use IV method as a special case of 2 stage least squares? Explain. 2+6+6

UNIT-II

3. a. Show that an autoregressive process of order 1 is a stationary stochastic process. 7

   b. Plot the correlogram for the following model
   $$y_t = 2.8 + 0.7\, y_{t-1} + u_t$$

   c. Briefly outline the key features of on ARMA (1, 1) model. 4

4. a. Explain how a vector autoregressive model can be used in the Granger-causality test for causality between two variables. 7

   b. How is co integration and error correction used in long-run equilibrium analysis? Outline the Engle-Granger 2 step method for testing co-integrating relations between variables? 3+4=7

UNIT-III

5. a. What is a dummy variables trap? Illustrate the problem on the basis of appropriate matrix-vector analysis. 3

   b. Suppose you are linearly regressing labour productivity on capital intensity for 4 size classes of farmers in a region (marginal, small, medium and large). Construct an appropriate dummy variable model such that you are able to test the following hypotheses. 7

      i. Intercept does not vary across classes.

      ii. Scope coefficient does not vary across classes.

   c. Suppose you have data on personal consumption expenditure (C_i) and personal disposable income (Y_i) of same set of n households during war time and peace time. Develop an appropriate linear model using independent dummy variables such that you can test the hypothesis of no impact of war on the marginal propensity to consume. 4

6. a. What is a linear probability model? Elaborate with the help of an example. Further, show that errors in this model are heteroscedastic. 7

   b. Write brief analytical note on any one of the following: 7

      i. Logit model, ii. Goodness of fit measures in qualitative dependent variable models.

UNIT-IV

7. a. Elaborate a polynomial lag model with expression s of median and mean lags. 7

   b. What do you mean by a Koyck lag scheme? Examine whether regression errors under Koyck transformation are serially correlated. Suggest an estimation strategy for a Koyck lag model. 7

8. Write short notes on the following: 7x2=14

   a. Partial stock adjustment model

   b. Adaptive expectations model

UNIT-V

9. a. Elaborate the least Squares Dummy variable model to capture fixed effects in panel data regression (assuming 4 firms and T time points) where you are required to regress labour productivity (Y_{it}) on capital intensity (X_{it}). Clearly outline the data stacking process. 7

Turn over