V. P. & R. P. T. P. Science College (Autonomous), Vallabh Vidyanagar

DEPARTMENT OF MATHEMATICS & STATISTICS

(Bachelor of Science) (Undergraduate)

Semester-I

The following is the list of subject codes and subject names for courses offered by the Department of Mathematics & Statistics:

MATHEMATICS			
Sr. No	**Course**	**Subject Code**	**Subject Name**
1	Major Course-1	US01MAMTH01	Calculus
2	Major Course-2	US01MAMTH02	Problems & Exercises in Calculus
3	Minor Course-1	US01MIMTH01	Curve sketching & Partial Derivatives
4	Minor Course-2	US01MIMTH02	Problems & Exercises in Curve sketching & Partial Derivatives
5	Inter-disciplinary Course-1	US01IDMTH01	Successive Differentiation & Partial Derivatives
6	Inter-disciplinary Course-2	US01IDMTH02	Problem & Exercises in Successive Differentiation & Partial Derivatives

STATISTICS			
Sr. No	**Course**	**Subject Code**	**Subject Name**
1.	Minor Course-1	US01MISTA01	Descriptive Statistics for Univariate data
2.	Minor Course-2	US01MISTA02	Statistics Practical-I

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Syllabus effective from the Academic Year 2024-2025

(Bachelor of Science) (Undergraduate)
B. Sc. (UG) Semester-I

Course Code	US01MAMTH01	Title of the Course	Calculus (Theory)
Total Credits of the Course	04	Hours per Week	4 hours

Course Objectives:	To make students familiar with: 1. Understand and apply derivatives, including higher-order derivatives, Leibniz's Theorem, and apply various mean value theorems in different contexts. 2. Expansion of function using Taylor's/Maclaurin's Theorems, Evaluating limits of indeterminate forms using L'Hospital's rule. 3. Explore functions of several variables, including continuity, limits, and partial derivatives, and understand the chain rule and Euler's Theorem. 4. Develop proficiency in converting between Polar and Cartesian coordinates, sketching curves represented in different forms, and computing arc lengths and radii of curvature.

Course Content		
Unit	Description	Weightage* (%)
1.	Successive Derivative, Higher order Derivatives, n^{th} Derivatives of standard form, Leibnitz's Theorem and its Applications, Mean Value Theorems: Rolle's Mean Value Theorem, Lagrange's Mean Value Theorem, Different forms of Lagrange's Mean Value Theorem, and their geometrical interpretations.	25%
2.	Cauchy's Mean Value Theorem and its geometrical interpretation, Taylor's and Maclaurin's Theorems (Lagrange's form of remainder), Power series expansions of $sinx, cosx, e^x$ for $x \in R$ and $(1+x)^n$, $\log(1+x)$ for $\lvert x\rvert < 1$ (Assuming the validity of expansions), Reduction formula for $\int \sin^m(x)\,dx$, $\int \cos^m(x)\,dx$ and, $\int \sin^m(x)\cos^n(x)\,dx$, $(m,n \in N)$. Indeterminate forms: L' Hospital Rules (Proof of 0/0 case only).	25%

3.	Domain and range of functions of several variables and its graphical representation, Limit-Continuity of function of two variables, partial derivatives, differentiability of functions of two variables, chain rule, Euler's Theorem on Homogeneous Functions of two and three Variables, total derivative, Differentiation of composite and implicit functions.	25%
4.	Polar coordinate system, relation between Polar and Cartesian coordinates, Curve sketching of Cartesian, Parametric and Polar equation (Limacon, Lemniscate, Rose curve and Spiral), Rectification: Arc length of the curve, Intrinsic equation of a curve, Radius of Curvature.	25%

Teaching-Learning Methodology	Classroom teaching, Class discussion, Problem solving activities, Presentation by students, Use of ICT whenever required.

