

(COMMON FOR THE FACULTIES OF ARTS & SCIENCE)

THIRD YEAR B. Sc.

STATISTICS

2023-24

Papers	Periods per week	Examination Hours	Maximum Marks	
			B.A	B.Sc.
Theory Papers				
Paper I	2	3	45	50
Paper II	2	3	45	50
Paper III	2	3	45	50
Practicals**	4	4	65	75
Total Marks			200	225

* **1 Period 1 hours**

** **per batch**

NOTE:

1. Common papers will be set for both the Faculties of Arts & Science.
2. Students are allowed to use simple electronic desk calculators (as per University guidelines).
3. Statistical Tables may be used (as per University guidelines)
4. Visit to Local Governments/ Organizations, Semi Governments Departments/ Organizations, Government Undertaking Organizations, Statistical Institute of repute, Private sector Statistical Organization and Research Stations within Udaipur Division may be organized to familiarize students with the practical work done at these centers.

MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR
THIRD YEAR B. Sc. STATISTICS 2023-24

PAPER-I
STATISTICAL INFERENCE

TIME: 3 hours

Max. Marks 50

UNIT -1

Testing of Hypothesis Null, Alternative, Simple and composite hypotheses, Two types of errors, Power of the test, Power curves in simple cases, critical region and best critical region (BCR). Most powerful and uniformly most powerful tests. Neyman- Pearson's Lemma, Determination of B.C.R for testing simple v/s simple hypothesis in uniform and normal populations.

UNIT-II

General theory of test of significance for large samples for testing of means and proportions, Determination of Sample size, Test of significance based on 't' distribution.

UNIT-III

Tests of significance based on Chi-square and F-sampling distributions.

UNIT-IV

Methods of estimation: Method of moments, Method of least squares and Method of maximum likelihood estimation with their properties (without proof).

Elements of Non-parametric Inference: Sign, Median and run test.

UNIT -V

Elements of Sequential Analysis, Construction of sequential probability ratio tests (SPRT), O.C. and A.S. N. functions. Applications of SPRT for testing simple v/s simple hypothesis in case of Bernoulli and Normal populations.

Elements of decision problems: Loss function, risk function, estimation and testing viewed as decision problems. Bayes rule.

Recommended Books :

1. GuptA. S.C.and Kapoor V.K. : Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Kapur J.N.and Saxena H.C. : Mathematical Statistics, S.Chand & Company Ltd., New Delhi.

Reference Books:

1. Singh, J. : Statistical Inference (Hindi edition), Madhya Pradesh Hindi Granth Academy, Bhopal.
2. Goon, A.M.,Gupta, M.K. and Das Gupta, B.(1980) : An outline of Statistical Theory,Vol.2. The world Press Publishers Private Ltd. Calcutta.
3. Rohatgi, V.K.(1986) : An Introduction to probability theory & Math. Statistics, Wiley Eastern.
4. Mood A.M.,Graybill,: F.A. and D.C.(1974) : Introduction to the theory of Statistics, Boes, Third edition McGraw Hill

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PAPER - II

DESIGN OF EXPERIMENTS AND SAMPLE SURVEYS

TIME: 3 hours

Max. Marks 50

UNIT-I

Analysis of variance for one-way and two-way classification (with one observation per cell). Linear model and its different types, Transformations, Basic concepts in design of experiments, Criteria for a good design, Uniformity trials, Size and Shape of block and plots.

UNIT-II

Completely randomized and Randomized block designs. Efficiency of Randomized block design over Completely randomized design. Latin square design. Missing plot technique, Estimation of single missing value in Randomized block and Latin square designs.

UNIT-III

Concepts of population and sample, need for sampling. The principle steps in a sample survey, concept of sampling and non-sampling errors, Advantages of sample survey over complete enumeration, Limitations of sampling, types of sampling, basic principles of sampling design, procedures of selecting a random sample.

UNIT-IV

Simple random sampling with and without replacement for variables and attributes. Stratified random sampling including allocation problems, Efficiency with SRS including intra class correlation coefficient (Excluding cost function).

