LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – STATISTICS

FIFTH SEMESTER – NOVEMBER 2009

ST 5405 - ECONOMETRIC METHODS

Date & Time: 14/11/2009 / 9:00 - 12:00 Dept. No.   Max. : 100 Marks

PART A

Answer ALL questions   (10 x 2 = 20)

1. Define the term 'Econometrics'.
2. Explain Sample regression line.
3. Is the model $Y = \beta_0 X^{\beta_1} + U$ linear with respect to X? Justify.
4. State the properties of Least Squares Estimators.
5. What are the assumptions made on random error?
6. For a three variable linear model, the sample regression function is found to be
   $Y = -1.9 + 3.5X_1 - 2.2X_2 + e$. Interpret the regression equation.
7. Define adjusted r^2 based on a K variable linear model.
8. What is multicollinearity?
9. What is specification error?
10. How the 'bench mark category' is interpreted in a regression model involving Dummy variables?

PART B

Answer any FIVE questions   (5 x 8 = 40)

11. Explain the role of Econometrics in detail.
12. For a two variable linear model, derive the variance of the OLS estimators.
13. Describe the method of testing the overall significance of a regression model.

14. Consider the following ANOVA table based on a linear regression:

Source	df	SS	MSS	F-ratio
Regression	?	400	?	?
Residual	45	?	?	
Total	50	1200		

    a) Find the missing values.
    b) What is sample size and how many independent variables are there in the model?
    c) Compute the F-ratio and test the hypothesis that R^2 is significantly
        different from zero at 5 % level
    d) Obtain an estimate for the variance of the disturbance term.

15. The following is part of the output obtained while investigating the presence of multicollinearity in the data used for building a linear model. Fill up the missing entries and point out which regressors are involved in collinear relationship(s), if any:

Eigen Value (of **X'X**)	Singular value (of **X**)	Condition Indices	X_1	X_2	X_3	X_4	X_5	X_6
2.429	?	?	0.0003	0.0005	0.0004	0.0000	0.0531	?
1.546	?	?	0.0004	0.0000	?	0.0012	0.0032	0.0559
0.922	?	?	?	0.0033	0.9964	0.0001	0.0006	0.0018
0.794	?	?	0.0000	0.0000	0.0002	0.0003	?	0.4845
0.308	?	?	0.0011	?	0.0025	0.0000	0.7175	0.4199
0.001	?	?	0.9953	0.0024	0.0001	?	0.0172	0.0029

16. What are the sources and effects of Autocorrelation?
17. State and prove Gauss- Markov theorem.
18. Explain lagged variable with an illustration.

PART C

Answer any TWO questions   (2 x 20 = 40)

19. Consider the following data on Y and X:

Age (X):   56   42   72   36   63   47   55   49   38   42   68   60

B.P (Y):   147   125   160   118   149   128   150   145   115   140   152   155

Fit a linear model of Y on X and test the hypothesis that the intercept and slope coefficients are statistically significant at 5 % level.

20. Develop a linear regression model for the following data and estimate its parameters.

Y: 7   3   3   7   6

X_1:   16   11   12   18   14

X_2:   56   22   34   15   18

21. a.) Suppose that a researcher is studying the relationship between grade points on

exam(Y) and hours studied for the exam(X) for a group of 10 students.
Analysis of the data reveals the following:
Sum of Y = 220:   Sum of X = 130
Sum of xy = 3446;   sum of x^2 = 2288 ;   sum of y^2 = 5506
where x and y are the deviations of X and Y from their respective means.
Find the following:
    a.) Mean of X and Y
    b.) Least squares intercept and slope
  b.) Explain the problem of multicollinearity in detail.

                                                               (6+14)

22. Write short notes on:-

    i) Nature of Econometrics.

    ii) Coefficient of determination.

    iii) Specification error.

    iv) Sources of lagged variables.   (5+5+5+5)

****