UNIFIED SYLLABUS OF STATISTICS
B.Sc. Part- II

Paper I : Statistical Inference

UNIT – I

Point estimation. Characteristics of a good estimator: Unbiasedness, consistency, sufficiency and efficiency. Method of maximum likelihood and properties of maximum likelihood estimators (without proof). Method of minimum Chi-square. Method of Least squares and method of moments for estimation of parameters. Problems and examples.

UNIT – II

Sufficient Statistics, Cramer-Rao inequality and its use in finding MVU estimators. Statistical Hypothesis (simple and composite). Testing of hypothesis. Type I and Type II errors, significance level, power of a test. Definitions of Most Powerful (MP), Uniformly Most Powerful (UMP) and Uniformly Most Powerful Unbiased (UMPU) tests.

UNIT – III

Neyman-Pearson's lemma and its applications for finding most powerful tests for simple hypothesis against simple alternative. Interval estimation – concept of interval estimation confidence interval for mean & variance in case of normal population only.

UNIT-IV

Test of significance – large sample test for proportions and means : (i) single sample, (ii) two independent samples. Tests based on chi-square, t and F distributions.

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Paper II : Survey Sampling

UNIT – I

Sampling Method : Concept of population, sample, parameter and statistic, sampling versus census, advantages of sampling methods, role of sampling theory, sampling and non-sampling errors, bias and its effects, probability sampling.

UNIT-II

Simple Random sampling with and without replacement, use of random number tables in selection of simple random sample, estimation of population mean and proportion. Derivation of expression for variance of these estimates. Estimates of variance. Sample size determination.

UNIT-III

Stratified random sampling. Problem of allocation, proportional allocation, optimum allocation. Derivation of the expression for the standard errors of the usual estimators when these allocation are used. Gain in precision due to stratification.

UNIT-IV

Systematic sampling : estimation of population mean and population total, standard errors of these estimators. Cluster sampling with equal clusters. Estimation of population mean and their mean square error.

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Paper III : Analysis of Variance and Design of Experiment.

UNIT-I

Analysis of Variance. One way classification. Assumptions regarding model. Two way classification with one observations per cell.

UNIT-II

Principles of Design of experiments: Randomization, Replication and local control. Choice of size and type of a plot using uniformity trials. Completely Randomized Design (CRD), Randomized Block Design (RBD). Concept and definition of efficiency of design. Comparison of efficiency between CRD and RBD.

UNIT – III

Latin Square Design (LSD), Lay-out, ANOVA table, Comparison of efficiencies between LSD and CRD, LSD and RBD.

UNIT-IV

Factorial Experiments : general description of factorial experiments; 2^2, 2^3 and 2^n factorial. Definition of main effects and interactions in 2^2 and 2^3 factorial. Preparation of ANOVA by Yate's procedure. Estimates and tests for main and interaction effects.

B.Sc. Part- II
PRACTICAL

The practical examination will be based on papers I, II and III and will cover the following experiments:

List of Practical Experiments

1. Chi-square test for (i) $\sigma = \sigma_0^2$ (ii) Goodness of fit, (iii) independence of two attributes.

2. t – test for (i) $\mu = \mu_0$ (ii) $\mu_1 = \mu_2$ (iii) $\rho = 0$

3. F-test for $\sigma_1^2 = \sigma_2^2$

4. Large sample tests.

5. ANOVA in one-way and two-way classification.

6. Analysis of LSD.

7. Drawing a simple random sample with the help of table of random numbers.

8. Estimation of population means and variance in simple random sampling.

9. Stratified random sampling for population mean (proportional and optimum allocation).

10. Factorial Experiment Practical.

REFERENCES

1. Hogg & Craig : Mathematical Statistics.

2. Mood, Graybill and Boes : Introduction to the theory of Statistics.

3. Goon, Gupta and Dasgupta : Fundamentals of Statistics, Vol. I and Vol. II

4. Gupta, S.C. and Kapoor, V.K. : Fundamentals of Statistics.

5. Gupta, S.C. and Kapoor, V.K. : Applied Statistics..

6. Cochran, W.G. : Sampling Techniques

7. Cochran and Cox : Experimental Design.

8. Das & Giri : Design and Analysis of Experiments (Wiley Eastern).