



**Department of Information Technology**

**B.sc in Information Technology (Data Science)**

GE Basket 1	
Mathematics	
1	Mathematics for Computing (GE3B-09)
2	Probability & Statistics (GE3B-10)
3	Bayesian Statistics (GE3B-11)
4	Operations Research (GE3B-12)
5	Data Analytics (GE3B-13)
6	Applied Cryptography (GE3B-14)
7	Inferential Statistics (GE3B-15)



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<b>Name of the Course: B.Sc. in Information Technology (Data Science)</b>	
<b>Subject:</b> Mathematics for Computing	
<b>Course Code: GE11/ (GE3B-09)</b>	<b>Semester: I</b>
<b>Duration: 60 Hrs</b>	<b>Maximum Marks: 100</b>
<b>Teaching Scheme</b>	<b>Examination Scheme</b>
<b>Theory: 5</b>	<b>End Semester Exam: 70</b>
<b>Tutorial:1</b>	<b>Attendance: 5</b>
<b>Practical:0</b>	<b>Continuous Assessment: 25</b>
<b>Credit:6</b>	<b>Practical Sessional internal continuous evaluation: NA</b>
	<b>Practical Sessional external examination: NA</b>
<b>Aim:</b>	
<b>Sl. No.</b>	
1.	To develop formal reasoning.
2.	Create habit of raising questions
3.	Knowledge regarding the use of Mathematics in Computer Science
4.	Ability to communicate knowledge, capabilities and skills related to the computer engineer profession
<b>Objective:Throughout the course, students will be expected to demonstrate their understanding of Mathematics by being able to do each of the following</b>	
<b>Sl. No.</b>	
1.	To understand and solve mathematical problems
2.	To impart knowledge regarding relevant topics .
3.	To familiarize students with linear Algebra, differential and integral calculus, numerical



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	methods and statistics.		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	<b>Knowledge of basic algebra, trigonometry and calculus .</b>		
<b>Contents</b>			<b>6 Hrs./week</b>
<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	<b>Modern algebra</b> Set, Relation, Mapping, Binary Operation, Addition Modulo n, Multiplication modulo n, semi group, properties of groups, subgroup.	3	7
02	<b>Trigonometry</b> Radian or circular Measure, Trigonometric Functions, Trigonometric ratios of angle $\theta$ when $\theta$ is acute, trigonometric ratios of certain standard angles, allied angles, compound angles, multiple and sub- multiple angles.	6	5
03	<b>Limits and Continuity</b> The real number system, The concept of limit, concept of continuity.	6	5
04	<b>Differentiation</b> Differentiation of powers of x, Differentiation of $e^x$ and $\log x$ , differentiation of trigonometric functions, Rules for finding derivatives, Different types of differentiation, logarithmic differentiation, differentiation by substitution, differentiation of implicit functions, differentiation from parametric equation. Differentiation from first principles.	6	7
05	<b>Integrations</b> Integration of standard Functions, rules of Integration, More formulas in integration, Definite integrals.	6	7
06	<b>Differential equations</b>	6	6



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	First order differential equations, practical approach to Differential equations, first order and first degree differential equations, homogeneous equations. Linear equations, Bernoulli's equation, Exact Differential Equations.		
07	<b>Complex Numbers</b>  Complex Numbers, Conjugate of a complex number, modulus of a complex Number, geometrical representation of complex number, De Moivre's theorem, $n^{\text{th}}$ roots of a complex number.	5	5
08	<b>Matrices and Determinants</b>  Definition of a matrix, Operations on matrices, Square Matrix and its inverse, determinants, properties of determinants, the inverse of a matrix, solution of equations using matrices and determinants, solving equations using determinants.	5	8
09	<b>Infinite Series</b>  Convergence and divergence, series of positive terms, binomial series, exponential series, logarithmic series.	5	7
10	<b>Probability</b>  Concept of probability, sample space and events, three approaches of probability, kolmogorov's axiomatic approach to probability, conditional probability and independence of events, bay's theorem.	5	5
11	<b>Introduction to Statistics</b>  Measures of central Tendency, Standard Deviation, Discrete series. Methods, Deviation taken from assumed mean, continuous series, combined standard deviation, coefficient of variation, variance.	3	8
	<b>Sub Total:</b>	<b>48</b>	<b>70</b>
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	<b>4</b>	<b>30</b>
	<b>Total:</b>	<b>52</b>	<b>100</b>

**Assignments:**

Based on the curriculum as covered by subject teacher.



