

with effect from :2024-25 (R-23)

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF MATHEMATICS

ALGEBRAIC STRUCTURES

(Stream Based OPEN ELECTIVE)

for B.E., IV- Sem.,

(Common to CSE, CSE-AIML & IT)

Instruction: 3 Hours per week	Sem. End Exam Marks: 60	Subject Reference Code:U230E420MA
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 will be able to:</i>
<ol style="list-style-type: none"> 1. Study the concept of Groups, Finite Groups, Subgroups, Cyclic Groups and their properties. 2. Understand Isomorphism – Automorphisms of groups and their properties. 3. Learn group Homomorphisms and related concepts. 4. Acquire knowledge of Rings, Integral domains and Fields, External and Internal direct products. 5. Identify Ring Homomorphisms, properties and polynomial rings 	<ol style="list-style-type: none"> 1. Solve the problems on Groups and will be equipped to apply them in applications like robotics, computer vision, computer graphics and medical image analysis 2. Implement the concepts of automorphism in developing encoding and decoding tools of Cryptography 3. Apply homomorphisms in the study of formal languages, automata theory, and compiler design. 4. Use the knowledge of Rings, Integral domains and Fields in coding theory. 5. Compute the programming of modern computer algebra algorithms using ring homomorphisms.

Unit-I:

Groups(8 classes)

Groups – Definition, Elementary properties of Groups, Finite Groups, Subgroups, Cyclic Groups – Properties of Cyclic Groups, Classification of Subgroups of Cyclic Group.

Unit-II:

Group Isomorphisms (8 classes)

Isomorphism – Definition, Properties, Automorphisms, Cosets and Lagrange’s theorem- properties of cosets, Lagrange’s theorem.

Unit-III:

Group Homomorphisms (08 classes)

External Direct Products - Definition, Properties, Factor Groups and Normal Subgroups, Internal Direct Products, Group Homomorphisms – Definition, Properties.

Unit-IV:

Rings (8 classes)

Rings, Properties of Rings, Subrings, Integral Domains and Fields Ring Homomorphisms and Ideals, Prime and Maximal Ideals.

Unit-V:

Ring Homomorphisms (8 classes)

Properties of Ring Homomorphisms, Polynomials - Polynomial Rings, the Division Algorithm.

Text Books:

1. Contemporary Abstract Algebra, Joseph A. Gallian, CRC Press
2. A First Course in Abstract Algebra, John B. Fraleigh, Pearson Education Limited

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.

Online Resources:


1. <https://ocw.mit.edu/>
2. <http://www.nptel.ac.in/course.php>
3. <https://www.coursera.org/in>


Prof. N. Kishan
(OU Nominee)


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


Dr. M. Raghavendra Sharma
(Subject Expert)

Dr. B. Srivastava
(Industry Expert)


Dr. T. Sudhakar Rao
(Chairman, BOS)