

JL – 38/14

Statistics

Paper – II

Time : 3 hours

Full Marks : 200

The figures in the right-hand margin indicate marks.

Answer any five questions.

1. (a) If X is distributed according to p -variate normal and if a set of components of X is uncorrelated with the other components prove that the marginal distribution of the set is multivariate normal. 20
- (b) Derive the distribution of the sample multiple correlation coefficient in the null case. Discuss the problem of classification into one of two multivariate norm populations when the parameters are estimated. 20
2. (a) Derive the distribution of the sample mean vector in the multivariate normal case. Develop a test procedure for testing the significance of the mean vector. 20

- (b) Derive the distribution of T^2 statistic. Prove that T^2 -test is a uniformly most powerful test under the conditions to be stated by you. 20
3. (a) Compare simple random sampling and stratified random sampling with proportional and optimum allocation and show how the gain due to stratification is achieved. 20
- (b) If the n units and the m subunits from each chosen unit are selected by simple random sampling obtain the variance of an unbiased estimate of over all population mean per subunit and an unbiased estimate of it. 20
4. (a) Distinguish between complete life table and abridged life table. Establish the relation between the various columns in the life table. Obtain an estimate of GRR under the assumption that the sex ratio at birth remains more or less constant at all stages of the women in the reproductive period. 20
- (b) Define "Reproduction rates" and explain how they may be looked upon as indices of population growth. 20

5. (a) Obtain the solution of the Yule's series. For the Markov's series find the correlogram if \square is autoregressive model of first order. 20
- (b) What is multicollinearity ? What are its consequences ? How do you detect multicollinearity ? Discuss the remedial approaches to multicollinearity. 20
6. (a) Discuss the analysis of variance of Latin Square Design with one missing observation. Obtain the efficiency of LSD relative to RBD. 20
- (b) Explain analysis of covariance model. Obtain the sum of squares for estimates of the parameters in the model and error. Develop a test procedure to test for the significance of the model. 20
7. (a) Discuss the role of control charts with reference to specification, production and inspection. Explain some of the benefits of the charts for the fraction defective and the number of defects. Comment on the statement that even if the sample points are within the control limits the chart may indicate a tendency for lack of control. 20

- (b) Explain sequential probability ratio test. Obtain the ASN and OC curve for the sequential sampling plan. 20
8. (a) Discuss single and multi period inventory control models and compare them. 20
- (b) Explain M/M/C : N/FIFO system and obtain its steady-state solution. Find the average queue length and average waiting time in the queue. 20

