



# DEPARTMENT OF MATHEMATICS

Semester: V

Integrated M.Sc. Mathematics  
Subject:060090505 DSE2Group Theory

Academic Year: 2019 -20

## Teaching Schedule

**Course Objectives:** To summarize concepts of group theory to enhance ability of analysing pure and applied mathematical problems.

**Course outcomes:** Upon completion of the course, students shall be able to

**CO1:** Summarize the properties of group and classify that whether set of elements with binary operation is group or not.

**CO2:** Determine possible subgroups of a group, to identify normal subgroups of a group.

**CO3:** Explain the subgroups using Lagrange's theorem and to construction a permutation group.

**CO4:** Determine a given group is cyclic or not and find a generator for a subgroup of a given order, verify that the cyclic group is isomorphism or not.

**CO5:** Define and test a potential isomorphism for being well-defined, a homomorphism and understand the significance of Cayley's theorem.

Unit	Sub Unit	No. of Lect.(s)	Topics	Reference Chapter/ Additional Reading	Teaching Methodology to be used	Active Learning Activities	Evaluation Parameter
<b>Unit 1: Groups</b>							
[16]	1.1	2	Definition of a group and illustrations	Ch#2 A Course in Abstract Algebra Vijay K Khanna & S K Bhambri	Chalk & Talk	<b>For Slow Learner:</b> Students must write answer of question(s) given by teacher after completion of unit <b>For Active Learner:</b> Student will solve extra examples other than examples which are given in assignment after completion of Unit.	Assignment-1
	1.2	2	Elementary property of a group				
	1.3	3	Equivalent definitions of a group				
	1.4	3	Generalized form of associative law				
	1.5	3	Finite groups and their tables				
	1.6	3	Semigroups				
<b>Unit 2: Subgroups</b>							
[21]	2.1	3	Definition of a subgroup and illustrations	Ch#2,3 A Course in Abstract Algebra Vijay K Khanna & S K Bhambri	Chalk & Talk	<b>For Slow Learner:</b> Students must write answer of question(s) given by teacher after completion of unit <b>For Active Learner:</b> Student will solve extra examples other than examples which are given	Unit Test -1 and Assignment-2
	2.2	3	Lagrange's theorem and its applications				
	2.3	3	Definition of a permutation and illustrations				
	2.4	3	Transpositions and cycle,				





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	2.5	3	Definition of a normal subgroup and illustrations			in assignment after completion of Unit.	
	2.6	2	Quotient group				
	2.7	4	Definition of isomorphism of a group and its illustrations				
<b>Unit 3: Cyclic Groups</b>							
<b>[16]</b>	3.1	3	Definition of a cyclic group and illustrations	Ch#2 A Course in Abstract Algebra Vijay K Khanna & S K Bhambri	Chalk & Talk	<b>For Slow Learner:</b> Students must write answer of question(s) given by teacher after completion of unit <b>For Active Learner:</b> Student will solve extra examples other than examples which are given in assignment after completion of Unit.	Unit Test -2 Assignment-3
	3.2	3	Properties of a cyclic groups				
	3.3	5	Isomorphisms of cyclic groups				
	3.4	3	Subgroups of a cyclic group				
	3.5	2	Generators of a cyclic group				
<b>Unit 4: Homomorphism of Group</b>							
<b>[22]</b>	4.1	5	Definition of a homomorphism and its illustrations	Ch#3 A Course in Abstract Algebra Vijay K Khanna & S K Bhambri	Chalk & Talk	<b>For Slow Learner:</b> Students must write answer of question(s) given by teacher after completion of unit <b>For Active Learner:</b> Student will solve extra examples other than examples which are given in assignment after completion of Unit.	Internal Examination and Assignment-4
	4.2	5	Kernel of homomorphism				
	4.3	5	Cayley's theorem				
	4.4	5	Isomorphism of group				
	4.5	4	Groups of order four and six				

**Text books:**

1. I.H.Sheth, "Abstract Algebra, PHI Learning Private Limited, 2014.
2. Vijay K Khanna and S K Bhambri, " A course in Abstract Algebra, Vikas Publishing House Pvt Ltd, 2013

**Reference books:**

1. Herstein I.N.: "Topics in Algebra", Wiley Eastern Ltd., New Delhi, 1975.
2. Malik D.S., Mordeson J.N., and Sen M.K.: "Fundamentals of Abstract Algebra", Mc Graw-Hill, International Edition, 1997.





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## Course Objectives and Course Outcomes Mapping:

- To understand the fundamentals concepts of group: CO1
- To develop the basic group theory by reference to some elementary examples: CO2, CO3, CO4, CO5.

## Course Units and Course Outcomes Mapping:

Unit No.	Unit	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Groups	✓				
2	Subgroups		✓	✓		
3	Cyclic groups				✓	
4	Homomorphism of a group					✓

## Programme Outcomes (PO)

### PO1: Knowledge

Provides knowledge about the fundamentals of pure, applied and computing mathematics and its applications to students that creates the opportunities in industries and research centers.

### PO2: Core Competence

Creates competency in science and mathematics to formulate, analyses and solve problem and/or also to pursue advanced study or research.

### PO3: Breadth

Trains students having good knowledge in unearth core of academia and industry by the roots of mathematics.

### PO4: Evaluation

Imparts in students to raise trial and error-based curiosity and problem-solving functionality with research based advanced tutorial for higher level decision makings tools.





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Programme Outcomes and Course Outcomes mapping:

Programme Outcomes	Course Outcome				
	C01	C02	C03	C04	C05
PO1	✓		✓		✓
PO2		✓	✓	✓	✓
PO3	✓	✓	✓	✓	✓
PO4	✓	✓		✓	✓

