

1 (a) Discuss general linear model with full rank case.  
Obtain estimate of the parameter and show that it is BLUE.

(b) Discuss the tests used for validity of the general linear model and significance of explanatory variable.

OR  
1 (a) What is heteroscedasticity? how it arise? How do you tackle it?

(b) Discuss non full rank general linear model in detail.

2 (a) Define CAN estimator. State and prove invariance property of CAN estimator.

(b) Let  $X_1, X_2, \dots, X_n$  be a random sample from Poisson distribution with mean  $\theta$ ,  $\theta > 0$ . Obtain CAN estimator of  $\theta$ . Hence derive CAN estimator for  $P(X=r)$ .

OR  
2 (a) State marginal and joint consistency. Show that  $T$  is marginal consistent for  $\theta$  iff  $T$  is jointly consistent for  $\theta$ .

(b) Let  $\{X_i\}_{i=1}^n$  be iid  $B(1, \theta)$ ,  $0 < \theta < 1$  Bernoulli variates. Obtain consistent estimator for  
i) population variance (ii) the Fisher information per unit observation.

3 (a) Describe with illustration to obtain asymptotic confidence interval using CAN estimator.  
(PTO)

(b) Describe the method to obtain asymptotic confidence interval for mean of Poisson distribution based on a random sample of size  $n$ .

OR

3 (a) What is non sampling errors? Discuss with illustration. Describe sources of non sampling errors.

(b) What is sample survey? Describe planning of sample survey. How do you process the survey data?

4 (a) What is simulation? Describe its applications.

(b) Discuss general technique for simulation from continuous distribution using inverse transformation.

OR

4 (a) Describe detail steps to simulate a random sample from a two-parameter gamma distribution.

(b) Describe the method with illustration to simulate a sample from discrete distribution.

5 Write note on any two:

(a) Generalized LRT and Large sample tests.

(b) Simulation from bivariate normal distribution.

(c) Methods of data collection.

(d) Study of family planning survey.

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