Evaluation Pattern			
Sr. No.	Details of the Evaluation		Weightage
1.	CCE (Continuous and Comprehensive Evaluation)	○ Class test/Internal Written test (30%) ○ Quiz (30%) ○ Active learning (10%) ○ Home Assignments (10%) ○ Class Assignments (10%) ○ Attendance (10%)	50 %
2.	SEE (Semester End Examination)	○ Written test 50 %	50 %

Course Outcomes:	
1.	Students will be able to analyse and solve problems involving derivatives, demonstrate proficiency in applying various Mean Value Theorems, and series expansions effectively.
2.	Students will be able to evaluating limits of functions.
3.	Students will develop a solid understanding of functions of several variables, including continuity, partial derivatives, and geometric interpretations.
4	Students will acquire skills in converting between Polar and Cartesian coordinates,

	sketching curves, and computing arc lengths and radii of curvature, enabling them to solve a variety of applied problems

Suggested Reference Books:	
Sr. No.	Reference Books
1.	Shanti Narayan, Differential Calculus, 14th Edition, S. Chand & Company Ltd., New Delhi, 2005.
2.	Shanti Narayan, Integral Calculus, 14th Edition, S. Chand & Company Ltd., New Delhi, 1996.
3	Maurice D. Weir, Joel Hass, Christopher Heil, Thomas' Calculus, 15th edition, Pearson Education, 2022.
4.	BS Grewal - Higher Engineering Mathematics - 44th/Ed. , Khanna Publisher, 2023.

On-line Resources : https://nptel.ac.in/courses

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(Bachelor of Science) (Undergraduate)
B. Sc. (UG) Semester-I

Course Code	US01MAMTH02	Title of the Course	Problems and Exercises in Calculus (Practical)
Total Credits of the Course	04	Hours per Week	8 hours

Course Objectives:	To make students familiar with: 1. Develop proficiency in derivatives, including successive derivatives and higher-order derivatives, Taylor's/Maclaurin's Theorems, and power series for accurate function approximation. 2. Evaluating limits involving indeterminate forms and applying Mean Value Theorems for function analysis. 3. Develop skills in computing partial derivatives and determining the differentiability of functions of two variables. 4. Apply Euler's Theorem on homogeneous functions and the chain rule effectively in problem-solving and apply knowledge of tangent planes and normal lines to solve problems related to curves. 5. Develop skills in accurately sketching Cartesian, parametric, and polar curves and Calculate arc length, derive intrinsic equations, and compute radii of curvature to solve problems related to rectification.

Course Content		
Parts	Description	Weightage* (%)
Part-1	1. Successive Derivatives. 2. Leibniz's Theorem. 3. Rolle's Mean Value Theorem, Lagrange's Mean Value Theorem. 4. Cauchy's Mean Value Theorem 5. Taylor's and Maclaurin's Theorems. 6. Power series of various functions. 7. Reduction formulae. 8. Indeterminate forms. 9. Limits and Continuity of functions of several variables.	50%
Part-2	1. Partial Derivatives and the differentiability of functions of two	50%

	variables. 2. Euler's Theorem on Homogeneous Functions of two and three variables. 3. Chain rule and total differentiation. 4. Differentiation of composite and implicit functions. 5. Sketching of Cartesian curves. 6. Sketching of parametric curves. 7. Sketching of polar curves. 8. Tangent planes and normal lines to curves. 9. Rectification: Arc length of curves, intrinsic equation of curves, Radius of Curvature.	

Teaching-Learning Methodology	Classroom teaching, Class discussion, Problem solving activities, Presentation by students, Use of ICT whenever required.

Evaluation Pattern			
Sr. No.	Details of the Evaluation		Weightage
1.	CCE (Continuous and Comprehensive Evaluation)	○ Lab work Assessment (40%) ○ Viva Voce/Lab Quiz (40%) ○ Attendance (20%)	50 %
2.	SEE (Semester End Examination)	○ Lab work Assessment (80%) ○ Viva Voce/Lab Quiz (20%)	50 %

Course Outcomes:	
1.	Students will demonstrate proficiency in applying derivative concepts and theorem-based techniques to solve a variety of mathematical problems accurately.
2.	Students will develop analytical skills in evaluating limits involving indeterminate forms and applying mean value theorems to analyze functions effectively.
3.	Students will gain practical experience in computing partial derivatives, determining differentiability of functions.
4.	Students will acquire advanced problem-solving abilities through the application of total differentiation, Euler's Theorem, and rectification methods to real-world scenarios involving curves and functions.

5.	Students will demonstrate a comprehensive understanding of multivariable calculus concepts and their practical applications in diverse mathematical contexts.

