ST. MIRA'S COLLEGE FOR GIRLS *POONA-411001*

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

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

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**
• Binary Operation Details Line 1 • Group: Definition and Examples • Elementary Properties of Groups	

Unit 2: Finite Groups and Subgroups	**10**
• Order of a group, order of an element • Examples (Zn, +) and (U(n), *) • Subgroup definition, Finite subgroup test, subgroups of Zn • Generator, cyclic group, finding generators of Zn(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**
• Coding of Binary Information and Error detection • Decoding and Error Correction	

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Unit 4: Cryptography	13

• Symmetric Cryptography
  ○ Ceaser cipher
  ○ Transposition cipher
• Asymmetric
  ○ RSA Encryption and Decryption	

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

Recommended Text Books:

- Bernard Kolman, Robert C. Busby and Sharon Ross, *Discrete Mathematical Stucture*, Pearson Education Publication (6th Edition)
  - Unit 3: Chapter 11
- J. A, Gallian , *Contemporary Abstract Algebra* , Seventh Edition
  Unit 1:Chapter 0, Unit 2: Chapter 2, Unit 3: Chapter 3 ,4, 5 and 7
- Koblitz, Neal, *A Course in Number Theory and Cryptography*, Second Edition.

Reference Books:

- I.N.Herstein , *Abstract Algebra*, Wiley, Third Edition
- John B. Fraleigh. *A First Course in Abstract Algebra.*

E-Resources:

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

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