Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited -
2022 'B^{++}'Grade
(CGPA 2.96)

Name of the Faculty: Commerce & Management

NEP 2020

Syllabus: Business Statistics
Name of the Course: B.Com. II (Sem.–III & IV)

(Syllabus to be implemented June 2025-26)

Level 5 Semester-III
Course Code: DSC (VI) - VI
Business Statistics Paper-III
(Introduced from June 2025)

Preamble:

To familiarize the students with basic concepts of the Business Statistics and a hands-on practice of the various statistical tools and techniques are the main intensions of this paper. It will enable them to improve their logical reasoning ability and interpretation of various business results. The course aims at acquainting the students with the emerging issues in business, trade and commerce regarding analyzing business facts.

Program Outcomes:

1. To expose students to basic Statistical concepts.
2. To inculcate an analytical approach to the subject matter.
3. To stimulate the student's interest by showing the relevance and use of statistical knowledge.
4. To study and critically analyze statistical reasoning to problems of business.
5. To boost quantitative thinking and develop numerical abilities.
6. To enlighten the student abilities to apply the statistical concepts to real life problems in Commerce, Economics, Management and Social sciences.
7. To improve their logical reasoning ability and interpretation of various statistical results.
8. To prepare a base of various courses like C.A., C.W.A. M.B.A., etc.

Course Outcomes

After completion of this course the students enable

1. **To Understand the concept of central tendency and its importance in summarizing datasets.**
2. **To Distinguish between absolute and relative measures of dispersion.**
3. **To Compute and interpret the correlation coefficients.**
4. **To Understand the concept of regression analysis as a statistical technique used for Prediction.**

4 Credits	100 marks (Semester end examination 60 and internal evaluation 40)	Total 60 hours
Unit No.	**Course Content**	**No. of Hours**
Unit-I	**Measures of Central Tendency**	15 hours
	Concept of central tendency, Requirements of a good average. Arithmetic mean (A.M.): Definition, Properties of A.M. (Without proof), Combined A.M. Merits and Demerits, Numerical Problems. Median and Quartiles: Definitions, Merits and demerits of median. Numerical Problems. Definitions of Deciles and Percentiles. Mode: Definition, Merits and demerits, Empirical relation among mean, median and mode. Numerical Problem on Empirical relation.	
Unit-II	**Measures of Dispersion**	15 hours
	Concept of dispersion, Requirements of a good measure of dispersion, Absolute and Relative measures of dispersion. Range, Coefficient of range, Merits and Demerits of range, Numerical Problems. Quartile Deviation (Q.D.), Coefficient of Q.D., Merits and Demerits of Q.D. Numerical Problems. Variance and Standard deviations (S.D.), Coefficient of S. D.,	
	Coefficient of variation, Merits and demerits of S.D., Numerical Problems.	
Unit-III	**Analysis of Bivariate data: Correlation**	**15 hours**
	Concept of correlation, Types of correlation. Methods of studying correlation: Scatted Plot, Karl Pearson's correlation coefficient (r), Spearman's Rank correlation coefficient (R), Interpretation of r (with special cases r = -1, 0, +1). Numerical Problems on computation of r and R (with and without ties) for ungrouped data.	
Unit-IV	**Analysis of Bivariate data: Regression**	15 hours

	Concept of Regression, Lines of Regression. Regression equations, regression coefficients, relation between correlation coefficients and regression coefficients, Properties of Regression Coefficients (Without proof), Numerical problems on ungrouped data.	

