Registration Number:

Date & Session 5-12-2022 ( 9am)

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

**B.Sc – V SEMESTER**

**SEMESTER EXAMINATION: OCTOBER 2022**

**(Examination conducted in December 2022)**

**ECS 5118: BASIC ECONOMETRICS**

**Time: 2 ½ Hours Max Marks: 70**

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

**PART A: Answer any TEN of the following questions 10x3=30**

1. The Gauss-Markov theorem states that the OLS estimator is BLUE. In a sentence, state explain what U is and what it implies?
2. What is the difference between an estimator and an estimate? Explain in the context of simple regression model given underlying population regression line $β\_{0}+ β\_{1}X\_{i}$
3. For a regression model, the Explanatory Sum of Squares is 0.27 while the Residual Sum of Squares is 1.67. Calculate the $R^{2}$.
4. Consider the following regression line: $\hat{BP}$= 698.9 – 2.28 \*EX where BP is the Blood-pressure and EX is minutes of daily Exercise. If the standard error of the slope coefficient is 0.52. What is the t-statistic of the slope coefficient?
5. Re-formulate the following equation to be linear in parameters: $y=Ax^{β}e^{u}$ and interpret the slope coefficient.
6. A researcher seeks to understand Sales as a function of advertisement spending and dummy variables for 4 exhaustive regions (North, South, East and West), what specification would imply a dummy variable trap? What is the solution?
7. One way to interpret the coefficient of explanatory variable in the case of multiple linear regression model is the “partialing-out” interpretation. Explain.
8. Even if a variable is irrelevant, including it in OLS regression still increase the $R^{2}$ . Why?
9. What is the interpretation of $β\_{1}$ for this model: $lnY\_{i}= β\_{0}+ β\_{1 }X\_{i}+u\_{i}$ ? How does the interpretation of $β\_{1}$change if the model is: $lnY\_{i}= β\_{0}+ β\_{1 }X\_{i}+β\_{2}Z\_{i}+u\_{i}$ ?
10. Assume that the true model includes variables $X\_{2} and X\_{3}$ along with the constant term. What is the impact of excluding $X\_{3}$ which is a relevant variable on the coefficient of $X\_{2}$ ?
11. What is the difference between t-test and F-test?
12. Give an example of AR(1) and AR(2) error structure.

**PART B: Answer any TWO of the following questions 2x5=10**

1. What is multicollinearity? What are the problems associated with multicollinearity (i) when it is exact and (ii) not perfect? Describe potential solutions.
2. A researcher is interested in understanding how wages are affected by being part of a union. In addition, she is interested in finding if being a union member affects wages differently for male and female. Can an interaction model be used for this analysis? Explain.
3. Describe the Chow test which can be used in case you are considering splitting your data in 2 subsamples and estimating 2 models or not differentiating the subsamples. Recall that it is a variant of F test with the general form of

F = $\frac{Improvement in\frac{fit}{extra}degrees of freedom}{ \frac{residual sum of squares}{degrees of freedom remaning}}$

**PART C: Answer any TWO of the following questions 2x15=30**

1. What is heteroscedasticity? Discuss consequences. If heteroscedasticity has a specific form $σ^{2}=λZ\_{i}$where Z is a known variable, how should we proceed?
2. Consider 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. $Y= β\_{0}+ β\_{1}X+β\_{2}\left(X\*D\right)+u$ .When would we use model **a,** and when would we use model **b**?
3. The result of estimating the impact of ASVABC (cognitive ability), years of schooling for mother (SM) and father (SF) on Years of Schooling of respondent (S) is shown below.



* 1. Interpret all the coefficients.
	2. What does the F-statistic of 81.06 relate to and how would you go about testing for the joint significance of father’s and mother’s schooling?
	3. Given the coefficient of SF (0.091) and standard error (0.045), how is the 95% confidence interval generated?