Course: VSC
Number Theory and Matrix Algebra

Semester: I	Credits:2	Subject Code: BSVSCCSM12301	Lectures: 30

Course Outcomes:

At the end of this course, the learner will be able to:

- CO1- Classify different types of relations and apply the concepts of divisibility in Number Theory and its properties.
- CO2- Understand prime numbers, congruence relations and define real life problems using recurrence relation.
- CO3- Explore the equivalence between vector equations and matrix equations.
- CO4-Learn computations with matrices; apply different methods such as row echelon and LU decomposition to solve linear algebraic systems.

Unit 1: Congruence and Divisibility	15

- Well ordering principles
- Division Algorithm (without proof)
- Divisibility and its properties.
- Euclid's Lemma (Without proof).
- Definition of G.C.D and L.C.M, Expressing G.C.D of two integers as a linear combination of the two integers.
- Relatively prime integers and Euclid's Lemma generalisation
- Congruence relation and its properties, Residue Classes: Definition, Examples, addition and multiplication modulo n and composition tables.
- Solve Congruence equations using Chinese remainder Theorem.
- Euler's and Fermat's Theorem(Without proof) examples
- Homogenous Recurrence Relation, types and solutions.
- Assignment

Unit 2:Matrices	15

- Systems of Linear Equations
- Row Reduction and Echelon Forms
- Vector Equations
- The Matrix Equation
- Solution Sets of Linear Systems
- Applications of Linear Systems
- Linear Independence
- Linear Models in Business, Science, and Engineering
- Solving system of linear Equations using LU Decomposition
- Assignment

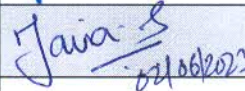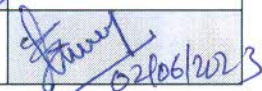| Board of Studies	Department	Name	Signature
Chairperson (HoD)	B.Sc. (Computer Science)	Gitanjali Phadnis	G.M.Phadnis 02/06/2023

Recommended Text Books:
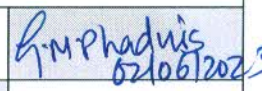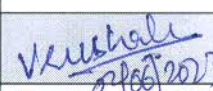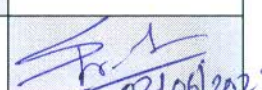
- David C. Lay, Steven R. Lay Judi J.Mc Donald *Linear Algebra and its Application*, Pearson Publication, Fifth Edition, 2016.
- David M. Burton, *Elementary Number Theory*,McGraw-Hill Science/Engineering/Math; 7th Edition February 4, 2010.
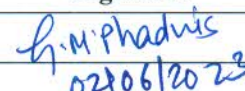
Reference Books:

- Bernard Kolman, Robert Busby, Sharon Cutler Ross, Nadeem-ur-Rehman,*Discrete Mathematics Structure* Pearson Education, 5th Edition.
- Zukerman, *An Introduction to the Theory of Numbers*, WileyPublication, 4th Edition

E-Resources:

- https://swayam.gov.in/
- https://nptel.ac.in/
- http://ocw.mit.edu

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