# (COMMON FOR THE FACULTIES OF ARTS & SCIENCE)

## MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

# FIRST YEAR B. Sc.

# STATISTICS

# 2021-22

| Papers | Periods per week | Examination Hours | Maximum Marks | |
|---|---|---|---|---|
| Theory Papers | | | **B.A** | **B.Sc.** |
| 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)

# MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR
# FIRST YEAR B. Sc. STATISTICS 2021-22
## PAPER – I
## DESCRIPTIVE STATISTICS

**TIME: 3 hours** **Max. Marks 50**

### UNIT - I

Definition and History of Statistics, Concept of statistical population. Attributes and Variables, different methods of collection, classification and tabulation of statistical data. Representation of Data: Discrete and continuous variates, Construction of frequency tables for grouped and ungrouped data in uni-variate and bivariate cases, Histogram, Frequency polygon, curves and ogives, One, two and three-dimensional diagrams.

### UNIT - II

Measures of Location: Arithmetic mean, weighted arithmetic mean, geometric mean and harmonic mean, Median and Mode. Requisites of an ideal measure of central tendency, merits and demerits of various measures of central tendency. Partition Values: Quartiles, Deciles and Percentiles.

### UNIT - III

Measures of Dispersion: Range, Semi-interquartile range, Mean deviation, Root mean square deviation, Standard deviation and coefficient of variation. Lorenz curve, Requisites of an ideal measure of dispersion.

### UNIT - IV

Moments: Raw, central, factorial and absolute moments, Relationship between central, raw and factorial moments.

Charlier's checks and Sheppard's corrections (without proof), effect of change of origin and scale on moments. Different measures of Skewness and Kurtosis.

### UNIT - V

Theory of Attributes: Class frequencies and their order (up to three attributes only), consistency of data, association and independence of attributes. Yule's coefficient of association and coefficient of colligation.

**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. Gokhroo, D.C. & Saini, S.R. : Mathematical Statistics (Hindi edition), Navkar Prakashan, Ajmer.
2. Gupta, S.P. : Statistical Methods, Sultan Chand & Sons, New Delhi.
3. Rao N.S., Suthar S.P. S.L. Publication, : Business Statistics (Hindi edition), Alka and Gupta Ajmer.

# MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR
# FIRST YEAR B. Sc. STATISTICS 2021-22
## PAPER -II
## PROBABILITY THEORY

**TIME: 3 hours** **Max. Marks 50**

### UNIT - I

Random experiment, sample space, events, elements of an event, union and intersection of events, mutually exclusive, exhaustive, independent and equally likely events. Classical and Statistical definitions of probability and simple problems, Axiomatic approach to probability. Addition law of probability for two or more events.

### UNIT - II

Conditional probability, Multiplication law of probability, Statistical independence of events, Baye's theorem and its simple applications.

### UNIT - III

Random Variable Discrete and continuous random variables, Probability mass and density functions,- joint, marginal and conditional probability functions, Distribution functions.

### UNIT -IV

Mathematical Expectation Definition of expectation, Addition and Multiplication laws of expectation, Moments in terms of expectation, variance and covariance for the linear combination of random variables. Elementary idea of conditional expectation. Schwartz's inequality.

### UNIT - V

Moment generating and Cumulants generating functions with properties, Characteristic function with properties (without proof).

**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.
3. Goon A.M., Gupta M., K. Das Gupta B (1999) : Fundamentals of Statistics,Vol.11, World Press Calcutta


**Reference Books :**


1. Gokharoo D.C. and Saini, S.R. : Mathematical Statistics (Hindi edition), Navkar Prakashan, Ajmer.
2. Bhargava, S.L. and Agarwal, S.M. : Mathematical Statistics (Hindi edition), Jaipur Publishing House, Jaipur.
3. David, R. (1996) : Elementary Probability, Oxford Press.
4. Bhat B.R., Srivenkatramana T and Madhava. K.S.(1977) : A Beginner's Text, Vol II New Age Rao International (P) Ltd

# MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR
# FIRST YEAR B. Sc. STATISTICS 2021-22

## PAPER - III
## COMPUTATIONAL TECHNIQUES & OFFICIAL STATISTICS

**TIME: 3 hours** **Max. Marks 50**

### UNIT – I

Theory of Finite Differences: Operator, $\Delta$ , E & $\nabla$ with their properties, Problems of identities involving $\Delta$ & E & $\nabla$ , Factorial function; Newton-Gregory's forward and backward interpolation formulae, Estimation of missing value in equal intervals.

