



**Krantiguru Shyamji Krishna Verma**  
**KACHCHH UNIVERSITY**

**BHUI-370001**

**Ordinances and Regulations**  
**(As per Guidelines of NEP 2020)**  
**&**

**Syllabus (Statistics Faculty)**

**For Programmes of**  
**B. Com. (3 Years)**

**&**

**B. Com. Honours/Honours with Research (4 Years)**

**(For the candidates to be admitted from the academic year**  
**2025 - 2026 onwards)**

**Syllabus of B.Com Sem V and Sem VI**  
**(Major, Minor)**



**B.COM. SEMESTER – V**

Course Type	Course No.	Title of Course	Credits
<b>Major</b>			
DSC-M	501 B	Advance Statistics ( Inferential Statistics-I )	4
DSC-M	502 B	Advance Statistics (Inferential Statistics-II)	4
DSC-M	503B	Advance Statistics (Nonparametric Inference)	4
<b>Minor</b>			
MIC	501 D	Statistics – IV	4
MIC	502 D	Statistics – V	4

**B.COM. SEMESTER – VI**

Course Type	Course No.	Title of Course	Credits
<b>Major</b>			
DSC-M	601 B	Advance Statistics (Statistical quality control)	4
DSC-M	602 B	Advance Statistics (Operations Research)	4
DSC-M	603 B	Advance Statistics (Demography And Vital Statistics)	4
<b>Minor</b>			
MIC	601 D	Statistics – VI	4



# **B.com**

## **Sem. – V**



# K.S.K.V. KACHCHH UNIVERSITY

## Bachelor of Commerce

### Semester-V

#### DSC-M 501 B

#### Inferential Statistics-I

Unit	Particulars	No. of Lectures \ Hours
1	<b>Estimation Theory</b> Meaning of Statistical Inference, Parameter and Statistic, Standard error of a statistic, Property of estimator- consistency, unbiasedness, efficiency of estimator, Types of Estimation, Concepts of Point and Interval estimation. Determination of a Sample Size	15
2	<b>Testing of Hypotheses</b> Meaning of statistical hypothesis, Definitions of Null hypothesis, Alternate hypothesis, Simple and Composite hypothesis, Critical region, Type-I and Type- II errors, Level of significance, Power of tests, One tailed and Two tailed tests, Examples of finding $\alpha$ , $\beta$ and power of tests by using Binomial and Poisson distributions.	15
3	<b>Large Sample Test:</b> Idea of parameter and statistic, standard error of statistic, Level of significance. Large sample Test for attributes and variables-95% and 99%, confidence interval. Testing of (I) One mean (II) One proportion (III) Equality of Two mean and two proportion.	15
4	<b>Small Sample Tests : Student's t Test</b> Introduction to small sample tests, assumptions for small sample tests, applications of t-test (both one and two tailed): (1) testing mean of a small sample, (2) comparing means of two samples (independent samples), (3) paired t-test for dependent samples, simple examples based on these tests.	15

### COURSE OBJECTIVES

- Develop a solid understanding of key inferential statistics concepts, including sampling distributions, hypothesis testing, and confidence intervals.
- Equip students with the ability to apply various statistical techniques to analyze real-world data and draw valid conclusions.
- Foster critical thinking skills by engaging students in problem-solving activities involving statistical inference.
- Introduce students to statistical software tools for data analysis to enhance practical skills in handling and interpreting data.

### COURSE OUTCOMES

- Upon successful completion of this course, students will be able to:
  - Conduct inferential analyses using appropriate statistical methods and interpret the results accurately.



- Formulate and test hypotheses using various statistical tests, understanding when to apply each test based on data characteristics.
- Calculate and interpret confidence intervals for population parameters based on sample data
- Demonstrate proficiency in using statistical software for data analysis, including data manipulation and visualization.
- Prepare comprehensive reports that summarize statistical analyses and present findings in a clear and coherent manner.

