20P361 (Pages: 2) Name……..

Reg. No……..

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS-PG)

(Regular/Supplementary/Improvement)

CC19P ST3 C11 - APPLIED REGRESSION ANALYSIS

(Statistics)

(2019 Admission onwards)

Time: Three Hours Maximum: 30 Weightage

PART A

Answer any ***four*** questions. Each question carries 2 weightage.

1. List the important properties of least square estimators of a simple linear regression model.
2. What is collinearity? Point out its consequences.
3. Define coefficient of determination R^2.
4. Explain Mallows C_p- statistics.
5. What is the basic idea of kernel smoothers in non-parametric regression?
6. Distinguish between link functions and linear predictors.
7. What are the important features of Generalized Linear Models, when compared with classical linear models?

(4 × 2 = 8 Weightage)

PART B

Answer any ***four*** questions. Each question carries 3 weightage.

8. Obtain an unbiased estimate of σ^2 in the Gauss - Markov setup $(Y, X\beta,\ \sigma^2 I_n)$.
9. Obtain the least square estimators of the parameters of a multiple regression model.
10. What are outliers? What will happen to the regression models if the data contain outliers?
11. Explain the different methods of scaling residuals.
12. Explain the problem of ill-conditioning in polynomial regression. Describe how orthogonal polynomials can be used to overcome the ill-conditioning.
13. Explain the problem of regression for binary response variable and develop the method of maximum likelihood to estimate the parameters in a logistic regression model.
14. Distinguish between linear and non-linear regression models and offer your comments on the method of least squares applied on them.

(4 × 3 = 12 Weightage)

PART C

Answer any ***two*** questions. Each question carries 5 weightage.

15. (a) Explain the concept of estimability of a parametric function. Illustrate with an example.

    (b) State and prove Gauss-Markov theorem.

16. Discuss briefly the state of affairs and consequences on account of possible departures from the underlying assumptions on a linear model.

17. (a) What is the need of piecewise polynomial fitting? Discuss the method of splines in this context.

    (b) Distinguish between bias due to under-fitting and bias due to over-fitting in a multiple regression model, giving an illustrative example.

18. (a) Describe Poisson regression model.

    (b) Present a short account on prediction and estimation with the generalized linear model.

(2 × 5 = 10 Weightage)

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