### UNIT – II

Theory of divided differences and its properties, Newton's divided difference & Lagrange's interpolation formulae, inverse interpolation by making use of Lagrange's formula.

Numerical Integration : Trapezoidal rule, Simpson's 1/3 & 3/8th rule, Weddle's rule and related problems.

### UNIT - III

Linear Programming: Definition of Linear Programming Problem (LPP), formulation of LPP, Graphical method (for two variables), Simplex computational procedure and Duality.

### UNIT – IV

Statistical Quality Control: Process control and Product control, Control charts, 3a-control limits, Tools for SQC, Control charts for variables and attributes, $\overline{X}$ and R charts, $\overline{X}$ and S charts, p, np and c-charts. Criterion for detecting lack of control in various charts. Natural tolerance and specification limits, Modified control limits. Principles of Acceptance Sampling Problem of lot acceptance, good and bad lots, producer's & Consumer's risk, single & double sampling plans and their O.C. functions. Concepts of AQL, LTPD, AOQL, Average amount of Inspection and ASN functions.

### UNIT - V

Statistical Organizations in India, Central Statistical Organization, National Sample Survey Organization, their functions and publications. System of collection of agricultural statistics,

crop forecasting and estimation, productivity. Industries and foreign trade related statistics. Statistical Organizations in Rajasthan, their functions and publications.

**Recommended Books:**


1. Saxena H.C. : Finite Differences and Numerical Analysis, S.Chand & Company Ltd., New Delhi.
2. Gokhroo D.Cand Saini S.R. : Numerical Analysis (Hindi edition), Navkar Prakashan, Ajmer
3. Gokhroo D.C.and Saini S.R. : Elements of Linear Programming (Hindi and English editions), Jaipur Publishing House
4. Asthana B.N. & Srivastava S.S. : Applied Statistics of India, Chaitanya Publishing House, Allahabad.
5. Porwal L.S.and Agarwal N.P. : Applied & Economic Statistics of India (Hindi Ed.)
6. Duncan A.J. (1914) : Quality Control and Industrial Statistics. Fourth editions, Taraporewala & Sons.
7. Montgomery, C. (1991) : Introduction to the Statistical Quality Control (Second edition.) John Wiley & Sons.


**Reference Books :**


1. Bhargava S.L., Sharma, K.D. Bhati, S.S. : Linear Programnling (Hindi edition), Jaipur and Publishing House, Jaipur
2. Nagar, K.N. : Fundamentals of Statistics (Hindi edition) Meenakshi Prakashan, Meerut
3. Gupta, B.N. : Statistics: Theory & Practice (Hindi and English editions), Sahitya Bhawan, Agra.
4. Saluja M.R. : Indian Official Statistical Systems, Statistical Publishing Society, Calcutta

# MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

# FIRST YEAR B. Sc. STATISTICS 2021-22

## STATISTICS PRACTICAL

**Duration of Examination: Four Hours** **Max. Marks: Arts - 65**
**Science – 75**

**TIME: 3 hours** **Max. Marks 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** |

**The following topics are prescribed for practical work:**

1. Presentation of raw data.
2. Graphical representation by (I) Histogram (ii) Frequency polygon (iii) Frequency curve and (iv) Ogives.
3. Diagrammatic representation by (i) Bars (ii) Pie diagram.
4. Measures of Central Tendency: Mean, Median, Mode, G.M., H.M., Quartiles, Deciles & Percentiles.
5. Measures of Dispersion (i) Range (ii) Semi interquartile range (iii) Mean Deviation (iv) Standard Deviation and Variance (v) Coefficient of Variation (vi) Lorenz Curve.
6. Moments and various measures of Skewness and Kurtosis.
7. Evaluation of probabilities using addition and multiplication theorems, conditional Probabilities and Baye's Theorem.
8. Exercises on Mathematical expectation and finding measures of central tendency, dispersion, Skewness and kurtosis of uni-variate probability distribution.
9. Exercises on determination of class frequencies, consistency of data and association of attributes.
10. Solution of LPP by Graphical and Simplex methods.
11. Statistical Quality Control: (i) $\overline{X}$ & R Charts (ii) X and a charts (iii) p, np and c-charts.
12. Exercises on Finite Difference Theory: (i) Construction of finite difference table. (ii) Newton Gregory's forward and backward interpolation formulae (iii) Estimation of missing value in case of equal intervals.
13. Lagrange's and Newton's divided difference formulae
14. Inverse interpolation by Langrange's formula.
15. Numerical Integration by Trapezoidal, Simpson's 1/3rd & 3/8th rules.