

	The expectation of Random variables with properties, Expectation of a function of a random variable. Measures of location, dispersion, skewness, and kurtosis.	
III	Discrete Probability Distributions Discrete Uniform, Bernoulli's, Binomial, Poisson, Geometric, and Negative Binomial distributions and their properties Continuous Probability Distributions Rectangular, Exponential, and Normal distributions and their properties.	15
IV	Practical Component Based on R Programming <ul style="list-style-type: none"> • Computation of probability and conditional probability. • Applications of Bayes' Theorem • Construction of univariate and Bivariate probability distributions. • Construction of marginal and conditional probability distributions. • Generate a random sample from Binomial, Poisson, Geometric, and Negative-Binomial distributions. • Generate a random sample from rectangular, exponential, and normal distributions. • Fitting of Binomial distribution. Fitting of Poisson distribution. • Fitting of Exponential distribution. Fitting of Normal distribution. 	15

Suggested Reference Books:

1. Introduction to the Practice of Statistics, Moore, S. David; McCabe, P. George W. H. Freeman and Company, New York.
2. Basic Statistics, Agarwal, B. L., New Age International (P) Ltd.
3. Introduction to the theory of Statistics, Mood, A. M., Greybill, F.A., Boes, D.C., Mc Graw Hill.
4. Fundamentals of Mathematical Statistics, S. C. Gupta and V. K. Kapoor, Sultan Chand and Sons, New Delhi.
5. Mathematical Statistics, P. Mukhopadhyay, New Central Book Agency (P) Ltd, Calcutta
6. An Introduction to Probability and Statistics, V. K. Rohatgi and A.K.Md. Ehsanes Saleh, Wiley Series.

DSM122 Database Management System

Semester: II	Course Title: Database Management System	Credit: 4
Course No.: DSM122		(3 T + 1 P)

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	Describe the basic concepts and components of a database system.
CO 2	UNDERSTANDING	Explain relational models, schemas, and normalization techniques.
CO 3	APPLYING	Design entity-relationship models and convert them into relational schemas.
CO 4	ANALYSING	Analyze SQL queries and optimize database performance.
CO 5	EVALUATING	Evaluate concurrency control, transaction management, and

		recovery techniques.
CO 6	CREATING	Build database applications using SQL and advanced database programming concepts.

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	1	2	1	-
CO 2	1	2	1	1	-
CO 3	1	1	1	2	-
CO 4	1	2	1	1	1
CO 5	1	-	2	-	1
CO 6	1	1	1	2	1

Unit	Detailed Syllabus	Teaching Hours
I	Introduction to Databases and DBMS Definition and characteristics of databases, File systems vs. database systems, Types of databases: Centralized, Distributed, Cloud, NoSQL, Database users and architecture, Data models (Hierarchical, Network, Relational), Database management system components and functions Case Study: Study of Relational Database Models.	15
II	Relational Models and SQL Entity-Relationship (ER) modeling and diagram conversion, Relational algebra and calculus, Schema design and integrity constraints, Introduction to SQL: DDL, DML, DCL, and TCL commands, Advanced SQL queries: Joins, Subqueries, Aggregation, and Views, Normalization (1NF, 2NF, 3NF, BCNF)	15
III	Transaction Management and Concurrency Control Transactions and properties (ACID), Concurrency control mechanisms: Locks, Timestamps, and Multiversion concurrency, Deadlocks and prevention techniques, Database recovery and backup techniques	15
IV	Practical Component <ol style="list-style-type: none"> Design an ER diagram for a university database with entities like students, courses, and enrollments. Normalize the given dataset to 3NF and identify functional dependencies. Create a database and tables for an e-commerce platform using appropriate constraints. Write an SQL query to display all customer orders using INNER JOIN across two tables. Use GROUP BY to find the total sales amount for each product category and filter with HAVING. Write a subquery to find employees earning more than the average 	15

	<p>salary of their department.</p> <p>7. Develop a correlated subquery to list customers who have placed more than one order.</p> <p>8. Implement and demonstrate the use of constraints such as PRIMARY KEY, FOREIGN KEY, UNIQUE, NOT NULL, and CHECK in an SQL table.</p>	
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Suggested Reference Books:

1. Ramez Elmasri & Shamkant B. Navathe, Fundamentals of Database Systems, Pearson, 7th Edition, 2016.
2. Abraham Silberschatz, Henry Korth, and S. Sudarshan, Database System Concepts, McGraw-Hill, 6th Edition, 2010.
3. C.J. Date, An Introduction to Database Systems, Pearson, 8th Edition, 2003.
4. Hector Garcia-Molina, Jeffrey Ullman, and Jennifer Widom, Database Systems: The Complete Book, Pearson, 2nd Edition, 2008.
5. Pramod J. Sadalage & Martin Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Addison-Wesley, 2013.

DSE123 Linear Algebra

Semester: II	Course Title: Linear Algebra	Credit: 4
Course No.: DSE123		(3 T + 1 P)

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	Describe the concept of the algebra of matrices and elementary row operations, calculate the rank of the matrix, and analyze the consistency of a linear system.
CO 2	UNDERSTANDING	Explain the concept of Eigenvalues and Eigenvectors; evaluate the diagonalization of matrices and quadratic & bilinear forms.
CO 3	APPLYING	Discuss the basics of Vector spaces.
CO 4	ANALYSING	Describe and use the linear transformation and evaluate nullity and kernel.
CO 5	EVALUATING	Explain the range and kernel and the basic introduction of Inner product spaces and orthogonal and orthonormal vectors.
CO 6	CREATING	Describe the application of rank, Eigenvalues, Eigenvectors, and Gram-Schmidt orthogonalization.

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	2	-	-	-
CO 2	-	1	1	-	-
CO 3	1	1	1	-	-
CO 4	-	-	-	1	-
CO 5	-	-	1	1	-
CO 6	-	-	-	-	-