Reference Books Recommended:

1. Gupta S. C. & Kapoor V. K.: Fundamental of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Gupta S. C. & Kapoor V. K.: Fundamental of Applied Statistics, Sultan Chand & Sons, New Delhi.
3. Gupta A. C.: Fundamental of Applied Statistics, Sultan Chand& Sons, New Delhi.
4. Kenny & Keeping: Mathematics of Statistics Volume I and II, VanNostran.
5. Gupta C. B. and Gupta Vijay (2004) An introduction to Statistical Methods, Vikas Publishing House Pvt. Limited.
6. Agrawal B. M. (2014) Essential of Business Statistics. Ane Books Pvt. Ltd.
7. B. L. Agrawal (2006) Baisc Statistics. New Age International

Level 5.0 Semester-III
Course Code: DSM 2 (Minor)
Fundamental of Statistics -I
(Introduced from June 2025)

Course Outcomes
After completion of this course the students will be able -

1. To understand the need and mechanism of sampling.
2. To understand different types of sampling and their uses.
3. To identify different components of time series as well as and to measure trend component.
4. To compute various types of index numbers.

4 Credits	100 marks (Semester end examination 60 and internal evaluation 40)	Total 60 hours
Unit No.	Course Content	No. of Hours
Unit-I	Sampling -I	15 hours
	Introduction, Concept of a Population and sample from population. Difference between Population and Sample Inquiry. Advantage of Sample Inquiry. Concept of Sampling, Purpose of Sampling, Definitions of Population, sample, sampling and census. Principles step in sample survey, Advantages of sampling over census method.	
Unit-II	Sampling -II	15 hours
	Methods of Sampling: Simple random sampling (With and Without replacement), Stratified random sampling, its merits and demerits. Illustrative Examples.	
Unit-III	Business Forecasting and Time series	15 hours
	Introduction, steps in forecasting, Requirement of good forecasting system, Methods of Forecasting. Concept of Time series, Definitions and uses of time series, Components of time series: Secular Trend, Seasonal variations, Cyclical variations and Irregular variations. Methods of measuring trend: Freehand or Graphic method, Method of Semi-Averages, Methods of Moving Averages. Merits and Limitations of all these methods. Illustrative Examples.	
Unit-IV	Index Number	15 hours
	Definition, Characteristics, Limitation and use of index numbers. Problem in the Construction of Index number, Price	

	relative, Quantity relative and Value relative, Applications of Index Numbers in Share Market. Price, Quantity and Value Index number. Methods of Construction Index Numbers: Unweighted Index Number: Simple Aggregative method, Simple average of Relatives method. Merits and Limitations of this method. Weighted Index Number: Weighted Aggregate method, Weighted average of relative method. Illustrative Examples.	

Note: Use of non-programmable calculator is allowed.

Reference Books Recommended:

1. Gupta S. C. & Kapoor V. K. : Fundamental of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Gupta S. C. & Kapoor V. K. : Fundamental of Applied Statistics, Sultan Chand & Sons, New Delhi.
3. Gupta A. C. : Fundamental of Applied Statistics, Sultan Chand& Sons, New Delhi.
4. Kenny & Keeping: Mathematics of Statistics Volume I and II, VanNostran.
5. Ken Blank: Business Statistics, Willey India (P.)Ltd., New Delhi.
6. Goon Gupta & Dasgupta: Fundamental of Statistics Volume I and II, World Press, Calcutta.
7. Spiegel M.R.: Theory and Problems of Statistics, McGraw Hill Book Co., London.
8. Shenoy G.V., Srivastava U.K. & Sharma S. C. : Business Statistics, Wiley Eastern.
9. Das G.& Patnaik: Fundamentals of Mathematical Analysis, Tata McGraw Hill, New Delhi.
10. D. N. Elance (1956) : Fundamentals of Statistics Kitab Mahal ,Allahabad.
11. D.C. Sancheti and V.K. Kapoor: Statistics (Theory and Application), Sultan Chand& Sons Publication, New Delhi.
12. Meyer P. L. (1970): Introductory Probability and statistical application, Addison Wesley.
13. DeGroot M. H. (1975): Probability and Statistics, Addison Wesley. Mood A. M. Graybill F. A .and Bose D. C. (1974): Introduction to the theory of Statistics, McGraw Hill.
14. Rohatgi V. K. (1986): An introduction to probability theory and Mathematical statistics, Wiley Eastern.