Suggested Reference Books:

Sr. No.	Reference Books
1.	Shanti Narayan, Differential Calculus, 14th Edition, S. Chand & Company Ltd., New Delhi, 2005.
2.	Shanti Narayan, Integral Calculus, 14th Edition, S. Chand & Company Ltd., New Delhi, 1996
3	Maurice D. Weir, Joel Hass, Christopher Heil, Thomas' Calculus, 15th edition, Pearson Education, 2022.
4.	BS Grewal - Higher Engineering Mathematics - 44th/Ed. , Khanna Publisher, 2023.

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(Bachelor of Science) (Undergraduate)
B. Sc. (UG) Semester-I

Course Code	US01MIMTH01	Title of the Course	Curve sketching & Partial Derivatives (Theory)
Total Credits of the Course	02	Hours per Week	2 hours

Course Objectives:	To make students familiar with: 1. Develop proficiency in converting between polar and Cartesian coordinates, sketching curves represented in different forms, and computing arc lengths and radii of curvature. 2. Explore functions of several variables, including continuity, limits, and partial derivatives, and understand the chain rule and Euler's theorem.

Course Content

Unit	Description	Weightage* (%)
1.	**Curve Sketching :** Polar coordinate system, relation between polar and Cartesian coordinates, Curve sketching of Cartesian, parametric and Polar equation (Limacon, Lemniscate, Rose curve and Spiral etc…), Rectification: Arc length of the curve, Intrinsic equation of a curve, Radius of Curvature.	50%
2.	**Partial Derivatives and its applications:** Introduction to function of several variables, Limit – Continuity of function of several variables and partial derivatives- Geometric interpretation. Euler's Theorem on Homogeneous Functions of Two and Three Variables, Total Differentials, Differentiation of Composite and Implicit Functions, Extreme Values, Lagrange Multipliers.	50%

Teaching-Learning Methodology	Classroom teaching, Class discussion, Problem solving activities, Presentation by students, Use of ICT whenever required.

Evaluation Pattern

Sr. No.	Details of the Evaluation		Weightage
1.	CCE (Continuous and Comprehensive Evaluation)	○ Class test/Internal Written test (40%) ○ Quiz (20%) ○ Home Assignments (20%) ○ Attendance (20%)	50 %
2.	SEE (Semester End Examination)	○ Written test (50 %)	50 %

Course Outcomes:	
1.	Students will acquire skills in converting between polar and Cartesian coordinates, sketching curves, and computing arc lengths and radii of curvature, enabling them to solve a variety of applied problems.
2.	Students will develop a solid understanding of functions of several variables, including continuity, partial derivatives, and geometric interpretations.

Suggested Reference Books:	
Sr. No.	Reference Books
1.	Shanti Narayan, Differential Calculus, 15th Edition, S. Chand & Company Ltd., New Delhi, 2005.
2.	Shanti Narayan, Integral Calculus, 14th Edition, S. Chand & Company Ltd., New Delhi, 1996
3	Maurice D. Weir, Joel Hass, Christopher Heil, Thomas' Calculus, 15 th edition, Pearson Education, 2022.
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B. Sc. (UG) Semester-I

Course Code	US01MIMTH02	Title of the Course	Problems and Exercises in Curve sketching & Partial Derivatives (Practical)
Total Credits of the Course	02	Hours per Week	4 hours

Course Objectives:	To make students familiar with: 1. Evaluating limits involving indeterminate forms. 2. Develop proficiency in sketching Cartesian curves, parametric curves and polar curves, tangent planes and normal lines to the curve. 3. Gain practical experience in calculating arc lengths of curves and deriving intrinsic equations. 4. Develop skills in computing partial derivatives and determining the differentiability of functions of two variables. 5. Apply Euler's theorem on homogeneous functions and the chain rule effectively in problem-solving.

Course Content		
Sr. No.	List of Practical	Weightage* (%)
1	Indeterminate forms.	100%
2	Sketching of Cartesian curves.	
3	Sketching of parametric curves.	
4	Sketching of polar curves.	
5	Rectification: Arc length of curves, intrinsic equation of curves, Radius of Curvature.	
6	Limits and Continuity of functions of two variables.	
7	Partial Derivatives and the differentiability of functions of two variables.	
8	Euler's Theorem on Homogeneous Functions of two and three	

	variables.	
9	Chain rule and total differentiation.	
10	Differentiation of composite and implicit functions.	
11	Extreme Values.	
12	Lagrange Multipliers.	

Teaching-Learning Methodology	Classroom teaching, Class discussion, Problem solving activities, Presentation by students, Use of ICT whenever required.

