**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU -27**

Registration Number:

Date & Session:9-12-2022

**M.A ECONOMICS – III SEMESTER**

**SEMESTER EXAMINATION: OCTOBER 2022**

**(Examination conducted in December 2022)**

**EC 9422: BASIC ECONOMETRICS**

**Time: 2 ½ Hours Max Marks: 70**

**This paper contains \_\_\_2\_\_\_ printed pages and \_\_3\_\_\_ parts**

**PART A**

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

1. Differentiate between time-series and cross-sectional data.
2. The Gauss-Markov theorem states that the OLS estimator is BLUE. Explain what “B” and what “U” are and what it implies?
3. What is the interpretation of $β\_{1}$ for this model: $Y\_{i}= β\_{0}+ β\_{1 }ln⁡(X\_{i})+u\_{i}$ ?
4. What is the difference between an estimator and an estimate? Explain in the context of simple regression model given underlying population regression line $β\_{0}+ β\_{1} X\_{i}$ .
5. For a regression model, the Explanatory Sum of Squares (ESS) is 0.27 while the Residual Sum of Squares (RSS) is 1.67. Calculate the $R^{2}$.
6. In a regression model with 2 explanatory variables (X and Z), how is the interpretation of the coefficient on X different from a model with only X as the explanatory variable?
7. Discuss linearity in parameters.

**PART B**

**PART B: Answer any THREE of the following 10x 3=30**

1. In the context of econometrics,
2. What is $R^{2}$ ?
3. Why does $R^{2}$ increase even if we add an irrelevant variable to our model?
4. What is autocorrelation and give an example of AR(1) error structure. Discuss one method to correct for autocorrelation.
5. What is multicollinearity? What are the problems associated with multicollinearity (i) when multicollinearity is exact and (ii) when it is not perfect? Describe potential solutions.
6. Consider a model with one explanatory variable $y=β\_{1}+ β\_{2}X+u$.
7. Suppose that the units of measurement of X are changed so that the new measure, X\*, is related to the original one by $X^{\*}=X/μ$. Find the new estimate of the new slope coefficient $β\_{2}^{\*}$ in terms of $β\_{2} = \frac{\sum\_{i}^{n}(Y\_{i}-\overbar{Y})(X\_{i}-\overbar{X})}{\sum\_{i}^{n}(X\_{i}-\overbar{X})^{2} }$
8. How does the interpretation of slope coefficient change if an additional variable is added to the model?
9. The rate of growth of employment is estimated via OLS using two explanatory variables - real GDP growth and inflation. From 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.
	1. Calculate the corresponding F statistic.
	2. What is the null hypothesis of the F test?

**PART C**

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

1. What is heteroscedasticity? Discuss consequences on the OLS estimator. If heteroscedasticity has a specific form $σ^{2}=λZ\_{i}$ where Z is a known variable, how should we proceed?
2. Interpret all the slope coefficients and graphically show the difference between the following models (X is a continuous variable and D a dummy variable):
	1. $Y= β\_{0}+ β\_{1}X+β\_{2}D+u $
	2. $Y= β\_{0}+ β\_{1}X+β\_{2}D+β\_{3}\left(X\*D\right)+u$
	3. $Y= β\_{0}+ β\_{1}X+β\_{2}\left(X\*D\right)+u$
3. What are the consequences of autocorrelation? Suggest a potential remedy to solve autocorrelation problem.