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<b>List of Books</b>							
<b>Text Books:</b>							
<b>Name of Author</b>	<b>Title of the Book</b>	<b>Edition/ISSN/ISBN</b>		<b>Name of the Publisher</b>			
S. K. Mapa	Higher Algebra			Levant Books			
<b>O'Regan, Gerard</b>	Mathematics in Computing						
Chakravorty and Ghosh	Advanced Higher Algebra			U N Dhar Pvt. Ltd			
<b>Reference Books:</b>							
Das and Mukherjee	Integral Calculus			U N Dhar Pvt. Ltd			
Das and Mukherjee	Differential Calculus			U N Dhar Pvt. Ltd			
<b>End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.</b>							
<b>Group</b>	<b>Unit</b>	<b>Objective Questions</b>		<b>Subjective Questions</b>			
		(MCQ only with the correct answer)					
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
<b>A</b>	<b>1 to 11</b>	<b>10</b>	<b>10</b>				
<b>B</b>	<b>1 to 11</b>			<b>5</b>	<b>3</b>	<b>5</b>	<b>60</b>
<b>C</b>	<b>1 to 11</b>			<b>5</b>	<b>3</b>	<b>15</b>	



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- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

**Examination Scheme for end semester examination:**

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

**Name of the Course: B.Sc. in Information Technology (Data Science)**

**Subject: Probability & Statistics**

**Course Code: GE12/(GE3B-10)**

**Semester: I**

**Duration: 60 Hrs**

**Maximum Marks: 100**

**Teaching Scheme**

**Examination Scheme**

Theory: 5

End Semester Exam: 70

Tutorial:1

Attendance: 5

Practical:0

Continuous Assessment: 25

Credit:6

Practical Sessional internal continuous evaluation: NA

Practical Sessional external examination: NA

**Aim:**

**Sl. No.**

1. The aim of this course is to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.
2. The objective of this course is to familiarize the students with statistical techniques.

**Objective:** Throughout the course, students will be expected to demonstrate their understanding



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of probability & statistics by being able to learn each of the following			
<b>Sl. No.</b>			
1.	The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.		
2.	The basic ideas of statistics including measures of central tendency, correlation and regression.		
3.	The statistical methods of studying data samples.		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	Knowledge of basic algebra, calculus.		
2.	Ability to learn and solve mathematical model.		
<b>Contents</b>			<b>6 Hrs./week</b>
<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	Definition of Partial Differential Equations, First order partial differential equations, solutions of first order linear PDEs; Solution to homogenous and nonhomogeneous linear partial differential equations of second order by complimentary function and particular integral method. Second-order linear equations and their classification, Initial and boundary conditions, D'Alembert's solution of the wave equation; Duhamel's principle for one dimensional wave equation. Heat diffusion and vibration problems, Separation of variables method to simple problems in Cartesian coordinates. The Laplacian in plane, cylindrical and spherical polar coordinates, solutions with Bessel functions and Legendre functions. One dimensional diffusion equation and its solution by separation of variables.	18	20
02	Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality. Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities. Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.	18	25
03	Basic Statistics, Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions,	20	25