Level 5.0 Semester-III
Course Code: Open Elective 5
Applied Statistics -I
(Introduced from June 2025)

Course Outcomes:
After completion of this course the students will be able -

1. To identify different components of time series as well as and to measure trend component.
2. To compute various types of index numbers.

2 Credits	50 marks (Semester end examination 30 and internal evaluation 20)	Total 30 hours
Unit No.	**Course Content**	**No. of Hours**
Unit-I	Time series	15Hours
	Definitions and uses of time series, Components of time series: Secular Trend, Seasonal variations, Cyclical variations and Irregular variations. Methods of measuring trend: Freehand or Graphic method, Method of Semi-Averages, Methods of Moving Averages. Merits and Limitations of all these methods. Illustrative Examples.	
Unit-II	Index Number	15Hours
	Definition, Characteristics, Limitation and use of index numbers. Problem in the Construction of Index number, Price relative, Quantity relative and Value relative, Applications of Index Numbers in Share Market. Price, Quantity and Value Index number. Methods of Construction Index Numbers: Unweighted Index Number: Simple Aggregative method, Simple average of Relatives method. Merits and Limitations of this method. Weighted Index Number: Weighted Aggregate method, Weighted average of relative method. Illustrative Examples.	

Note: Use of non-programmable calculator is allowed.
Reference Books Recommended:

1. Gupta S. C. & Kapoor V. K. : Fundamental of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Gupta S. C. & Kapoor V. K. : Fundamental of Applied Statistics, Sultan Chand & Sons, New Delhi.
3. Gupta A. C. : Fundamental of Applied Statistics, Sultan Chand& Sons, New Delhi.

4. Kenny & Keeping: Mathematics of Statistics Volume I and II, VanNostran.
5. Ken Blank: Business Statistics, Willey India (P.)Ltd., New Delhi.
6. Goon Gupta & Dasgupta: Fundamental of Statistics Volume I and II, World Press, Calcutta.
7. Spiegel M.R.: Theory and Problems of Statistics, McGraw Hill Book Co., London.
8. Shenoy G.V., Srivastava U.K. & Sharma S. C. : Business Statistics, Wiley Eastern.
9. Das G.& Patnaik: Fundamentals of Mathematical Analysis, Tata McGraw Hill, New Delhi.
10. D. N. Elance (1956) : Fundamentals of Statistics Kitab Mahal ,Allahabad.
11. D.C. Sancheti and V.K. Kapoor: Statistics (Theory and Application), Sultan Chand& Sons Publication, New Delhi.
12. Meyer P. L. (1970): Introductory Probability and statistical application, Addison Wesley.
13. DeGroot M. H. (1975): Probability and Statistics, Addison Wesley. Mood A. M. Graybill F. A .and Bose D. C. (1974): Introduction to the theory of Statistics, McGraw Hill.
14. Rohatgi V. K. (1986): An introduction to probability theory and Mathematical statistics, Wiley Eastern.

Level 5.0 Semester-III
Course Code: Vocational Skill Course 3
Practical -III
(Introduced from June 2025)

Course Outcomes:
After completion of this course the students will be able -

1. To Calculate mean, median and mode for given datasets.
2. To apply measures of dispersion in real life data analysis.

2 Credits	50 marks (Semester end examination 30 and internal evaluation 20)	Total 30 hours
Unit No.	**Course Content**	**No. of Hours**
	List of Practical	**30hours**
	1. Computation of Mean, Median and Mode -I (Discrete Frequency Distributions) 2. Computation of Mean, Median and Mode -II (Continuous Frequency Distributions) 3. Computation of Range and Quartile Deviation -I (Discrete Frequency Distributions) 4. Computation of Range and Quartile Deviation -II (Continuous Frequency Distributions) 5. Computation of Variance and Standard Deviation -I (Discrete Frequency Distributions) 6. Computation of Karl Pearson's Correlation coefficient and Rank Correlation coefficient. 7. Computation of regression.	

