DRAVIDIAN UNIVERSITY
Centre for Off-Campus Education & Research
Syllabus for M.Phil/Ph.D Statistics
Paper II: Broad Field

Unit – I: Sampling Techniques: Varying probability sampling with and without replacement, PPS WR and WOR techniques, Lahiri's Scheme, Hurwitz – Thomson Estimator, Ratio and Regression Methods of estimation, Two stages and Multistage Sampling, Cluster Sampling, Double Sampling.

Unit – II: Design of Experiments: Construction of orthogonal Lation squares, analysis of LSD and Graeco LSD, Analysis of 2^n, 3^2 and 3^3 Factorial Designs, Confounding in Factorial, Split plot Design, construction and analysis of BIBD, Youden Square and Two associates of PBIBD.

Unit – III: Applied Regression Analysis: Two and Three – Variable Linerar regression Models, Criteria for Model Selection: R^2 and R^{-2} Criteria, Cρ-Criterion, Testing the General Linear hypothesis, chow test, test for structural change, Restricted Least Squares estimation, Generalized MSE Criterion, Nonlinear Regression., Nonlinear Methods of Estimation.

Unit – IV: Econometric Methods:
Inference in General Linear Model, Heteroscedasticity: Glejser's test, Goldfeld and Quandt test; Multicollinearity; Farrar – Glauber test; Autocorrelation: Durbin- Watson Test, Distributed Lag Models: Almon and Koyek's procedures.

Unit – V Operations Research: Operations Research Models, LPP-Simplex Method, Transportation, Assignment, Sequencing problems; Game theory, Queuing Models, Inventory Models.

Unit – VI: Statistical Quality control : Control charts for Attributes and Variables: Modified control chart, OC and ARL of control charts, Moving Average and CUSUM charts: Single, Double and Sequencing Sampling Plans, Skip Lot Sampling.

Unit – VII: Biostatistics: Bioassays: Parallel and Slope Ratio Bioassays; Probit and Logit Transformations for estimating Median effective dose; Quantitative Genetics: concepts of Genotypes and Phenotypes; Basic Matings from Single Gene Crosses, Mendel's laws of heredity; Random Mating: Hardy – Weinberg law, Estimation of Gene Frequencies in ABO blood group system.

Unit – IX : Demography and Official Statistics: Sources of Demographic Data, Measures of Mortality, Fertility and Reproduction; Models for population growth; Stochastic Models for population growth; statistical systems in India; CSO and NSSO, Population census, Methods of collecting official statistics: Sources of Agricultural and Forest Statistics.
Unit – X: Time Series and Forecasting: components of time series and their Measurement; Foresting based on regression techniques; Time series Forecasting, Exponential Smoothing Methods; Elements of MA, AR, ARMA and ARIMA Models; Box Jenkin's time series methods.

References:

1. Sing d and Chudary F.S (1986): Theory and analysis of Sample Survey Designs. New Age International Publishers.
2. M.N.Das and N.C.Giri (1979), Design and Analysis of Experiments, Wiley & Sons, New York.
3. C.D.Montgomery (1976), Design and Analysis of Experiments, Wiley & Sons, New York.
4. Johnston.J (1984): Econometric Methods, 3rd Edition. MC.Graw Hill.
5. Judge.C.G., Griffiths, R.C.Hill, W.E.Lutkephol, H and Lee.T.C (1985): The Theory and Practice of Econometrics, John Wiley and Sons.
6. Draper. N and Smith.B (1981): Applied Regression analysis, Second Edition.
7. Taha .H.A (1982) Operational Research: An Introduction ; Macmillan.
8. Montgomery D.C (1985), Introduction to Statistical Quality Control, Wiley.
9. D.J.Finnery (1971): Statistical Methods in Biological Assay, Charles Griffen and Company, London.
10. William D.Stansfield. (1969): Theory and Problems of Genetics, Schaum's Outline Series, MC Graw Hill, New York.
11. Oscar Kempthorne (1973): An Introduction to Genetic Statistics, Jagmohan book Agency, New Delhi.
12. S.K.Sinha and B.K.Kale (1980): Life Testing and Reliability Estimation, Wiley Eastern Ltd., New Delhi.
13. Suddender Biswas (1988), Stochastic Process in Demography and applications, Wiley Eastern Ltd., New Delhi.
14. Asthana (1970), Indian Official Statistics.
15. Markidakis, S Steven C.Wheel Wright and Victor E.Mcgee (1983): Forecasting: methods and Applications, 2nd Edition, New York, John Wiley & Sons.

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Model Question Paper for M.Phil/Ph.D Statistics

Paper II: Broad Field

Time: 3 Hours Max marks: 100

Answer any Five Questions

All Question Carry Equal Marks

5x20=100

1. a).Explain PPS sampling with replacement and without replacement Give Lahiri's Scheme for PPS sampling.
   b). Describe the cluster sampling technique.

2. a). What are orthogonal Latin Squares ? How do you construct them ? Explain the analysis of Graeco LSD.
   b). Describe the analysis of BIBD.

3. a). Explain R^2 and R^{-2} and Cρ-Criterion for model selection.
   b). Specify a nonlinear regression model. Explain the maximum likehood method of estimation for nonlinear regression model.

4. a). What are the sources and consequences of Heteroscedasticity ? Explain the Goldfeld and Quandt test.
   b). Explain the problem of autocorrelation with reference to a two-variable linear model.

5. a). Explain any two methods to obtain optimum solutions for solving Transportation problem.
   b). Distinguish between deterministic and stochastic inventory models. State different costs involved in inventory problem.

6. a). What is a CUSUM Chart ? What are its advantages over $\bar{X}$ chart. Give the use of V-Mask in CUSUM Charts.
   b). Distinguish between Single and Double sampling plans. How do you obtain OC curve for Double Sampling Plan ?.

7. a). Explain Slope Ratio Bioassay.
   b). State and Prove Hardy-Weinberg law of equilibrium.

8. a). Explain the concept of Reliability: Discuss different measures of Reliability.
   b). Describe the applications of Exponential and Weibull distributions in Relibility and Life testing.

9. a). Explain a stochastic model for population growth.
   b). What are the functions of CSO and NSSO ? Give the various sources of Agricultural and Forest Statistics in India.

10. a). Describe any two types of exponential smoothing methods for forecasting.
    b). Distinguish between ARMA and ARIMA models.

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