UNIT-V

Cluster Sampling (with equal cluster size): Definition, Estimation of mean and its variance, Variance estimator, Systematic sampling, estimation of mean and its variance, comparison with SRS and stratified random sampling for a linear trend population.

Recommended Books :

1. Gupta S.C. and Kapoor V.K. : Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi.
2. Goon, A.M., Gupta, M.K. : Fundamentals of Statistics, Vol.I. The World Press and Dasgupta, B. Pvt. Ltd. Calcutta

3. Cochran, W.G. and Cox, G.M : Experimental Designs, John Wiley & Sons, New York.
4. Sukhatme P.V., Sukhatme B.V., : Sampling theory of Surveys, and Applications,
5. Sukhatme S. and Ashok C. : Indian Society of Agricultural Statistics, New Delhi.
6. Gupta S.C and Kapoor V.K. : Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi

Reference Books :

1. Goulden, C.H. : Methods of Statistical Analysis (Hindi Ed.) Bihar Hindi Granth Academy, Patna
2. Snedecor, G.W. : Statistical Methods (Hindi Ed.) Commission of Scientific & Technical Words, Ministry of Education, Govt. of India
3. Mukhopadhyay, : Applied Statistics, New Central Book Agency Pvt., Ltd. Calcutta P. (1999)
4. Montgomery, D.C'.(1991) : Design and Analysis of Experiments, Wiley Eastern.
6. Goon A.M., Gupta M.K and Dasgupta, B. : Fundamentals of Statistics, Vol.11, The World and Press Pvt. Ltd., Calcutta.
7. Cochran W.G. : Sampling Techniques (Hindi and English Edition), Kendriya Hindi Granth Academy, New Delhi (Hindi Ed.), Wiley Eastern Ltd, New Delhi (English Ed.)
8. Mukhopadhyay P. (1998) : Theory and Methods of Survey Sampling, Prentice Hall
9. Sampat, S. (2000) : Sampling Theory (Narosa).

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PAPER -III
PROJECT WORK

TIME: 3 hours

Max. Marks 50

The project work shall be spread over the whole year. A project may be undertaken by a group of students. However, the project report shall be submitted by each member of the group separately.

A project report shall clearly state the problem addressed, the methodology adopted, the assumptions, the hypotheses formulated, any previous reference to the study undertaken, statistical analyses performed and the broad conclusion drawn. There shall be an external examiner and an internal examiner (preferably the supervisor of the student) for the evaluation of the project work. Out of total 50 marks assigned to the project, 30 marks will be assigned on the evaluation of the project report separately by both the examiners and 20 marks will be assigned on the oral presentation and viva-voce.

Guidelines of Project Work

1. A project work is compulsory and shall be offered in third year. Project submission is in end of third year but the allocation of students should be done at the starting of third year session.
2. A project work may be taken individually or by a group of students (not more than 5 per batch).
3. Project work shall be supervised by faculty members assigned by the Head/ Incharge of the department, as the case may be at the starting of third year.
4. The orientation of Project work shall be neither of a theory paper nature nor of a lab/practical nature but shall be in the form of dissertation.
5. Students, will decide Project Topic/ Area in consultation with the supervisor. Project work may be carried out in a group of students depending upon the depth of fieldwork/ problem involved.
6. Review meetings are to be done periodically (fortnightly/monthly) to the allocated students by the respective supervisors.
7. Students may be given 6 to 10 weeks during the whole year, for their industrial work/ data collection/ survey or any other fieldwork involved in the project.
8. The project work should be selected in such a way that there is enough scope to apply and demonstrate the statistical techniques learnt in the course.