Reference Books Recommended:

1. Agarwal B. L.: Programmed Statistics, New Age International Limited, New Delhi fourth Edition, 2021
2. Gupta S. C. & Kapoor V. K. : Fundamental of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
3. Gupta S. C. & Kapoor V. K. : Fundamental of Applied Statistics, Sultan Chand & Sons, New Delhi.
4. Gupta A. C. : Fundamental of Applied Statistics, Sultan Chand& Sons, New Delhi.
5. Kenny & Keeping: Mathematics of Statistics Volume I and II, VanNostran.
6. Ken Blank: Business Statistics, Willey India (P.)Ltd., New Delhi.

Level 5.0 Semester-IV
Course Code: DSC VIII
Business Statistics -IV
(Introduced from June 2025)

Course Outcomes

After completion of this course the students enable

1. To Apply formulas for permutations and combinations.
2. To Define probability and understand its fundamental principle.
3. To Solve problems involving the binomial distribution.
4. To Compute and interpret control limits for different types of control chart.

4 Credits	100 marks (Semester end examination 60 and internal evaluation 40)	Total 60 hours
Unit No.	**Course Content**	**No. of Hours**
Unit-I	**Permutation and Combination**	15 hours
	Factorial, Results of Factorial, Introduction to Permutation and Combination, Definition and application of the counting principle. Multiplication rule for counting, Factorial notation and basic operations with factorials. Formula for permutations when some objects are repeated. Example problems: arranging letters, numbers, or statistical data points. Basic Combination Formula, sampling problems, constructing sample sets, and understanding combinatorial probability. Numerical Examples.	
Unit-II	**Introduction to Probability**	15 hours
	Definitions and examples -Experiment, Sample space, Event, mutually exclusive events, equally likely events, Exhaustive events, Sure event, Null event, Complementary event and independent events. Mathematical definition of probability, Definition of Conditional Probability. Statements of Addition and Multiplication laws of probability. Problems on Probabilities, Conditional probabilities, Probabilities using Addition and Multiplication laws of probabilities (without use of permutations and combinations).	

Unit-III	**Probability Distributions: Binomial and Normal distribution**	15 hours
	Definitions- Random Variable, Discrete and Continuous random variables, Probability mass function (p. m. f.), Probability density function (p. d. f.). **Binomial Distribution:** - Probability mass function (p. m. f.) of binomial distribution with parameters ***n*** and ***p***. Mean, Variance and S.D. of binomial distribution (without proof). Examples of real-life situations where binomial distribution is applicable. Numerical problems on binomial distribution. **Normal Distribution:** - Probability density function (p.d.f.) of Normal distribution with parameters □ and □ ^{2}**.** Notation: $X \sim N(\square, \square^2)$. Properties of Normal distribution. Numerical problems on Normal distribution.	
Unit-IV	**Statistical Quality Control (S. Q. C)**	15 hours
	Meaning of quality. Meaning of SPC. Chance and Assignable causes of variations. Meaning of Process control and Product control. Procedure of construction of Shewhart's control chart. Types of Shewhart's control charts- i) Control charts for Mean and Range. ii) Control chart for number of defectives (d-chart or np-chart) for a fixed sample size. iii) Control chart for number of defects per unit (c-chart). Numerical problems on the construction of the above charts.	

N**ote: Use of non-programmable calculator is allowed.**

Reference Books Recommended:

1. Gupta S. C. & Kapoor V. K.: Fundamental of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Gupta S. C. & Kapoor V. K.: Fundamental of Applied Statistics, Sultan Chand & Sons, New Delhi.
3. Gupta A. C.: Fundamental of Applied Statistics, Sultan Chand& Sons, New Delhi.
4. Kenny & Keeping: Mathematics of Statistics Volume I and II, VanNostran.
5. Gupta C. B. and Gupta Vijay (2004) An introduction to Statistical Methods, Vikas Publishing House Pvt. Limited.

