ST. JOSEPH'S COLLEGE (AUTONOMOUS), BANGALORE-27
MA ECONOMICS – III SEMESTER
SEMESTER EXAMINATION: OCTOBER 2019
<u>EC9418: BASIC ECONOMETRICS</u>

Time- 2 ½ hrs **Max Marks-70**

This paper contains TWO printed pages and THREE parts

PART A   Answer any FIVE of the following **2 X5=10**

1. What is the difference between error term and residual? Use simple regression framework to give an example.
2. Can the adjusted- R^2 be greater than R^2. Explain your answer.
3. Consider the following regression line: $\widehat{Grades}$= 698.9 – 2.28 *STR where STR is the Student-Teacher Ratio. You are told that the t-statistic on the slope coefficient is 4.38. What is the standard error of the slope coefficient?
4. What is the interpretation of β_1 for this model: $\ln(Y_i) = \beta_0 + \beta_1 X_i + u_i$?
5. What is dummy variable trap?
6. Use an example to describe a joint or a compound test? Why doesn't a "t-test" suffice?
7. Give an generic example of a semi-log model and the interpretation of the coefficient of the explanatory variable

PART B   Answer any THREE of the following **10x 3=10**

8. Suppose that the units of measurement of X are changed so that the new measure, X*, is related to the original one by X* = μX. Show that the new estimate of the slope coefficient is β/μ, where β is the slope coefficient in the original regression with one explanatory variable X.

9. A popular test for auto-correlation is the Durbin Watson (DW) test. The DW statistic is given by $d = \frac{\sum(\widehat{e_t} - \widehat{e_{t-1})^\wedge 2}}{\sum \widehat{e_t}^2}$. Show why d=2 supports no auto-correlation?

10. Your data has weight and height from 29 female and 81 male students at your university. You also know the number of siblings they have. You consider a new theory that children who have more siblings come from poorer families and will have to share the

food on the table. You decide to hypothesize that peers with many siblings will weigh less, on average, for a given height. In addition, you believe that the muscle/fat tissue composition of male bodies suggests that females will weigh less, on average, for a given height. To test these theories, you perform the following regression:

$\widehat{Studentw}$ = - 229.92 – 6.52 *Female + 0.51 *Sibs+ 5.58 *Height, R^2=0.50

where Studentw is in pounds, Height is in inches, Female takes a value of 1 for females and is 0 otherwise, Sibs is the number of siblings.

    a. Does the intercept make sense?

    b. Interpret the coefficients and the R^2

11. Graphically show the difference between the following models (X is a continuous variable and D a dummy variable):

    a. $Y = \beta_0 + \beta_1 X + \beta_2 D + u$

    b. $Y = \beta_0 + \beta_1 X + \beta_2 D + \beta_3 (X * D) + u$

    c. $Y = \beta_0 + \beta_1 X + \beta_2 (X * D) + u$

12. What is autocorrelation? Suggest a potential way to fit model with AR(1) autocorrelation?

PART C   Answer any TWO of the following   15 X2=30

13. 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 and give the intuition for the bias.

14. In a regression of the rate of growth of employment on the rate of growth of real GDP using a sample of 31 OECD countries, R^2= 0.2837. The F-test of the goodness of fit can be calculated as $F = \frac{ESS/k-1}{RSS/n-k-1}$ where n is the number of observations and k the number of parameters excluding the intercept term. ESS stands for Explanatory Sum of Squares and RSS for Residual Sum of Squares. Calculate the corresponding F statistic for the model above with the given information.

15. What is heteroscedasticity? Suggest possible remedies both when the form of heteroscedasticity is unknown as well as when it is known.