



Mathematics Paper-I
Groups and Coding Theory
[CORE COURSE]

Semester: III	Credits: 2	Subject Code: BS32103	Lectures: 36
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Course Outcomes:

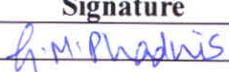
After completion of the course, the learner will be able to

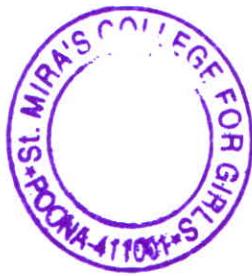
- relate and describe the basic algebraic structure like Group and its type.
- solve arithmetic problems in finite groups.
- apply and analyze the linear block codes for error detection and correction.
- describe and explain the basics of Cryptography and Network Security.

Unit 1: Groups	3
<ul style="list-style-type: none">• Binary Operation Details Line 1• Group: Definition and Examples• Elementary Properties of Groups	

Unit 2: Finite Groups and Subgroups	10
<ul style="list-style-type: none">• Order of a group, order of an element• Examples $(Z_n, +)$ and $(U(n), *)$• Subgroup definition, Finite subgroup test, subgroups of Z_n• Generator, cyclic group, finding generators of Z_n (Corollary 3,4 without proof)• Permutation group, definition, composition of two permutations,• Representation, Caley's theorem with proof• Permutation as product of disjoint cycles, inverse and order of a permutation, even/ odd permutation• Cosets: Definition, Examples and Properties, Lagrange Theorem with Proof.	

Unit 3: Groups and Coding Theory	10
<ul style="list-style-type: none">• Coding of Binary Information and Error detection• Decoding and Error Correction	

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Unit 4: Cryptography	13
<ul style="list-style-type: none">• Symmetric Cryptography<ul style="list-style-type: none">○ Ceaser cipher○ Transposition cipher• Asymmetric<ul style="list-style-type: none">○ RSA Encryption and Decryption	

No of Lectures=36 + 12(Contact Hours)=48(Total)

Recommended Text Books:
<ul style="list-style-type: none">• Bernard Kolman, Robert C. Busby and Sharon Ross, <i>Discrete Mathematical Stucture</i>, Pearson Education Publication (6th Edition)<ul style="list-style-type: none">○ Unit 3: Chapter 11• J. A, Gallian , <i>Contemporary Abstract Algebra</i> , Seventh Edition<ul style="list-style-type: none">Unit 1:Chapter 0, Unit 2: Chapter 2, Unit 3: Chapter 3 ,4, 5 and 7• Koblitz, Neal, <i>A Course in Number Theory and Cryptography</i>, Second Edition.

Reference Books:
<ul style="list-style-type: none">• I.N.Herstein , <i>Abstract Algebra</i>, Wiley, Third Edition• John B. Fraleigh. <i>A First Course in Abstract Algebra</i>.

E-Resources:
<ul style="list-style-type: none">• https://nptel.ac.in/courses/111/106/111106113/• https://swayam.gov.in• https://cosmolearning.org/courses/abstract-algebra-groups-rings-fields/video-lectures/

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St. Mira's College for Girls, Pune
(SY B.SC(CS) 2021-2024)

Board Of Studies	Name	Signature(In white cell)
Chairman (HoD)	Gitanjali Phadnis	<i>G.M. Phadnis</i> 20/3/2021
Faculty	Vrushali Paranjpe	<i>V. Paranjpe</i> 20/3/2021
Subject Expert (Outside SPPU)	Dr. Machchhindra Gophane	<i>M.G.</i> 20/3/2021
Subject Expert (Outside SPPU)	Dr. Prashant Malavadkar	<i>P.M.</i> 20-03-2021
VC Nominee (SPPU)	Dr. Vinayak Joshi	<i>V.Joshi</i> 20/3/2021
Industry Expert	Mr. Anup Manakeshwar	<i>A. Manakeshwar AB</i> 20-03-2021
Alumni	Ms. Jyoti Sharma	<i>Jyoti</i> 20/03/2021

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