

19P361

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Name.....

Reg. No.....

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(CBCSS-PG)

CC19P ST3 C11 - APPLIED REGRESSION ANALYSIS

(Statistics)

(2019 Admission Regular)

Time: Three Hours

Maximum: 30 Weightage

Part A

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

1. Define multiple linear regression models. What are the assumptions?
2. Show that the least square estimate of linear regression model is independent of its residual sum of squares
3. What are studentized residuals and PRESS residuals?
4. How will you use splines in piecewise polynomial regression modelling?
5. What is Serial correlation? How does serial correlation affect regression modeling?
6. Explain nonparametric regression model.
7. Write a short note on Poisson regression.

(4 x 2 = 8 Weightage)

Part B

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

8. Let $Y_1 = \theta + \varepsilon_1$, $Y_2 = 2\theta - \varphi + \varepsilon_2$ and $Y_3 = \theta + 2\varphi + \varepsilon_3$ where $E(\varepsilon_i) = 0$, $i = 1, 2, 3$ and ε_i 's are *ii d*. Find the least square estimate of θ and φ
9. Explain bias due to under fitting and bias due to over fitting of a multiple linear regression model.
10. What is multicollinearity? Explain the variance decomposition method of detecting multicollinearity and derive the expression for 'Variance Inflation Factor'.
11. Discuss the role of dummy variables in linear models. Explain how they are used to indicate different intercepts and different slopes of the regression model. Illustrate with examples.
12. What are outliers and high leverage points? Discuss the effect of outliers in regression modelling.
13. Explain Mallows' C_p statistic
14. Let $Y_i, i = 1, 2, \dots, n$ be independent random variables and $Y_i \sim N(i\theta, i^2\sigma^2)$. Find generalized least square estimator of θ

(4 x 3 = 12 Weightage)

Part C

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

15. Obtain the decomposition of the total variation in the data under a multiple linear regression model. Hence, define SS_T , SS_R and SS_{Res} and indicate the ANOVA.
16. Derive the least squares estimators of model parameters for multiple linear regression models. Obtain mean and variance of the estimator.
17. Explain the concept of orthogonal polynomials and obtain the first five orthogonal polynomials. Explain how orthogonal polynomials are used in fitting regression models?
18. Explain the logistic regression model, interpret the parameters and explain how to test the significance of i^{th} regressor in a dichotomous logistic model

(2 x 5 = 10 Weightage)