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7. B. L. Agrawal (2006) Baisc Statistics. New Age International.

Level 5.0 Semester-IV
Course Code: DSM3 (Minor)
Fundamental of Statistics-II
(Introduced from June 2025)

Course Outcomes

After completion of this course the students enable

1. **To Understand the concept of central tendency and its importance in summarizing datasets.**
2. **To Distinguish between absolute and relative measures of dispersion.**
3. **To Compute and interpret the correlation coefficients.**
4. **To Understand the concept of regression analysis as a statistical technique used for Prediction.**

4 Credits	100 marks (Semester end examination 60 and internal evaluation 40)	Total 60 hours
Unit No.	**Course Content**	**No. of Hours**
Unit-I	**Measures of Central Tendency**	15 hours
	Concept of central tendency, Requirements of a good average. Arithmetic mean (A.M.): Definition, Properties of A.M. (Without proof), Combined A.M. Merits and Demerits, Numerical Problems. Median and Quartiles: Definitions, Merits and demerits of median. Numerical Problems. Definitions of Deciles and Percentiles. Mode: Definition, Merits and demerits, Empirical relation among mean, median and mode. Numerical Problem on Empirical relation.	
Unit-II	**Measures of Dispersion**	15 hours
	Concept of dispersion, Requirements of a good measure of dispersion, Absolute and Relative measures of dispersion. Range, Coefficient of range, Merits and Demerits of range,	

	Numerical Problems. Quartile Deviation (Q.D.), Coefficient of Q.D., Merits and Demerits of Q.D. Numerical Problems. Variance and Standard deviations (S.D.), Coefficient of S. D., Coefficient of variation, Merits and demerits of S.D., Numerical Problems.	
Unit-III	**Analysis of Bivariate data: Correlation**	**15 hours**
	Concept of correlation, Types of correlation. Methods of studying correlation: Scatted Plot, Karl Pearson's correlation coefficient (r), Spearman's Rank correlation coefficient (R), Interpretation of r (with special cases r = -1, 0, +1). Numerical Problems on computation of r and R (with and without ties) for ungrouped data.	
Unit-IV	**Analysis of Bivariate data: Regression**	15 hours
	Concept of Regression, Lines of Regression. Regression equations, regression coefficients, relation between correlation coefficients and regression coefficients, Properties of Regression Coefficients (Without proof), Numerical problems on ungrouped data.	

Reference Books Recommended:

8. Gupta S. C. & Kapoor V. K.: Fundamental of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
9. Gupta S. C. & Kapoor V. K.: Fundamental of Applied Statistics, Sultan Chand & Sons, New Delhi.
10. Gupta A. C.: Fundamental of Applied Statistics, Sultan Chand& Sons, New Delhi.
11. Kenny & Keeping: Mathematics of Statistics Volume I and II, VanNostran.
12. Gupta C. B. and Gupta Vijay (2004) An introduction to Statistical Methods, Vikas Publishing House Pvt. Limited.
13. Agrawal B. M. (2014) Essential of Business Statistics. Ane Books Pvt. Ltd.
14. B. L. Agrawal (2006) Baisc Statistics. New Age International

Level 5.0 Semester-IV
Course Code: Open Elective 6
Applied Statistics -II
(Introduced from June 2025)