Evaluation Pattern		
Details of the Evaluation		Weightage
CCE (Continuous and Comprehensive Evaluation)	○ Lab work Assessment (40%) ○ Viva Voce/Lab Quiz (40%) ○ Attendance (20%)	50 %
SEE (Semester End Examination)	○ Lab work Assessment (80%) ○ Viva Voce/Lab Quiz (20%)	50 %

Course Outcomes:	
1.	Students will demonstrate proficiency in accurately sketching Cartesian, parametric, and polar curves, applying geometric principles and understanding curve behaviour.
2.	Students will develop problem-solving skills in determining tangent planes and normal lines to curves, applying concepts of vectors and derivatives.
3.	Students will gain practical experience in calculating arc lengths of curves, deriving intrinsic equations, and computing radii of curvature, applying advanced techniques in curve analysis.
4.	Students will develop analytical skills in evaluating limits involving indeterminate forms.
5.	Students will gain practical experience in computing partial derivatives, determining differentiability of functions, and acquire advanced problem-solving abilities through the application of total differentiation, Euler's theorem, and Extreme values of a function and Lagrange multipliers method to evaluate extreme values of a function.
Suggested Reference Books:	

Sr. No.	Reference Books
1.	Shanti Narayan, Differential Calculus, 14th Edition, S. Chand & Company Ltd., New Delhi, 2005.
2.	Joel Hass, Christopher Heil, Maurice D. Weir, Thomas' Calculus, 15th edition, Pearson Education, 2022.
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(Bachelor of Science) (Undergraduate)
B. Sc. (UG) Semester-I

Course Code	US01IDMTH01	Title of the Course	Successive Differentiation & Partial Derivatives (Theory)
Total Credits of the Course	02	Hours per Week	2 hours

Course Objectives:	To make students familiar with: 1. Understand and apply derivatives, including higher-order derivatives, Leibniz's theorem, and Taylor's/Maclaurin's theorems for function approximation, evaluating limits of indeterminate forms using Hospital's. 2. Explore functions of several variables, including continuity, limits, and partial derivatives, and understand the chain rule and Euler's theorem.

Course Content		
Unit	Description	Weightage* (%)
1.	**Successive Differentiation:** Successive Derivative, Higher order Derivatives, n^{th} Derivatives of standard Form, Leibnitz's Theorem and its Applications. **Taylor's and Maclaurin's expansion:** Taylor's and Maclaurin's Theorems (Without proof), Power series expansions of $\sin x$, $\cos x$, e^x for $x \in R$ and $(1+x)^n$, $\log(1+x)$ for $\lvert x \rvert < 1$ (Assuming the validity of expansions).	50%
2.	**Partial Derivatives and its applications:** Introduction to function of several variables, Limit – Continuity of function of several variables and partial derivatives - Geometric interpretation. Euler's Theorem on Homogeneous Functions of Two and Three Variables, Total Differentials, Differentiation of Composite and Implicit Functions, Extreme Values, Lagrange Multipliers.	50%

Teaching-Learning Methodology	Classroom teaching, Class discussion, Problem solving activities, Presentation by students, Use of ICT whenever required.

Evaluation Pattern			
Sr. No.	Details of the Evaluation		Weightage
1.	CCE (Continuous and Comprehensive Evaluation)	○ Class test/Internal Written test (40%) ○ Quiz (20%) ○ Home Assignments (20%) ○ Attendance (20%)	50 %
2.	SEE (Semester End Examination)	○ Written test (50 %)	50 %

Course Outcomes:	
1.	Students will be able to analyse and solve problems involving derivatives, and series expansions effectively.
2.	Students will develop a solid understanding of functions of several variables, including continuity, partial derivatives, and geometric interpretations, enabling them to solve a variety of applied problems.

Suggested Reference Books:	
Sr. No.	Reference Books
1.	Shanti Narayan, Differential Calculus, 14th Edition, S. Chand & Company Ltd., New Delhi, 2005.
2.	Joel Hass, Christopher Heil, Maurice D. Weir, Thomas' Calculus, 15th edition, Pearson Education, 2022.
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B. Sc. (UG) Semester-I

Course Code	US01IDMTH02	Title of the Course	Problems and Exercises in Successive Differentiation & Partial Derivatives (Practical)
Total Credits of the Course	02	Hours per Week	4 hours

Course Objectives:	To make students familiar with: 1. Evaluating limits involving indeterminate forms. 2. Develop proficiency in derivatives, including successive derivatives and higher-order derivatives, Taylor's/Maclaurin's theorems, and power series for accurate function approximation. 3. Develop skills in computing partial derivatives and determining the differentiability of functions of two variables. 4. Apply Euler's theorem on homogeneous functions and the chain rule effectively in problem-solving.