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1. An outline of Statistics theory: Goon, Gupta and Dasgupta
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6. Statistical Inference : George Casella and Roger L. Berger

### Structure of Course Examination

Evaluation for each course shall be done by a Continuous and Comprehensive Evaluation (CCE) by the concerned course teacher as well as by an end semester examination and will be consolidated at the end of the course. The components for continuous internal assessment are:

#### Internal Evaluation System

Internal Tests	25 Marks
Class participation / Case analysis and presentation/ assignment, tutorials/ slip tests (announced/ surprised), quizzes etc.	25 Marks
<b>Total</b>	<b>50 Marks</b>

Component, the end semester examination, which will be a written-type examination of at least 2:00 hours duration, would also form an integral component to the evaluation. The ratio of marks to be allotted to Continuous and Comprehensive Evaluation (CCE) and to end semester examination is 50:50.

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University examination will be of 50 Marks and 120 minutes (2.00Hrs.)

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Q.2	Answer two short questions carrying 05 marks each OR Any one question which could be a long question, case study, application of concepts, practical problem etc carrying 10 marks (Unit No. 2)	(10)
Q.3	Answer two short questions carrying 05 marks each OR Any one question which could be a long question, case study, application of concepts, practical problem etc carrying 10 marks (Unit No. 3)	(10)
Q.4	Answer two short questions carrying 05 marks each OR Any one question which could be a long question, case study, application of concepts, practical problem etc carrying 10 marks (Unit No. 4)	(10)
Q.5	Objective Questions (Equal weightage from all modules from Unit No. 1 to Unit No. 4) (any 10 out of 12 or any 5 out of 7) (It can include definitions, FIBs, True or False, one line answers, MCQs etc)	(10)
	<b>Total</b>	<b>(50)</b>





# K.S.K.V. KACHCHH UNIVERSITY

## Bachelor of Commerce

### Semester-V

#### DSC-M 502 B

#### Inferential Statistics-II

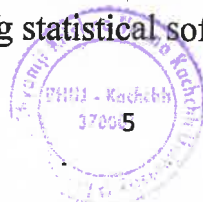
Unit	Particulars	No. of Lectures \ Hours
1	<b>Chi-square Test – 1</b> Introduction & Meaning, Definition and Nature, Condition, Uses Applications of chi-square test: test of independence, testing variance of a small sample, simple examples based on these tests.	15
2	<b>Chi-square Test – 2</b> Applications of chi-square test: testing independence of attributes using $m \times n$ . contingency table, using the formula for $2 \times 2$ contingency table with Yate's correction (without proof), testing goodness of fit (Binomial and Poisson distributions only), simple examples based on these tests.	15
3	<b>F-test</b> Introduction & Meaning, applications of F-test: (1) comparing variances of 2 small samples, simple examples based on these tests.	15
4	<b>Analysis of variance</b> Introduction, Variance Analysis in one way classification with example, Variance Analysis in two way classification with example	15

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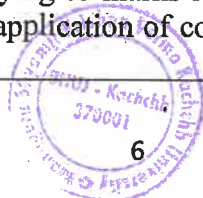
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# K.S.K.V. KACHCHH UNIVERSITY

## Bachelor of Commerce

### Semester-V

#### DSC-M 503 B

#### Nonparametric Inference

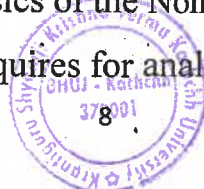
Unit	Particulars	No. of Lectures \ Hours
1	<b>Nonparametric test : Introduction</b> Introduction of Nonparametric Test, Concept of Parametric and Non-parametric Statistics, Assumptions of Non-parametric Test, Difference between Parametric and Non-parametric Test, Advantages and Disadvantages of Non-Parametric Tests, Characteristics of Nonparametric Test, Conditions for using Non-Parametric Tests, Types of Non-Parametric Test.	15
2	<b>Nonparametric test – 1</b> Introduction of Sign test, Steps to perform a Sign Test, One sample Sign Test and Sign Test for paired sample, Practical application of Sign Test with simple examples. Introduction of Wilcoxon Signed-Rank Test, Steps to perform a Wilcoxon Signed-Rank Test, Practical application of Wilcoxon Signed-Rank Test with simple examples.	15
3	<b>Nonparametric test – 2</b> Introduction of Wald-Wolfowitz/Run Test, Steps to perform a Wald-Wolfowitz/Run Test, Practical application of Wald-Wolfowitz/Run Test with simple examples. Introduction of Kruskal-Wallis Test, Steps to perform a Kruskal-Wallis Test, Practical application of Kruskal-Wallis Test with simple examples.	15
4	<b>Nonparametric test – 3</b> Introduction of Median Test, Steps to perform a Median Test, Practical application of Median Test with simple examples. Introduction of Mann-Whitney U Test, Steps to perform a Mann-Whitney U Test, Practical application of Mann-Whitney U Test with simple examples.	15