9. At the end of the session, a report on the work done should be submitted in two copies. If a team of two students jointly do a project work then they must submit individual reports separately (not copy of the same report).
10. The project report shall clearly state the selected problem, the statistical methodologies employed for data collection and analysis and the conclusions arrived at. Details of previous studies in the area of work and related references should also be given.
11. The project work will be assessed for a maximum of 50 marks. Each student shall give a presentation at the time of submission of their project work which will be evaluated internally for a maximum of 30 marks. There will be an external viva-voce examination for a maximum of 20 marks by an internal and an external examiner. The parameters for viva voce include (i) Clarity of presentation (ii) Clarity of the content / concept (iii) response to the queries and (iv) relevance of topic for carrying out the project.
12. If there is found any shortcoming in the project work, then the HOD decision shall be final in this regard.

References :

1. Kothari, C.R. (1985): Research Methodology: Methods and Techniques, Wiley Eastern.
2. Dominowski, R.L. (1980): Research Methods, Prentice Hall Inc., New Jersey.
3. Mishra, R.P. (1980): Research Methodology, Handbook Concept Publishing Company, New Delhi.
4. IIPS (1996): Research Methodology, IIPS, Mumbai.

**MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR
THIRD YEAR B. Sc. STATISTICS 2023-24**

STATISTICS PRACTICAL

Duration of Examination- Four Hours

**Max. Marks.: Arts - 65
Science - 75**

The distribution of marks will be as follows:

	B.A.	B.Sc.
Practicals	45 Marks	45 Marks
Viva-voce	10 Marks	15 Marks
Practical Record	10 Marks	15 Marks
Total	65 Marks	75 Marks

Introduction to C-programming Language:

Computer Programming in C-Language; Introduction to C-Language and its uses & advantages, C-Fundamentals: Character Set in C, Structure of C-Program; Data Types: constants, Variables and C-Keywords or Reserved words and defining defined Variable Names (user's defined variables indicating appropriate data types), and Characters type data, Types of Constants: Integer, Real and Character Constants and their print format specifications (Formatted and Un-Formatted Both); Declaration of Type of Variables used, operators: Arithmetic, Relational, Logical, Conditional, Assignment Operators, Making Expressions using Operators and converting mathematical expressions into C-Expressions, Commonly used C-Library functions, C-Statements: Input and Output Control Statements, Conditional Statements (simple and nested), Loop Control Statements (simple and nested), Creating Functions in C, Use of Automatic, External, Global and Static variables; Strings as Arrays.

The Characteristic Powerful Features of C: data structures; Structures: Array of structures, Introduction to multifile programs Macro, Recursion Functions passing arrays and structures as arguments to functions, functions returning pointer etc.; Pointers: Array of Pointers, Passing Pointers to Functions, Pointers and one dimensional Arrays, Pointer arithmetic, application of Pointers in processing strings, passing function to other functions.

Working with Data Files: Defining File Name, Types of File (Sequential, Random File), Modes of Files, Opening and Closing a File, Creating a File, Creating and Processing/Updating formatting and unformatting a File containing data records, File input and Output Functions, Detecting end of a File, Removing a File.

The following practical topics are prescribed for practical work using C-programming language:

1. Large sample test of significance for mean, standard deviation and proportion for one and two sample problems.
2. t-test for the significance of single mean and difference of means (paired and unpaired cases).
3. Test for, the significance of correlation coefficient and regression coefficients,
4. F-test for equality. of two population variances.
5. Chi-square test for (i) goodness of fit (ii) Independence of attributes (iii) significance of single variance (iv) Homogeneity of several correlation coefficients.
6. Sign test, Run Test and Median Test
7. Analysis of variance for (i) One-way classification, (ii) Two-way classification with one observation per cell.
8. Analysis of (i) CRD (ii) RBD and (iii) LSD.
9. Estimation of single missing value In RBD and LSD
10. Sample Surveys : (i) SRS (ii) Stratified sampling including allocation problems.

Books Recommended:

- 1 Programming with C-Byron Gottfried, schaum. Series.
- 2 C-Programming-Balaguruswami.
- 3 Let us C by Kanitkar.

Reference Books:

- 1 Snedecor G.W and Cochran, W.G.: Statistical Methods.
- 2 Computer Organizations and C- Programming, William Gear, McGraw-Hill Co.
- 3 Data structures and Program Design-Robert L.Kruse, Prentice - Hall of India.