

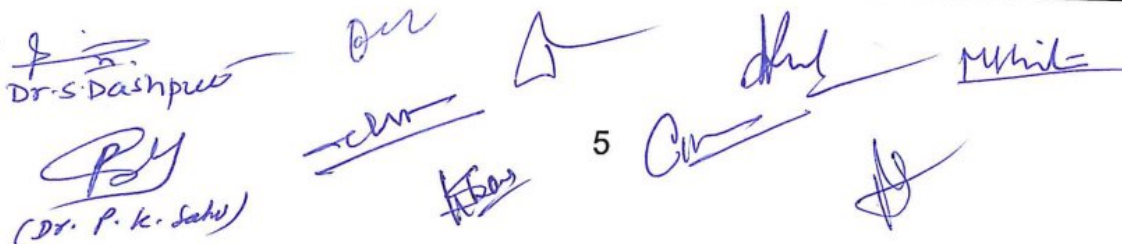
FOUR YEAR UNDER GRADUATE PROGRAM(2024-28)

DEPARTMENT OF MATHEMATICS

COURSE CURRICULUM

| Part A: Introduction | | | |
|---|----------------------------------|---|--|
| Program: Bachelor in Science (Certificate/Diploma/Degree/Honors) | | Semester - II | Session:2024-2025 |
| 1 | Course Code | MASC-02 | |
| 2 | Course Title | Algebra | |
| 3 | Course Type | Discipline Specific Course (DSC) | |
| 4 | Pre requisite | Knowledge of basic algebra , determinants and matrices. | |
| 5 | Course Learning Outcome (CLO) | This Course will enable the students to: <ul style="list-style-type: none"> ➤ Learn about the Matrix algebra. ➤ Understand Set theory, Function and Relation ➤ Learn about the theory of equations. ➤ Learn about the fundamental concepts of groups, Subgroups. ➤ Understand cosets and normal subgroups | |
| 6 | Credit Value | 4 C | 1Credit = 15 hours- Learning and Observation |
| 7 | Total Marks | Maximum Marks : 100 | Minimum Passing Marks:40 |

| Part B: Content of the Course | | |
|---|--|---------------|
| Total no of teaching – learning period =60 Periods (60 Hours) | | |
| UNIT | Topics | No of Periods |
| I | Matrix Algebra : Introduction, elementary operations of matrices, Inverse of a matrix. Special types of matrices: Transpose of a matrix, Symmetric and Skew symmetric matrices, Hermitian and Skew Hermitian matrix, Rank of a matrix, Echelon form of a matrix, Normal form, Application of matrices to a system of linear (both homogeneous and non-homogeneous) equations , Theorems on consistency of a system of linear equations.Eigen values and Eigen vectors, relation between Eigen values and Eigen vectors. Process of finding Eigen values and Eigen vectors, Cayley Hamilton theorem, and its use in finding inverse of a matrix. | 15 |
| II | Sets Theory & Functions: Sets, subsets Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, properties of empty set. Standard set operations. Classes of a set. Power set of a set. Difference and symmetric difference of two sets. Set identities, Generalized union and intersection. Relations and Functions: Product set, Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation, Partial ordering relations. Function, Types of Function, Inverse Function, Composite of functions, Modular arithmetic and basic properties of congruences | 15 |



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| III | Theory of equations: Symmetric functions of the roots of an equation Root of a multiplicity, Synthetic division, Greatest common Divisors, Relation between the roots and coefficients of general polynomial equations in one variable. Transformation of equations. Descarte's rule of signs. Solutions of cubic equations (Cardon method) , Biquadrate equation. | 15 |
| IV | Group Theory: Definition and properties of a group, Abelian groups, Examples of groups, Subgroups and examples, Cosets and their properties, Lagrange's theorem and its applications, Normal subgroups and their properties, Simple groups, Factors groups . | 15 |

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Text Books Recommended-

1. RamjiLal (2017). *Algebra 1: Groups, Rings, Fields and Arithmetic*. Springer.
2. Nathan Jacobson (2009). *Basic Algebra I* (2nd edition). Dover Publications
3. John B. Fraleigh (2007). *A First Course in Abstract Algebra* (7th edition). Pearson

Reference Books Recommended-

4. Michael Artin (2014). *Algebra* (2nd edition). Pearson.
5. Stephen H. Friedberg, Arnold J.Insel& Lawrence E. Spence (2003). *Linear Algebra* (4thedition). Prentice-Hall of India Pvt. Lt
6. Joseph A. Gallian (2017). *Contemporary Abstract Algebra* (9th edition). Cengage.
7. Kenneth Hoffman & Ray Kunze (2015). *Linear Algebra* (2nd edition). Prentice-Hall.
8. I. N. Herstein (2006). *Topics in Algebra* (2nd edition). Wiley India.

E-resources: <https://onlinecourses.nptel.ac.in>
<https://epqp.inflibnet.aci.in>
<https://swayam.gov.in>
<https://www.mooc.org>

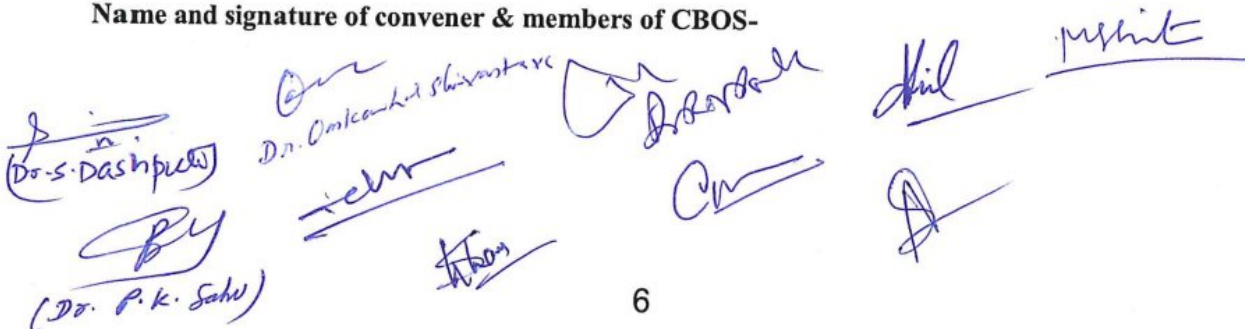
Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

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| Maximum Marks: | 100 Marks |
| Continuous Internal Assessment (CIA): | 30 Marks |
| End Semester Examination (ESE): | 70 Marks |

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| Continuous Internal Assessment (CIA) (Conducted by course teacher) | Test /Quiz – 20+20 Marks Assignment/Seminar- 10 Marks | Better marks out of two test/quiz + obtained marks in Assignment shall be considered against 30 marks |
| End Semester Examination (ESE) | Two Section-A&B Section-A: Q1.Objective- 10x1=10 marks Q2. Short answer type question-5x4=20marks Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Marks | |

Name and signature of convener & members of CBOS-



 (Dr. S. Dashputra)

 (Dr. P. K. Sahu)

 D.N. Omkarhari Shivastava

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