### COURSE OBJECTIVES

- This course offers students the knowledge about basics of Nonparametric test. This knowledge is necessary for the students who are opting statistics subject and for the professional and advanced studies this course will be very advantageous.

### COURSE OUTCOMES

1. To make them familiar with the basics of the Nonparametric test.
2. To give basic knowledge of tool requires for analyzing the Nonparametric test.



3. To make them aware of importance of Nonparametric tests Methods.

4. To make students familiar with various types of Nonparametric tests and their applications.

#### REFERENCE BOOKS:

1. Levin and Rubin: "Statistics for Management", Prentice Hall of India Pvt. Ltd. New Delhi
2. Sancheti & Kapoor: Business Statistics. Sultan Chand & Sons, New Delhi
3. Sancheti & Kapoor: Business Mathematics, Sultan Chand Sons, New Delhi..
4. S. C. Gupta, V. K. Kapoor, Fundamentals of Applied Statistics, Sultan Chand & sons, NewDelhi.
5. S.C. Gupta: "Fundamentals of Mathematica Statistics" S. Chand, New Delhi.
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# K.S.K.V. KACHCHH UNIVERSITY

## Bachelor of Commerce

### Semester-V

#### MIC 501 D

#### Statistics – IV (Inferential Statistics-I)

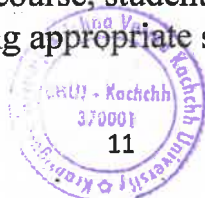
Unit	Particulars	No. of Lectures \ Hours
1	<b>Estimation Theory</b> Meaning of Statistical Inference, Parameter and Statistic, Standard error of a statistic, Property of estimator- consistency, unbiasedness, efficiency of estimator, Types of Estimation, Concepts of Point and Interval estimation. Determination of a Sample Size.	15
2	<b>Testing of Hypotheses</b> Meaning of statistical hypothesis, Definitions of Null hypothesis, Alternate hypothesis, Simple and Composite hypothesis, Critical region, Type-I and Type- II errors, Level of significance, Power of tests, One tailed and Two tailed tests, Examples of finding $\alpha$ , $\beta$ and power of tests by using Binomial and Poisson distributions.	15
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## Bachelor of Commerce

### Semester-V

#### MIC 502 D

#### Statistics – V (Inferential Statistics-II)

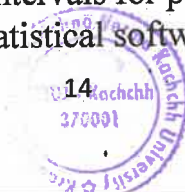
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# **B.com**