Course Content		
Sr. No.	List of Practical	Weightage* (%)
1.	Indeterminate forms	100%
2.	Successive Derivatives.	
3.	Leibniz's theorem.	
4.	Taylor's and Maclaurin's Theorems.	
5.	Power series expansion of various functions.	
6.	Limit and Continuity of functions of two variables.	
7.	Partial Derivatives and the differentiability of functions of two variables	
8.	Euler's Theorem on Homogeneous Functions of two and three variables.	
9.	Chain rule and total differentiation.	
10.	Differentiation of composite and implicit functions.	
11.	Extreme Values.	

12.	Lagrange Multipliers.	

Teaching-Learning Methodology	Classroom teaching, Class discussion, Problem solving activities, Presentation by students, Use of ICT whenever required.

Evaluation Pattern		
Details of the Evaluation		Weightage
CCE (Continuous and Comprehensive Evaluation)	○ Lab work Assessment (40%) ○ Viva Voce/Lab Quiz (40%) ○ Attendance (20%)	50 %
SEE (Semester End Examination)	○ Lab work Assessment (80%) ○ Viva Voce/Lab Quiz (20%)	50 %

Course Outcomes:	
1.	Students will demonstrate proficiency in applying derivative concepts and theorem-based techniques to solve a variety of mathematical problems accurately.
2.	Students will develop analytical skills in evaluating limits involving indeterminate forms.
3.	Students will gain practical experience in computing partial derivatives, determining differentiability of functions.
4.	Students will gain practical experience in computing partial derivatives, determining differentiability of functions, and acquire advanced problem-solving abilities through the application of total differentiation, Euler's theorem, and Extreme values of a function and Lagrange multipliers method.

Suggested Reference Books:	
Sr. No.	Reference Books
1.	Shanti Narayan, Differential Calculus, 14th Edition, S. Chand & Company Ltd., New Delhi, 2005.
2.	Joel Hass, Christopher Heil, Maurice D. Weir, Thomas' Calculus, 15th edition, Pearson Education, 2022.
3.	BS Grewal - Higher Engineering Mathematics - 44th/Ed. , Khanna Publisher, 2023.

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DEPARTMENT OF MATHEMATICS AND STATISTICS

(Bachelor of Science) (Undergraduate)

B. Sc (UG) Semester - I

Minor Course – 1: Descriptive Statistics for Univariate Data

Course Code	**US01MISTA01**	Title of the Course	**DESCRIPTIVE STATISTICS FOR UNIVARIATE DATA**
Total Credits of the Course	02	Hours per Week	2 hours

Course Objectives:	1. To understand the types of data in scientific and other fields 2. To compute various measures of central tendency, dispersion, skewness and kurtosis with its merits and demerits and its usefulness in real life. 3. To understand the concept of various partition values and its uses in real life.

Course Content		
Unit	Description	Weightage* (%)
I	Data Types : scale of measurements – nominal, ordinal, interval and ratio **Analysis of Quantitative data – I** Measures of central tendency : Mean, Median, Mode, Geometric mean Harmonic mean, Weighted mean, Combined mean with its merits and demerits, Properties (with proof), Examples Partition values and their graphical representation	50%
II	**Analysis of Quantitative data - II** Measures of Dispersion : Range, Quartile derivation, Mean Derivation, Standard derivation and Coefficient of variation(C.V) with its merits and demerits, Properties (with proof)	50%

	Box – and – whisker plot, Stem – and – Leaf diagram, Lorenz curve Moments : Raw and central moments Relationship between raw and central moments Skewness, Kurtosis , Examples	

Teaching-Learning Methodology	Classroom teaching, Presentation by students, Use of ICT whenever required.