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	Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, Tests for single mean, difference of means, and difference of standard deviations. Test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.						
	<b>Sub Total:</b>		<b>56</b>	<b>70</b>			
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>		<b>4</b>	<b>30</b>			
	<b>Total:</b>		<b>60</b>	<b>100</b>			
<b>Assignments:</b> Based on the curriculum as covered by subject teacher.							
<b>List of Books</b>							
<b>Text Books:</b>							
<b>Name of Author</b>	<b>Title of the Book</b>	<b>Edition/ISSN/ISBN</b>	<b>Name of the Publisher</b>				
Erwin Kreyszig	Advanced Engineering Mathematics	9 th Edition	John Wiley & Sons				
N. G. Das	Statistical Methods	0070083274, 9780070083271	Tata Mc.Graw Hill				
<b>Reference Books:</b>							
P. G. Hoel, S. C. Port and C. J. Stone	Introduction to Probability Theory		Universal Book Stall				
W. Feller	An Introduction to Probability Theory and its Applications	3rd Ed.	Wiley				
<b>End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.</b>							
<b>Group</b>	<b>Unit</b>	<b>Objective Questions</b> (MCQ only with the correct answer)		<b>Subjective Questions</b>			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
<b>A</b>	<b>1 to 3</b>	<b>10</b>	<b>10</b>				
<b>B</b>	<b>1 to 3</b>			<b>5</b>	<b>3</b>	<b>5</b>	<b>70</b>
<b>C</b>	<b>1 to 3</b>			<b>5</b>	<b>3</b>	<b>15</b>	
<ul style="list-style-type: none"> <li>Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.</li> <li>Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.</li> </ul>							



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Examination Scheme for end semester examination:				
Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

<b>Name of the Course: B.Sc. in Information Technology (Data Science)</b>			
<b>Subject: Bayesian Statistics</b>			
<b>Course Code: GE13/(GE3B-11)</b>		<b>Semester: I</b>	
<b>Duration: 60 Hrs.</b>		<b>Maximum Marks: 100</b>	
<b>Teaching Scheme</b>		<b>Examination Scheme</b>	
<b>Theory: 5</b>		<b>End Semester Exam: 70</b>	
<b>Tutorial: 1</b>		<b>Attendance : 5</b>	
<b>Practical: 0</b>		<b>Continuous Assessment: 25</b>	
<b>Credit: 6</b>		<b>Practical Sessional internal continuous evaluation: NA</b>	
		<b>Practical Sessional external examination: NA</b>	
<b>Aim:</b>			
<b>Sl. No.</b>			
1.	The aim of this course is to equip students with the skills to perform and interpret Bayesian statistical analyses.		
<b>Objective:</b>			
<b>Sl. No.</b>			
1.	To describing the fundamentals of Bayesian inference by examining some simple Bayesian models.		
2.	To explore more complicated models, including linear regression and hierarchical models in a Bayesian framework		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	Knowledge in mathematics		
<b>Contents</b>			<b>6 Hrs./week</b>
<b>Chapte r</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	Introduction to Statistical Science Scientific Data Gathering Logic, Probability, and Uncertainty Discrete Random Variables	14	15
02	Bayesian Inference for Discrete Random Variables Continuous Random Variables	14	20



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	Bayesian Inference for Binomial Proportion Comparing Bayesian and Frequentist Inferences for Proportion Bayesian Inference for Poisson		
03	Bayesian Inference for Normal Mean Comparing Bayesian and Frequentist Inferences for Mean Bayesian Inference for Difference Between Means	14	20
04	Bayesian Inference for Simple Linear Regression Bayesian Inference for Standard Deviation Robust Bayesian Methods	14	15
	<b>Sub Total:</b>	<b>56</b>	<b>70</b>
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	<b>4</b>	<b>30</b>
	<b>Total:</b>	<b>60</b>	<b>100</b>

**List of Books**

**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
William M. Bolstad	Introduction to Bayesian statistics	2nd ed. ISBN 978-0-470-141 15-1	
Andrew Gelman, John Carlin, Hal Stern, David Dunson, Aki Vehtari, and Donald Rubin.	Bayesian Data Analysis	Third edition	

**Reference Books:**


**End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1,2,3,4	10	10				
B	3, 4,			5	3	5	70
C	1,2,3,4			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.



