

B.Sc. (Honours) Examination, 2019

Semester-VI

Statistics

**Course : BSC-62 (Old)
(Linear Models)**

Time : 3 Hours

Full Marks : 40

Questions are of value as indicated in the margin

Answer **any four** questions

1. (a) What is a 'linear model'? clearly bringout the differences among 'fixed', 'mixed' and 'raudom' effects models.
(b) What is meant by the term 'linear hypothesis'? How is such a hypothesis tested?
(1+3)+(2+4)=10
2. (a) In what respects do analysis of variance, regression analysis and analysis of covariance differ?
(b) Use the technique of analysis of variance for testing whether two regression lines are identical.
3+7=10
3. (a) For one way random effects model $y_{ij} = \mu + b_i + \epsilon_{ij}$ $i = 1(1)k, j = 1(1)r$ show that the following is a consistent estimator of the intra class correlation coefficient

$$\rho = \frac{\sigma_b^2}{\sigma_y^2} : \frac{MSA - MSE}{MSA + (r-1)MSE}$$

- (b) For the model mentioned in (a), find estimators of all variance components. 4+6=10
4. For two way classified data with one observation per cell find the ANOVA table clearly mentioning the model, assumptions hypotheses under fixed effects and random effects models. 10
5. Using analysis of variance technique test whether a regression line is linear. Also show that the test statistic can be expressed as

$$\frac{MS(DLR)}{MSW}$$

Where DLR stand for deviation from linear regression.

7+3=10

6. (a) How would you test for equality of regression equations from p groups?
(b) Why is it not possible to test interaction effects in a two-way classified data with one observation per call?
7+3=10