Evaluation Pattern			
Sr. No.	Details of the Evaluation		Weightage
1.	CCE (Continuous and Comprehensive Evaluation)	○ Class test/Internal Written test (40%) ○ Quiz (20%) ○ Home Assignments (20%) ○ Attendance (20%)	50 %
2.	SEE (Semester End Examination)	○ Written test (50 %)	50 %

Course Outcomes: Having completed this course, the learner will be able to	
1.	Quantify the measures of central tendency (location), dispersion (spread), skewness and kurtosis (shape related) and relate them with data
2.	Calculate quantiles and relate it with different characteristics of data

Suggested Text Books/ References:	
Sr. No.	Text Books
1.	B. L. Agarwal (2003). Programmed STATISTICS (Questions – Answers). New Age International Publishers. Chap. 1-5.

2.	D. Bhattacharya and S. Roychowdhury (2019 reprint).STATISTICS, Theory and Practice, 3rd Ed., U.N. Dhur & Sons Pvt. Ltd., Kolkata. Chap. 1-7.
3.	D. freedman, R. Pisani, R. Purves (2017 reprint). Statistics, 4th Ed., Viva Books, Kolkata. Chap 3-4.
4.	Goon, A.M., Gupta, M. K. and Dasgupta, B. (2002). Fundamental of Statistics, Vol. I, 8th Ed., The World Press, Kolkata. Chap. 4-9.
5.	B. L. Agarwal (2006). Basic Statistics, Revised 4th Ed., New Age International Publishers. Chap. 18.
	Reference Books
6.	Bilal, M. A. And Richard, H. M. (2015). Probability, Statistics, and reliability for Engineers and Scientists, 3rd Ed. Special Indian Ed., (Chapter 1 &2), CRC Press.
7.	J. McClave and T. Sincich (2018). Statistics, 13th Ed., Pearson, NY. Chap. 1-2.
8.	Pandian, C.R and Murali, K.S.K. (2015). Simple Statistical Methods for software Engineering: Data and patterns, (Section I) CRC Press. Chap. 1-4.

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DEPARTMENT OF MATHEMATICS AND STATISTICS

(Bachelor of Science) (Undergraduate)

B. Sc (UG) Semester - I

Minor Course – 2: Statistics Practical - I

Course Code	**US01MISTA02**	Title of the Course	**Statistics Practical - I**
Total Credits of the Course	02	Hours per Week	4 hours

Course Objectives:	1. Practicing to identify data types from the example/problem at hand from scientific and other fields 2. Practicing to summarize and derive tangible information contained in the scientific and other data

List of Practicals

Sr. No.	**Task Using MS-EXCEL/Manual**
1	Tabulation of scientific data: Discrete and Continuous frequency table, Cumulative frequency table for attributes and variables
2	Diagrammatical presentation of scientific data: Bar chart, Pie chart
3	Graphical presentation of scientific data: frequency curve, histogram, frequency polygon
4	Measures of central tendency: mean by direct method, and with change of origin and scale, and for classified frequency tabulated scientific data
5	Measures of central tendency: quantiles (including median) by direct method, graphically and for classified frequency tabulated scientific data
6	Measures of central tendency: mode by direct method, graphically and for classified frequency tabulated scientific data
7	Measures of dispersion: quartile deviation by direct method, graphically and for classified frequency tabulated scientific data
8	Measures of dispersion: mean deviation, standard deviation, coefficient of variation by direct method, and with change of origin and scale and for classified frequency tabulated scientific data.

9	Moments: raw, central, skewness and kurtosis based on moments
10	Box-Whisker plot of five data characteristics and outlier values, Stem and leaf diagram, Lorenz curve

Evaluation Pattern			
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1.	CCE (Continuous and Comprehensive Evaluation)	○ Class test/Internal Written test (40%) ○ Quiz (20%) ○ Home Assignments (20%) ○ Attendance (20%)	50 %
2.	SEE (Semester End Examination)	○ Written test (50 %)	50 %

REFERENCE MATERIAL

1.	Fred, Pyrczak (2017). SUCCESS at STATISTICS, A worksheet with Humor, 6th Ed., Routledge, NY.
2.	Pal, N. And Sarkar, S. (2005). STATISTICS, Concepts and Applications, Prentice Hall of India, New Delhi.
3.	K.V.S. Sarma (2001). STATISTICS made Simple DO It Yourself on PC, Prentice Hall of India, New Delhi.
4.	B. L. Agarwal (2006). Basic Statistics, Revised 4th Ed., New Age International Publishers. Chap. 18.