



Date:

Registration number:

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

B.Sc. STATISTICS – VI SEMESTER

SEMESTER EXAMINATION: APRIL 2022

(Examination conducted in July 2022)

ST – 6118: APPLIED STATISTICS

Time: 2½ Hours

Max: 70 Marks

*This question paper contains **Two** printed pages and **Three** parts*

PART A

I Answer any FIVE from the following

3 x 5 = 15

1. Define multiple correlation coefficient.
2. What is the importance of ϵ term (Error) in the linear regression model?
3. Define coefficient of determination. Give its interpretation.
4. Define time series data. Give additive and multiplicative models in time series analysis.
5. Give any three agencies responsible for the data collection in India.
6. What are prophylactic trials?
7. Define simulation. Explain the need for simulation.

PART B

II Answer any FIVE from the following

7 x 5 = 35

8. A) There are two series of index numbers P for price index and S for stock of the commodity. If we obtain the regression lines of P on S as $P = 17.6 + 0.8 \cdot S$. Interpret the estimates in the model. What is price index if stock of the commodity is 103 unit.
B) Derive the relation between multiple correlation coefficient, partial correlation coefficient and simple correlation coefficient. (2+5)
9. Stating the assumptions of multiple linear regression model, derive the ordinary least square estimator of regression coefficients. (7)
10. A) Give the list of different methods of variable selections. Explain any one method.
B) Explain Durbin – Watson test to test for the presence of autocorrelation. (4+3)
11. A) What are the different components of time series? Explain with example
B) Give the procedure of construction of seasonal indices by semi averages. (4+3)
12. A) Give any two approaches to estimate national income.
B) How Lorentz curve and Gini coefficient related? Explain. (2+5)
13. What are therapeutic trials? Explain the random allocation of subjects in therapeutic trials.
14. A) Explain the procedure of generating random observations from discrete distributions.

B) Consider an experiment of throwing an unbiased coin three times. Let X be a random variable which describes number of heads obtained. Generate 3 random observations, if the random numbers are 0.972, 0.146, and 0.811 (3+4)

PART C

III Answer any TWO from the following 10 x 2 = 20

15. A) Briefly explain different methods to detect the presence of multicollinearity in the data.

B) What is Heteroscedasticity? Explain any two methods of testing the presence of heteroscedasticity? (5+5)

16. A) Define following:

- i. Sensitivity
- ii. Specificity
- iii. False negative rate
- iv. False positive rate
- v. Predictive value positive
- vi. Predictive value negative.

B) Write a short note on receiver operating characteristic (ROC) curve. (6+4)

17. A) What is inverse transformation method? Explain.

B) Illustrate the generation of random observations from the distribution with probability

density function $f(x) = \begin{cases} 3e^{-3x} & x > 0 \\ 0 & \text{Otherwise} \end{cases}$ (4+6)