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- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

<b>Examination Scheme for end semester examination:</b>				
<b>Group</b>	<b>Chapter</b>	<b>Marks of each question</b>	<b>Question to be set</b>	<b>Question to be answered</b>
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3
<b>Examination Scheme for Practical Sessional examination:</b>				
<b>Practical Internal Sessional Continuous Evaluation</b>				
<b>Internal Examination:</b>				
Continuous evaluation				<b>40</b>

<b>Name of the Course: B.Sc. in Information Technology (Data Science)</b>	
<b>Subject: Operations Research</b>	
<b>Course Code: GE14/(GE3B-12)</b>	<b>Semester: I</b>
<b>Duration: 60Hrs</b>	<b>Maximum Marks: 100</b>
<b>Teaching Scheme</b>	<b>Examination Scheme</b>
<b>Theory: 5</b>	<b>End Semester Exam: 70</b>
<b>Tutorial: 1</b>	<b>Attendance : 5</b>
<b>Practical:0</b>	<b>Continuous Assessment:25</b>
<b>Credit: 6</b>	<b>Practical Sessional internal continuous evaluation: NA</b>
	<b>Practical Sessional external examination: NA</b>
<b>Aim:</b>	
<b>Sl. No.</b>	



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1.	To learn how to solve problem in optimized way.		
2.	Use various technique like game theory, LPP in real life problem.		
<b>Objective:</b>			
<b>Sl. No.</b>			
1.	Understand the optimization method		
2.	To evaluate the reliability and validity of a measuring		
3.	Apply the method to other Real life Problem		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	Mathematics		
2.	Linear Algebra		
Contents			6 Hrs./week
<b>Chapte r</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	Linear Programming Problems (LPP): Basic LPP and Applications; Various Components of LP Problem Formulation.	8	10
02	Solution of Linear Programming Problems: Solution of LPP: Using Simultaneous Equations and Graphical Method; Definitions: Feasible Solution, Basic and non-basic Variables, Basic Feasible Solution, Degenerate and Non-degenerate Solution, Convex set and explanation with examples. Solution of LPP by Simplex Method; Charnes' Big-M Method; Duality Theory. Transportation Problems	12	20



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	and Assignment Problems.		
03	Network Analysis: Shortest Path: Floyd Algorithm; Maximal Flow Problem (Ford-Fulkerson); PERT-CPM (Cost Analysis, Crashing, Resource Allocation excluded).	8	5
04	Inventory Control: Introduction to EOQ Models of Deterministic and Probabilistic ; Safety Stock; Buffer Stock.	8	10
05	Game Theory: Introduction; 2-Person Zero-sum Game; Saddle Point; Mini-Max and Maxi-Min Theorems (statement only) and problems; Games without Saddle Point; Graphical Method; Principle of Dominance.	10	15
06	Queuing Theory: Introduction; Basic Definitions and Notations; Axiomatic Derivation of the Arrival & Departure (Poisson Queue). Poisson Queue Models: (M/M/1): ( $\infty$ / FIFO) and (M/M/1: N / FIFO) and problems.	10	10
	<b>Sub Total:</b>	<b>56</b>	<b>70</b>
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	<b>4</b>	<b>30</b>
	<b>Total:</b>	<b>60</b>	<b>100</b>

**List of Books**

**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
H. A. Taha	Operations Research		Pearson

**Reference Books:**

P. M. Karak	Linear Programming and Theory of Games		ABS Publishing House
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Ghosh and Chakraborty	Linear Programming and Theory of Games		Central Book Agency
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**End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1 to 5	10	10				70
B	1 to 5			5	3	5	
C	1 to 5			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

