ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU -27
M.Sc(BIG DATA ANALYTICS) – III SEMESTER
SEMESTER EXAMINATION: OCTOBER 2022
(Examination conducted in December 2022)
BDADE 3521: INTRODUCTION TO ECONOMETRICS AND FINANCE

Time: 2 ½ Hours   **Max Marks: 70**
This paper contains FOUR printed pages and THREE parts

PART-A

Answer ALL questions   **10x1=10**

1. The OLS error or disturbance term

   a. is observed

   b. is unobserved

   c. can be calculated from the regression function

   d. should not be used in practice

2. Consider the following regression line: $\widehat{Test\ Score}$= 698.9 – 2.28 × *Classes-skipped.*
   You are told that the t-statistic on the slope coefficient is -4.38. What is the standard error of the slope coefficient?

   a. 0.52

   b. 1.96

   c. -1.96

   d. 4.38

3. Under 2SLS estimation technique, like in OLS, the joint significance of two or more coefficients is tested using:
   a. F- test

   b. Student's t-test

   c. Chi-square test

   d. Modified t-test

4. The simultaneous equation bias
   a. Refers to the bias of the researcher towards using this model

   b. Is the bias in the estimated parameters that disappears when the sample size becomes large

c. Is the bias in the estimated parameters that do not disappear when the sample size becomes large

d. Means that the error terms are biased positively in small samples

5. The Granger causality test is used to examine:
   a. Trade-surplus between two countries

   b. Causality between two time-series variables

   c. Test quality of casual clothes

   d. If sports teams should play on specific day

6. In testing causality of two time-series variables (X & Y), it is assumed that:
   a. Variance of one variable is explosive

   b. Both variables are stationary

   c. Some unobserved variable has constant mean

   d. None of the above

7. In Random Effects model, we assume that:
   a. Error term and individual time-unit component are correlated

   b. Error term and individual time-unit component are uncorrelated

   c. Error term and individual time-unit component are exactly the same value

   d. Error term and individual time-unit component both can be observed

8. In testing causality of two variables (X & Y), it is assumed that:
   a. At least one variable is stationary

   b. Both variables are stationary

   c. Neither are stationary

   d. Some unobserved variable has constant mean

9. In the Fixed Effects regression model, you should exclude one of the binary variables for the entities when an intercept is present in the equation
   a. because one of the entities is always excluded

   b. because there are already too many coefficients to estimate

   c. to allow for some changes between entities to take place

   d. to avoid perfect multicollinearity

10. The notation for panel data: (Y_{it}, X_{it}) $i = 1 \dots n; t = 1 \dots T$ is used to indicate that
    a. values of entities never change over time
    b. the Xs represent observed effects and the Ys represent the unobserved disturbance term
    c. there are n entities and T time periods
    d. econometricians like to complicate things

PART- B

Answer any SIX of the following questions: 6x5=30

11. Discuss identification in the context of Simultaneous Equation models.

12. If a variable should be included in the model but is not, there is omitted variable bias. Consider the true model which includes X_1 and X_2 but the estimated model excludes one of these variables. Derive the Omitted Variable Bias.

13. A common test for autocorrelation is the DW statistic given by $= \frac{\sum(\hat{e}_t - \widehat{e_{t-1}})^2}{\sum \hat{e}_t^2}$. where $\hat{e}_t$ is the residual. Answer the following:
    a. What is auto-correlation?
    b. What are the consequences of auto-correlation?
    c. Why does a value of d =2 in the formula above imply no auto-correlation?

14. Show that the random walk *without* drift is non stationary.

15. Describe the Engle-Granger co-integration test briefly.

16. Write a note on Box Jenkins methodology.

17. Discuss the idea behind Huasman test to choose between Random Effects and Fixed Effect model or to choose between IV and OLS.

18. Use simple regression framework to distinguish between the error term and the residual term. How is the residual term used to derive the OLS estimator? [Note: you do **not** need to derive.]

PART- C

Answer any THREE questions: 3x10=30

19. In Sports Economics, production functions are often estimated by relating the winning percentage of teams (Y) to inputs indicating performance in certain aspects of the game. L measures measure the quality of batting and bowling and M represents managerial

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ability, which is assumed to be constant *but unobservable* over time. The production function would then be specified as follows:

$$Y_{it} = \beta_0 + \beta_1 L_{it} + \beta_2 M_i + u_{it}$$

where *i* is an index for the cricket team, and *t* indexes time.

a. Assume that managerial ability is unobservable but is positively related, in a linear way, to L. Explain why the OLS estimator $\widehat{\beta_1}$ is inconsistent in the case of a single cross-section, i.e., if you attempt to estimate the above regression for a single year.

b. If you had data for two years, indicate the transformation, which allows you to obtain a consistent estimator for β_1?

20. a. Use the Method-of-Moments to derive the Instrumental Variable (IV) estimator from the moment condition E(Zu) = 0 where Z is the instrument and u the error term.

b. Explain what conditions are required for a variable to be a valid instrument?

21. a. What conditions must be met for a stochastic process to be stationary?

b. Discuss the unit root test.

22. a. What are the advantages of panel data?

b. What is the fixed-effect methodology and what are its advantages?