# **Sem. - VI**



# K.S.K.V. KACHCHH UNIVERSITY

## Bachelor of Commerce

### Semester-VI

#### DSC-M 601 B

#### Statistical quality control

Unit	Particulars	No. of Lectures \ Hours
1	<b>Process Control Technique – 1</b> Introduction of Quality and Quality Control, Variations in Quality: (i) Variations due to Chance Causes, (ii) Variations due to Assignable Causes, Theory of Control Charts, Theory of Runs, Specification Limits, Process Limits and Revised Limits, Uses of SQC, Charts for Variables : $\bar{X}$ chart, R chart, Construction of $\bar{X}$ and R charts, Conclusions from $\bar{X}$ and R charts, Objectives of Drawing $\bar{X}$ and R charts, simple examples based on these.	15
2	<b>Process Control Technique – 2</b> Charts for Attributes: p and np charts, Construction of p and np charts, Conclusions from p and np charts, Uses of p and np charts, Difference between p and np chart, C chart, Construction of C chart, Conclusions from C chart, Uses of C chart, Difference between Variable Charts and Attribute Charts, simple examples based on these.	15
3	<b>Lot Control Technique – 1</b> Meaning of Lot Control Technique, Advantages of Lot Control Technique, Single Sampling Plan, Acceptable Quality Level and Lot Tolerance Proportion Defective, Producer's risk and Consumer's risk, simple examples based on these.	15
4	<b>Lot Control Technique – 2</b> Operating Characteristic Curve, Average Sample Number, Average Outgoing Quality, Average Total Inspection, simple examples based on these. Double Sampling Plan (Theory only).	15

### COURSE OBJECTIVES

- Assist students in learning techniques and approach of SQC being used in industry to manufacture goods and services of high quality at low cost.
- Provide exposure to Sampling Inspection Plans.

### COURSE OUTCOMES

- Upon successful completion of this course, students will be able to:
  - Understand the concepts of quality control in industry.
  - Apply various tools to examine the quality of a process and product.
  - Understand the concepts of Lot Control Technique.
  - Understand the concepts of Single Sampling Plan & Double Sampling Plan.

## REFERENCE BOOKS:

1. M. Mahajan, Statistical Quality Control, Revised Edition, Dhanapat Rai & Co, 2007.
2. W.W.Hines, D. C.Montgomery, Probability and Statistics in Engineering and Management Science, John Wiley and Sons, New York, 1990.
3. Kapoor, V.K. and Gupta, S.P. (1978): Fundamentals of applied statistics, Sultan Chand & Sons. Gupta, R.C.(1974): Statistical Quality Control
4. An outline of Statistics theory: Goon, Gupta and Dasgupta

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	<b>Total</b>	<b>(50)</b>





# K.S.K.V. KACHCHH UNIVERSITY

## Bachelor of Commerce

### Semester-VI

#### DSC-M 602 B

#### Operations Research

Unit	Particulars	No. of Lectures \ Hours
1	<b>Operations Research: Introduction</b> Overview of Operations Research, Definitions of O.R., Characteristics of O.R., Application and scope of O.R., Phases of O.R., Model in O.R., Techniques and tools, Working of O.R., Advantages and Limitations of O.R.	15
2	<b>Decision Theory – 1</b> Meaning of decision theory and its basic terminologies, Methods of solving decision problem (i) Decision under uncertainty- Maxi-max, Maxi-min, Hurwich, Laplace (ii) Decision Making Under Risk: Decision Tree, simple examples based on these	15
3	<b>Decision Theory – 2</b> Methods of solving decision problem (ii) Decision Making Under Risk: Expected Monetary Value (EMV), Expected Opportunity Loss (EOL), Expected Value of Perfect Information (EVPI), simple examples based on these.	15
4	<b>Game Theory</b> Meaning of game, two person zero sum game and its assumptions, Pure Games with Saddle point, Games without Saddle point : Dominance Property, Algebraic Method simple examples based on these.	15

### COURSE OBJECTIVES

- At the end of this course students are expected to be able understand a wide variety of applications and problems that can be addressed using Operations Research techniques.
- To understand the basics in the field of decision theory.
- To understand the basics in the field of game theory

### COURSE OUTCOMES

- Recognize the importance and value of Operations Research in solving practical problems in industry
- Observing the data from statistical concept angel.
- Get awareness about the Operations Research.



- Will be able to understand the importance of basic Operations Research.
- Get awareness about the modern techniques of statistics by teaching learning process.

**REFERENCE BOOKS:**

1. Operation Research, Sultan Chand :Kanti swaroop, P.K.Guptha and Man Mohan
2. Operation Reach – S.D.Sharma
3. An outline of Statistics theory: Goon, Gupta andDasgupta
4. Business Statistics: Sancheti & Kapoor
5. Fundamental of Statistics: D. N. Elhance
6. Statistics of Management: Levin and Rubin.

