

With effect from :2025-26 (R-24)

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

Accredited by NAAC with A++ Grade

9-5-81, Ibrahimbagh, Hyderabad-500031

DEPARTMENT OF MATHEMATICS

ALGEBRAIC STRUCTURES

(OPEN ELECTIVE)

For B.E., IV- Sem.,

(Common to CSE, AIML & IT Branches)

Instruction : 3 Hours per week	Sem. End Exam Marks : 60	Subject Reference Code : U24OE420MA
Credits : 3	Sessional Marks : 40	Duration of Semester End Exam : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
<i>The course will enable the students to :</i>	<i>At the end of the course students should be able to:</i>
1. <i>Study</i> the concept of Groups, Finite Groups, Subgroups, Cyclic Groups and their properties.	1. <i>Solve</i> the problems on Groups and will be equipped to apply them in applications like robotics, computer vision, computer graphics and medical image analysis
2. <i>Understand</i> Isomorphism – Automorphism of groups and their Properties.	2. <i>Implement</i> the concepts of automorphism in developing encoding and decoding tools of Cryptography
3. <i>Learn</i> group Homomorphism and related concepts.	3. <i>Apply</i> homomorphism in the study of formal languages, automata theory, and compiler design.
4. <i>Acquire</i> knowledge of Rings, Integral domains and Fields, External and Internal direct products.	4. <i>Use</i> the knowledge of Ring, Integral domain and Field in coding theory.
5. <i>Identify</i> Ring Homomorphism, properties and polynomial rings	5. <i>Compute</i> the programming of modern computer algebra algorithms using ring homomorphism.

UNIT – I: (8 Hours)

GROUPS

Binary operations - Groups – Definition, Elementary properties of Groups, Finite Groups, Subgroups, Cyclic Groups – Properties of Cyclic Groups, Fundamental theorem of Cyclic Groups-Classification of Subgroups of Cyclic Group.

UNIT – II: (8 Hours)

GROUP ISOMORPHISM

Isomorphism – Definition, Properties (without proof)- Automorphism - Cosets -Properties of Cosets (without proof), Lagrange's theorem.

15
12/01/26

UNIT – III: (8 Hours)

GROUP HOMOMORPHISM

External Direct Product - Definition, Properties(without proof). Normal Subgroups and Factor Groups, Internal Direct Product, Group Homomorphism – Definition, Properties (without proof).

UNIT – IV: (8 Hours)

RINGS

Rings, Properties of Rings (without proof) – Subrings - Integral Domains and Fields - Ideals- Prime and Maximal Ideals.

UNIT – V: (8 Hours)

RING HOMOMORPHISM

Ring Homomorphism - Properties of Ring Homomorphism (without proof) - Polynomial Rings - The Division Algorithm.

Text Books:

Contemporary Abstract Algebra, Joseph A. Gallian, CRC Press

Reference Books:

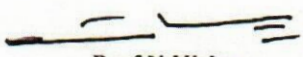
1. Topics in Algebra, I. N. Herstein, John Wiley & Sons
2. Basic Abstract Algebra, P. B. Bhattacharya, S. K. Jain, S. R. Nagpaul, Cambridge University Press
3. Abstract Algebra, D. S. Dummit, R. M. Foote, John Wiley & Sons, Inc.
4. A First Course in Abstract Algebra, John B. Fraleigh, Pearson Education Limited


Online Resources :

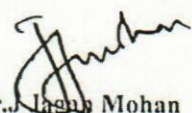
1. <https://ocw.mit.edu/courses/18-703-modern-algebra-spring-2013/>
2. https://onlinecourses.nptel.ac.in/noc19_cs78/preview


The break-up of CIE: Internal Tests + Assignments + Quizzes

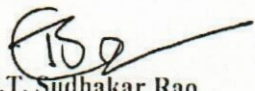
1	No. of Internal Tests	: 2	Max. Marks for each Internal Tests	: 30
2	No. of Assignments	: 3	Max. Marks for each Assignment	: 5
3	No. of Quizzes	: 3	Max. Marks for each Quiz Test	: 5
4	Duration of Internal Tests	: 90 Minutes		



Prof.N.Kishan
(OU Nominee)


Prof.M.A.Srinivas
(Subject Expert-JNTUH)


Dr. Jagad Mohan
(Subject Expert-BITS, Hyd)


Dr.B.Srivathsa
(Industry Expert)


Dr.T. Sudhakar Rao
(Chairman, BOS)


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