**Examination Scheme for end semester examination:**

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	3	3



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<b>Name of the Course: B.Sc. in Information Technology (Data Science)</b>			
<b>Subject: Data Analytics</b>			
<b>Course Code: GE15/(GE3B-13)</b>		<b>Semester: I</b>	
<b>Duration: 60 Hrs.</b>		<b>Maximum Marks: 100</b>	
<b>Teaching Scheme</b>		<b>Examination Scheme</b>	
<b>Theory: 5</b>		<b>End Semester Exam: 70</b>	
<b>Tutorial: 1</b>		<b>Attendance : 5</b>	
<b>Practical: 0</b>		<b>Continuous Assessment: 25</b>	
<b>Credit: 6</b>		<b>Practical Sessional internal continuous evaluation: NA</b>	
		<b>Practical Sessional external examination: NA</b>	
<b>Aim:</b>			
<b>Sl. No.</b>			
1.	Find a meaningful pattern in data		
2.	Graphically interpret data		
3.	Implement the analytic algorithms		
4.	Handle large scale analytics projects from various domains		
<b>Objective:</b>			
<b>Sl. No.</b>			
1.	The process of data analysis uses analytical and logical reasoning to gain information from the data.		
2.	To find meaning in data so that the derived knowledge can be used to make informed decisions.		
3.	Develop intelligent decision support systems		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	A strong mathematical background in Probability and Statistics		
2.	Critical thinking and problem solving skills		
<b>Contents</b>			<b>6 Hrs./week</b>
<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	<b>Data Definitions and Analysis Techniques</b> Elements, Variables, and Data categorization	<b>10</b>	<b>14</b>



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	Levels of Measurement Data management and indexing		
02	<b>Descriptive Statistics</b> Measures of central tendency Measures of location of dispersions	10	14
03	<b>Basic Analysis Techniques</b> Basic analysis techniques Statistical hypothesis generation and testing Chi-Square test t-Test Analysis of variance Correlation analysis Maximum likelihood test	12	14
04	<b>Data analysis techniques</b> Regression analysis Classification techniques Clustering Association rules analysis	12	14
05	<b>Case studies</b> Understanding business scenarios Feature engineering and visualization	12	14
	<b>Sub Total:</b>	56	70
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	4	30
	<b>Total:</b>	60	100

**List of Books**

**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Hastie, Trevor, et al.	The elements of statistical learning		Vol. 2. No. 1. New York: springer, 2009.
Montgomery, Douglas C., and George C. Runger	Applied statistics and probability for engineers		John Wiley & Sons, 2010

**Reference Books:**



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<b>End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.</b>							
Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1,2,3,4,5	10	10				
B	3, 4, 5			5	3	5	70
C	1,2,3,4,5			5	3	15	
<ul style="list-style-type: none"> <li>Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.</li> <li>Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.</li> </ul>							
<b>Examination Scheme for end semester examination:</b>							
Group	Chapter	Marks of each question	Question to be set	Question to be answered			
A	All	1	10	10			
B	All	5	5	3			
C	All	15	5	3			
<b>Examination Scheme for Practical Sessional examination:</b>							
<b>Practical Internal Sessional Continuous Evaluation</b>							
<b>Internal Examination:</b>							
Continuous evaluation						<b>40</b>	
<b>External Examination: Examiner-</b>							
Signed Lab Assignments				<b>10</b>			
On Spot Experiment				<b>40</b>			
Viva voce				<b>10</b>		<b>60</b>	



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<b>Name of the Course: B.Sc. in Information Technology (Data Science)</b>	
<b>Subject: Applied Cryptography</b>	
<b>Course Code: GE16/(GE3B-14)</b>	<b>Semester: I</b>
<b>Duration: 60 Hrs</b>	<b>Maximum Marks: 100</b>
<b>Teaching Scheme</b>	<b>Examination Scheme</b>
<b>Theory: 5</b>	<b>End Semester Exam: 70</b>
<b>Tutorial: 1</b>	<b>Attendance : 5</b>
<b>Practical: 0</b>	<b>Continuous Assessment: 25</b>
<b>Credit: 6</b>	<b>Practical &amp; Sessional internal continuous evaluation: NA</b>
	<b>Practical &amp; Sessional external examination: NA</b>
<b>Aim:</b>	
<b>Sl. No.</b>	
1	To learn fundamentals of theoretical and practical areas of cryptography.
2	To learn fundamentals of digital signature and secure data transmission.
<b>Objective:</b>	
<b>Sl. No.</b>	
1.	Understand various types of attacks and their characteristics.
2.	Understand the basic concept of encryption and decryption for secure data transmission.
3.	Analyze and compare various cryptography techniques.