Course Outcomes:
After completion of this course the students will be able -

1. To compute correlation between two variables in real life situations.
2. To Construct various control charts.

2 Credits	50 marks (Semester end examination 30 and internal evaluation 20)	Total 30 hours
Unit No.	**Course Content**	**No. of Hours**
Unit-I	Correlation and Regression	15Hours
	Concept of correlation, Types of correlation. Methods of studying correlation: Scatted Plot, Karl Pearson's correlation coefficient (r), Spearman's Rank correlation coefficient (R), Interpretation of r (with special cases r = -1, 0, +1). Numerical Problems on computation of r and R (with and without ties) for ungrouped data. Concept of Regression, Lines of Regression. Regression equations, regression coefficients, relation between correlation coefficients and regression coefficients, Properties of Regression Coefficients (Without proof), Numerical problems on ungrouped data.	
Unit-II	**Statistical Quality Control (S. Q. C)**	15 hours
	Meaning of quality. Meaning of SPC. Chance and Assignable causes of variations. Meaning of Process control and Product control. Procedure of construction of Shewhart's control chart. Types of Shewhart's control charts- i) Control charts for Mean and Range. ii) Control chart for number of defectives (d-chart or np-chart) for a fixed sample size. iii) Control chart for number of defects per unit (c-chart). Numerical problems on the construction of the above charts.	

Note: Use of non-programmable calculator is allowed.
Reference Books Recommended:

1. Gupta S. C. & Kapoor V. K. : Fundamental of Mathematical Statistics, Sultan Chand & Sons, New Delhi.

2. Gupta S. C. & Kapoor V. K. : Fundamental of Applied Statistics, Sultan Chand & Sons, New Delhi.
3. Gupta A. C. : Fundamental of Applied Statistics, Sultan Chand& Sons, New Delhi.
4. Kenny & Keeping: Mathematics of Statistics Volume I and II, VanNostran.
5. Ken Blank: Business Statistics, Willey India (P.)Ltd., New Delhi.
6. Goon Gupta & Dasgupta: Fundamental of Statistics Volume I and II, World Press, Calcutta.
7. Spiegel M.R.: Theory and Problems of Statistics, McGraw Hill Book Co., London.
8. Shenoy G.V., Srivastava U.K. & Sharma S. C. : Business Statistics, Wiley Eastern.
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11. D.C. Sancheti and V.K. Kapoor: Statistics (Theory and Application), Sultan Chand& Sons Publication, New Delhi.
12. Meyer P. L. (1970): Introductory Probability and statistical application, Addison Wesley.
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14. Rohatgi V. K. (1986): An introduction to probability theory and Mathematical statistics, Wiley Eastern.

Level 5.0 Semester-IV
Course Code: Skill Enhancement Course 3
Practical Using MS-Excel
(Introduced from June 2025)

Course Outcomes:
After completion of this course the students will be able -

1. To Calculate mean, median and mode for given datasets using MS-Excel.
2. To apply measures of dispersion in real life data analysis using MS-Excel.

2 Credits	50 marks (Semester end examination 30 and internal evaluation 20)	Total 30 hours
Unit No.	**Course Content**	**No. of Hours**
	List of Practical	**30hours**
	Note: - Complete the entire following Practical's by using MS-Excel. 1. Computation of Mean, Median and Mode -I (Discrete Frequency Distributions) 2. Computation of Mean, Median and Mode -II (Continuous Frequency Distributions) 3. Computation of Range and Quartile Deviation -I (Discrete Frequency Distributions) 4. Computation of Range and Quartile Deviation -II (Continuous Frequency Distributions) 5. Computation of Variance and Standard Deviation -I (Discrete Frequency Distributions) 6. Computation of Karl Pearson's Correlation coefficient and Rank Correlation coefficient. 7. Computation of regression.	

Reference Books Recommended:

1. Agarwal B. L.: Programmed Statistics, New Age International Limited, New Delhi fourth Edition, 2021
2. Kieran Healy, Data Visualization A Practical Introduction, Princeton University Press, 2018
3. Claus O. Wilke, Fundamentals of Data Visualization, O'Reilly Media, 1st edition, 2019
4. Dr. B. G. Kore, MS-Excel for data Analysis, Nirali Prakashan
5. David M Lovino, Statistics for Managers using Microsoft Excel, Pearson