**Structure of Course Examination**

Evaluation for each course shall be done by a Continuous and Comprehensive Evaluation (CCE) by the concerned course teacher as well as by an end semester examination and will be consolidated at the end of the course. The components for continuous internal assessment are:

**Internal Evaluation System**

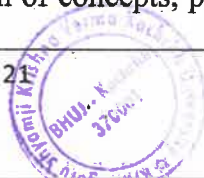
Internal Tests	25 Marks
Class participation / Case analysis and presentation/ assignment, tutorials/ slip tests (announced/ surprised), quizzes etc.	25 Marks
<b>Total</b>	<b>50 Marks</b>

Component, the end semester examination, which will be a written-type examination of at least 2:00 hours duration, would also form an integral component to the evaluation. The ratio of marks to be allotted to Continuous and Comprehensive Evaluation (CCE) and to end semester examination is 50:50.

The external evaluation pattern would be based on the written examination taken at the end of the semester. The format includes subjective, objective and applications questions so the test of students can be done on parameters like conceptual knowledge, its application in actual sense, his or her memory and presence of mind. The structure is as under:

University examination will be of 50 Marks and 120 minutes (2.00Hrs.)

Q.1	Answer two short questions carrying 05 marks each OR Any one question which could be a long question, case study, application of concepts, practical problem etc carrying 10 marks (Unit No. 1)	(10)
Q.2	Answer two short questions carrying 05 marks each OR Any one question which could be a long question, case study, application of concepts, practical problem etc carrying 10 marks (Unit No. 2)	(10)



Q.3	Answer two short questions carrying 05 marks each OR Any one question which could be a long question, case study, application of concepts, practical problem etc carrying 10 marks. (Unit No. 3)	(10)
Q.4	Answer two short questions carrying 05 marks each OR Any one question which could be a long question, case study, application of concepts, practical problem etc carrying 10 marks (Unit No. 4)	(10)
Q.5	Objective Questions (Equal weightage from all modules from Unit No. 1 to Unit No. 4) (any 10 out of 12 or any 5 out of 7) (It can include definitions, FIBs, True or False, one line answers, MCQs etc)	(10)
	<b>Total</b>	<b>(50)</b>





# K.S.K.V. KACHCHH UNIVERSITY

## Bachelor of Commerce

### Semester-VI

#### DSC-M 603 B

#### Demography And Vital Statistics

Unit	Particulars	No. of Lectures \ Hours
1	<b>Demography : Introduction</b> Introduction of demography, Study of demography, method of obtain vital statistics, history of demography, scope of demography, Uses of demography, Defects of demographic statistics.	15
2	<b>Vital Statistics – 1</b> Measures of death rate, Crude and standardized death rates, Measures of mortality rates, Infant mortality rates, Crude birth rate with numerical examples.	15
3	<b>Vital Statistics – 2</b> Measure of fertility rate : Specific fertility rate, General fertility rate, Total fertility rate, Marriage rate with numerical examples.	15
4	<b>Vital Statistics – 3</b> Life Tables: Scope, importance and limitations of life tables, Different methods of construction of life tables with numerical examples.	15

#### COURSE OBJECTIVES

- To identify appropriate sources of data and to perform basic demographic analyses using various techniques across populations.
- To learn the main theories used to understand population studies and societal change.

#### COURSE OUTCOMES

- Upon successful completion of this course, students will be able to:
  - Understand the interdisciplinary nature of demography.
  - Understand the measures of death rate and birth rate.
  - Understand the measures of mortality and fertility.
  - Describe the concept of life tables.

#### REFERENCE BOOKS:

1. Goon, Gupta and Dasgupta : An outline of Statistics theory
2. Croxton, F.E. and Cowden, D.J. (1973): Applied General Statistics, Prentice Hall Of India, third edition



3. Srivastava, O.S.: A Textbook of Demography, Vikas Publishing.
4. Gupta, O.P.: Mathematical Statistics, Kedarnath Publication, Meerut
5. Shrinivasan, K. and Srinivasan, K.: Basic Demographic Techniques and Applications.

