KU5DSCMAT302
BASIC ABSTRACT ALGEBRA

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
V	DSC	300-399	KU5DSCMAT302	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4		1	30	70	100	2

Course Description

This course introduces the abstract structures like group, rings, integral domains and fields and to discuss basic properties and problems in groups.

Course Prerequisite

Set and Functions.

Course Outcomes

CO No.	Expected Outcome	Learning Domains
1	Comprehend binary operations and groups.	Understand
2	Classify abelian groups and non-abelian groups.	Understand
3	Understand permutation groups.	Understand
4	Determining the subgroups of groups, cyclic subgroups and cyclic groups.	Apply
5	Comprehend generating sets, group of permutations and cosets	Understand
6	Understand Factor groups, Rings, Fields and integral domain	Understand

Mapping of Course Outcomes to PSOs							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	✔						
CO 2	✔						
CO 3	✔		✔				

CO 4	✔						
CO 5	✔	✔					
CO 6	✔						

COURSE CONTENTS

Contents for Classroom Transaction

MODULE	UNIT	DESCRIPTION	HOURS
I		**Groups**	14
	1	**Binary operations**	
		a) Definitions and Examples	
		b) Tables	
	2	**Groups**	
		a) Definition and Examples	
		b) Elementary Properties of Groups	
		c) Group Isomorphisms	
		d) Properties of Group Tables	
	3	**Abelian Examples**	
II		**Subgroups and Cyclic groups**	14
	1	**Nonabelian Examples**	
		a) Notation and Terminology	
		b) Permutations	
		c) Disjoint Cycles	
		d) The Dihedral Group	
	2	**Subgroups**	
		a) Subsets and Subgroups	
		b) Cyclic Subgroups	

	3	**Cyclic Groups**	
		a) Elementary Properties of Cyclic Groups	
		b) The structure of Cyclic Groups	
		c) Subgroups of Finite Cyclic Groups	
III	**Generating Sets and Structure of Groups**		**13**
	1	**Generating Sets**	
	2	**Groups of Permutations**	
		a) Group homomorphism	
		b) Cayley's Theorem	
		c) Even and Odd Permutations	
		d)The Alternating Groups	
	3	**Cosets and the Theorem of Lagrange**	
		a) Cosets	
		b) The Theorem of Lagrange	
		c) Cosets Left and Right	
IV	**Factor Groups, Rings and Fields**		**14**
	1	**Factor Groups**	
	2	**Rings and Fields**	
		a) Definitions and Basic Properties	
		b) Homomorphisms and Isomorphisms	
		c) Multiplicative Questions: Fields	
	3	**Integral Domains**	
		a) Divisors of Zero and Cancellation	
		b) Integral Domains	
		c)The Characteristic of a Ring	
V	**Teacher Specific Module**		**5**
	Directions		
	Omitted Proofs of the above sections.		
	Cayley Digraphs		
	Plane Isometries		

Essential Readings

1. John B. Fraleigh, A First Course in Abstract Algebra, Eighth Edition, Pearson.

Reference Distribution

Module	Unit	Reference No.	Sections	Remarks
I	1	1	1.1 to 1.30	
	2		2.1 to 2.23	
	3		3.1 to 3.5	
II	1		4.1 to 4.21	Omitting the proofs of 4.17 and 4.21
	2		5.1 to 5.26	
	3		6.1 to 6.21	Omitting the proofs of 6.2,6.10 and 6.15
III	1		7.1 to 7.6	
	2		8.1 to 8.25	Omitting the proofs of 8.5 and 8.19
	3		10.1 to 10.20	Omitting the proof of 10.17
IV	1		12.1 to 12.11	
	2		22.1 to 22.18	
	3		23.1 to 23.14	

Suggested Readings

1. J.A Gallian, Contemporary Abstract Algebra, Narosa.
2. I.N Herstein, Topics in Algebra (2^{nd} edition), Wiley
3. M. Artin, Algebra, Prentice Hall

Assessment Rubrics

Evaluation Type		Marks
End Semester Evaluation		**70**
Continuous Evaluation		**30**
a)	Test Paper*	12
b)	Assignment	12
c)	Seminar/ Viva-voce	6
Total		**100**

* A student has to appear for at least two written tests. Average mark of best two tests is to be considered for internal mark.