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4.	Understand the concept of digital signature and its applications.		
<b>Contents</b>		<b>6 Hrs./week</b>	
<b>Module</b>	<b>Name of the Topics</b>	<b>Hours</b>	<b>Marks</b>
1	Introduction: Need for Security, Security approaches, Principles of Security, Types of Attacks, Plain Text & Cipher Text, Transposition Techniques, Substitution Techniques, Encryption & Decryption, Symmetric Key & Asymmetric Key Cryptography, Key Range & Key Size.	14	18
2	Introduction to Number Theory, Modular Arithmetic, Prime Numbers, Residue Classes, Euler's Totient Function, Fermat's Theorem and Euler's Generalization, Euclidean Algorithm, Extended Euclidean Algorithm for Multiplicative Inverse, Primitive Roots & Discrete Logarithm, Chinese Remainder Theorem, Gauss Theorem.	14	15
3	Symmetric Key Cryptography: Overview, Block Cipher, DES Algorithm, Strength of DES, AES Algorithm, Evaluation Criteria for AES, Modes of Operations.	8	10
4	Asymmetric Key Cryptography: Principles of Public Key Cryptography, RSA Algorithm, Key Management, Man in the Middle Attack, Diffie-Hellman Key Exchange Algorithm.	10	15
5	Authentication: Authentication Requirement, Functions, Message Digest, Hash Function, Security of Hash Function, Kerberos, Digital Signature Standard, Digital Signature Algorithms – DSA, ElGamal Signature, Authentication Protocols.	10	12
<b>Sub Total:</b>		<b>56</b>	<b>70</b>
<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>		<b>4</b>	<b>30</b>



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<b>Total:</b>		<b>60</b>	<b>100</b>				
<b>List of Books</b>							
<b>Text Books:</b>							
<b>Name of Author</b>	<b>Title of the Book</b>	<b>Edition/ISSN/ISBN</b>	<b>Name of the Publisher</b>				
William Stallings	Cryptography and Network Security: Principles and Practice	7th edition	PEARSON				
<b>Reference Books:</b>							
AtulKahate	Cryptography and Network Security	3rd edition	McGraw Hill Education (India) Private Limited				
B. Schneier	Applied Cryptography	2nd Edition	J. Wiley and Sons				
<b>End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.</b>							
Group	Module	Objective Questions		Subjective Questions			
		(MCQ only with the correct answer)		No of question to be set	To answer	Marks per question	Total Marks
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
<b>A</b>	<b>All</b>	<b>12</b>	<b>10</b>				
<b>B</b>	<b>All</b>			<b>5</b>	<b>3</b>	<b>5</b>	<b>70</b>
<b>C</b>	<b>All</b>			<b>5</b>	<b>3</b>	<b>15</b>	
<ul style="list-style-type: none"> <li>Only multiple choice type question (MCQ) with one correct answer are to be set in the</li> </ul>							



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objective part.

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

#### Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	12	10
B	All	5	5	3
C	All	15	3	3

Name of the Course: **B.Sc. in Information Technology (Data Science)**

**Subject:** Inferential Statistics

<b>Course Code:</b> GE17/(GE3B-15)	<b>Semester:</b> I
<b>Duration:</b> 60 Hrs	<b>Maximum Marks:</b> 100
<b>Teaching Scheme</b>	<b>Examination Scheme</b>
<b>Theory:</b> 5	<b>End Semester Exam:</b> 70
<b>Tutorial:</b> 1	<b>Attendance :</b> 5
<b>Practical:</b> 0	<b>Continuous Assessment:</b> 25
<b>Credit:</b> 6	<b>Practical Sessional internal continuous evaluation:</b> NA
	<b>Practical Sessional external examination:</b> NA