### Structure of Course Examination

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#### Internal Evaluation System

Internal Tests	25 Marks
Class participation / Case analysis and presentation/ assignment, tutorials/ slip tests (announced/ surprised), quizzes etc.	25 Marks
<b>Total</b>	<b>50 Marks</b>

Component, the end semester examination, which will be a written-type examination of at least 2:00 hours duration, would also form an integral component to the evaluation. The ratio of marks to be allotted to Continuous and Comprehensive Evaluation (CCE) and to end semester examination is 50:50.

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Q.3	Answer two short questions carrying 05 marks each OR Any one question which could be a long question, case study, application of concepts, practical problem etc carrying 10 marks (Unit No. 3)	(10)
Q.4	Answer two short questions carrying 05 marks each OR Any one question which could be a long question, case study, application of concepts, practical problem etc carrying 10 marks (Unit No. 4)	(10)
Q.5	Objective Questions (Equal weightage from all modules from Unit No. 1 to Unit No. 4) (any 10 out of 12 or any 5 out of 7) (It can include definitions, FIBs, True or False, one line answers, MCQs etc)	(10)
<b>Total</b>		<b>(50)</b>





# K.S.K.V. KACHCHH UNIVERSITY

## Bachelor of Commerce

### Semester-VI

#### MIC 601 D

#### Statistics – VI (Statistical quality control)

Unit	Particulars	No. of Lectures \ Hours
1	<b>Process Control Technique – 1</b> Introduction of Quality and Quality Control, Variations in Quality: (i) Variations due to Chance Causes, (ii) Variations due to Assignable Causes, Theory of Control Charts, Theory of Runs, Specification Limits, Process Limits and Revised Limits, Uses of SQC, Charts for Variables : $\bar{X}$ chart, R chart, Construction of $\bar{X}$ and R charts, Conclusions from $\bar{X}$ and R charts, Objectives of Drawing $\bar{X}$ and R charts, simple examples based on these.	15
2	<b>Process Control Technique – 2</b> Charts for Attributes: p and np charts, Construction of p and np charts, Conclusions from p and np charts, Uses of p and np charts, Difference between p and np chart, C chart, Construction of C chart, Conclusions from C chart, Uses of C chart, Difference between Variable Charts and Attribute Charts, simple examples based on these.	15
3	<b>Lot Control Technique – 1</b> Meaning of Lot Control Technique, Advantages of Lot Control Technique, Single Sampling Plan, Acceptable Quality Level and Lot Tolerance Proportion Defective, Producer's risk and Consumer's risk, simple examples based on these.	15
4	<b>Lot Control Technique – 2</b> Operating Characteristic Curve, Average Sample Number, Average Outgoing Quality, Average Total Inspection, simple examples based on these. Double Sampling Plan (Theory only).	15

### COURSE OBJECTIVES

- Assist students in learning techniques and approach of SQC being used in industry to manufacture goods and services of high quality at low cost.
- Provide exposure to Sampling Inspection Plans.

### COURSE OUTCOMES

- Upon successful completion of this course, students will be able to:
  - Understand the concepts of quality control in industry.
  - Apply various tools to examine the quality of a process and product.
  - Understand the concepts of Lot Control Technique.
  - Understand the concepts of Single Sampling Plan & Double Sampling Plan.

## REFERENCE BOOKS:

1. M. Mahajan, Statistical Quality Control, Revised Edition, Dhanapat Rai & Co, 2007.
2. W.W.Hines, D. C.Montgomery, Probability and Statistics in Engineering and Management Science, John Wiley and Sons, New York, 1990.
3. Kapoor, V.K. and Gupta, S.P. (1978): Fundamentals of applied statistics, Sultan Chand & Sons. Gupta, R.C.(1974): Statistical Quality Control
4. An outline of Statistics theory: Goon, Gupta andDasgupta

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