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<b>Aim:</b>			
<b>Sl. No.</b>			
1	To learn how to set up and perform hypothesis tests		
2	Use regression analysis to analyze and interpret data collected from ANOVA and ANCOVA designs.		
<b>Objective:</b>			
<b>Sl. No.</b>			
1.	To enable students to analyze and interpret data		
2.	Understand the types of questions that the statistical method addresses		
3.	To evaluate the reliability and validity of a measuring		
4.	Apply the method to other examples and situations		
5.	Use data to make evidence based decisions that are technically sound		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	Mathematics		
2.	Probability Statistics		
<b>Contents</b>			<b>6 Hrs./week</b>
<b>Chapt er</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>



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01	Estimation: Concepts of estimation, unbiasedness, sufficiency, consistency and efficiency. Factorization theorem. Complete statistic, Minimum variance unbiased estimator (MVUE) and Rao-Blackwell theorem with applications. Cramer-Rao inequality and MVB estimators (statement and applications).	<b>12</b>	<b>10</b>
02	Methods of Estimation: Method of moments, method of maximum likelihood estimation.	<b>8</b>	<b>5</b>
03	Principles of test of significance: Null and alternative hypotheses (simple and composite), Type-I and Type-II errors, critical region, level of significance, size and power, best critical region, most powerful test, uniformly most powerful test,	<b>12</b>	<b>20</b>
04	Neyman Pearson Lemma (statement and applications to construct most powerful test). Likelihood ratio test and relevant problems, properties of likelihood ratio tests (without proof).	<b>12</b>	<b>15</b>
05	Interval estimation - Confidence interval for the parameters of various distributions, Confidence interval for Binomial proportion, Confidence interval for population correlation coefficient for Bivariate Normal distribution, Pivotal quantity method of constructing confidence interval, Large sample confidence intervals.	<b>12</b>	<b>20</b>
	<b>Sub Total:</b>	<b>56</b>	<b>70</b>
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	<b>4</b>	<b>30</b>
	<b>Total:</b>	<b>60</b>	<b>100</b>

**List of Books**

**Text Books:**

<b>Name of</b>	<b>Title of the Book</b>	<b>Edition/ISSN/ISBN</b>	<b>Name of the Publisher</b>
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B.sc in Information Technology (Data Science)

Author							
Goon A.M., Gupta M.K.: Das Gupta.B.		Fundamentals of Statistics				World Press	
<b>Reference Books:</b>							
Rohatgi V. K. and Saleh, A.K. Md. E.		An Introduction to Probability and Statistics		2ndEdn		John Wiley & Sons.	
Dudewicz, E. J., and Mishra, S. N.		Modern Mathematical Statistics				John Wiley & Sons.	
Bhattacharjee , D. & Das, K. K.		A Treatise on Statistical Inference and Distributions				Asian Books	
Hogg, R.V., Tanis, E.A. and Rao J.M		Probability and Statistical Inference		Seventh Ed		Pearson Education	
<b>End Semester Examination Scheme.                      Maximum Marks-70.                      Time allotted-3hrs.</b>							
Group	Unit	Objective Questions		Subjective Questions			
		(MCQ only with the correct answer)		No of question to be set	To answer	Marks per question	Total Marks
No of question to be set	Total Marks	No of question to be set	To answer				
<b>A</b>	<b>1 to 5</b>	<b>10</b>	<b>10</b>				<b>70</b>
<b>B</b>	<b>1 to 5</b>			<b>5</b>	<b>3</b>	<b>5</b>	



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<b>C</b>	<b>1 to 5</b>		<b>5</b>	<b>3</b>	<b>15</b>	
<ul style="list-style-type: none"><li>• Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.</li><li>• Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.</li></ul>						
<b>Examination Scheme for end semester examination:</b>						
<b>Group</b>	<b>Chapter</b>	<b>Marks of each question</b>	<b>Question to be set</b>	<b>Question to be answered</b>		
<b>A</b>	<b>All</b>	<b>1</b>	<b>10</b>	<b>10</b>		
<b>B</b>	<b>All</b>	<b>5</b>	<b>5</b>	<b>3</b>		
<b>C</b>	<b>All</b>	<b>15</b>	<b>3</b>	<b>3</b>		