EU ERA UNIVERSITY

Name of the Program	B.A. / B.Sc. (LIBERAL EDUCATION)			Year/ Semester:	3rd /5th
Course Name	Algebra and Group Theory	Course Code:	MT301	Type:	Theory
Credits	04			Total Sessions Hours:	60 Hours
Evaluation Spread	Internal Continuous Assessment:	50 Marks		End Term Exam:	50 Marks
Type of Course	○ Compulsory	● Core		○ Creative	○ Life Skill
Course Objectives	This paper is designed with the objective of helping students understand and comprehend the important concepts in algebra. Students will learn to illustrate and prove mathematical theorems, to demonstrate the ability to think logically, analytically, and abstractly, and the ability to communicate mathematics, both orally, and in writing.				

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	Attributes
CO1	Learn the application of matrix in real life and in decision making for society.
CO2	Understand the importance of algebraic properties with regard to working within various number systems.
CO3	Extend group structure to finite permutation groups (Cayley's Theorem).
CO4	Generate groups given specific conditions.
Pedagogy	Interactive, discussion-bases, student-centered, presentation.
Internal Evaluation Mode	Mid-term Examination: 20 Marks Activity: 10 Marks Class test: 05 Marks Online Test/Objective Test: 05 Marks Assignments/Presentation: 05 Marks Attendance: 05 Marks

Session Details	Topic	Hours	Mapped CO
Unit 1	Matrix: Symmetric, Skew-symmetric, Hermitian and Skew-Hermitian, Elementary operations, Rank of Matrix, Linear independence of row and columns matrices, consistency and inconsistency of linear equations, Characteristic equations, Eigenvalues and Eigenvectors, Cayley-Hamilton theorem and applications. **Activity:** Create chart for the process to find rank of matrix, Eigenvalue and Eigenvector and also verification of Cayley Hamilton theorem.	15	CO1

Unit 2	Relation between roots and coefficient of general polynomial equation in one variable, transformation of equations, Descarte rule of sign. **Activity:** Using Descarte rule to find the number of root of any order polynomial.	15	CO2
Unit 3	Binary operations, Algebraic structure, Definition of a group with examples and ==basic== properties, Subgroup, Generators of group, Cyclic groups, Permutation groups, Even and odd permutations. **Activity:** Algebra of binary numbers.	15	CO3,CO4
Unit 4	==Cosets, Lagrange's theorem and related results,== Fermat and Euler theorem, Normal subgroup, Quotient groups, Homomorphism and isomorphism, Fundamental theorem of homomorphism, First, second and third isomorphism theorems and their related results **Activity:** Assignment based activity regarding Theorem of isomorphism.	15	CO4

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2			3		1		1	2	1				1
CO2		1				1			2	1				1
CO3									1					
CO4	2					1		2	1					

Strong contribution-3,   Average contribution-2 ,   Low contribution-1,

Suggested Readings:	
Text- Books	==Herstein,== I. N. Topics in Algebra. Wiley Eastern Ltd.
Reference Books	Datta, K.B. Matrix and Linear Algebra. Prentice Hall of India Pvt. Ltd.
Para Text	**Unit 1:** 1. https://www.youtube.com/watch?v=kDjiSuF2gZk 2. https://www.youtube.com/watch?v=ZOHMCsdDti0 3. https://www.youtube.com/watch?v=56dEt9EOZ_M **Unit 2:** 1. https://www.youtube.com/watch?v=FAPShLAdkto 2. https://www.youtube.com/watch?v=EPSTw_dYqUM 3. https://www.emathhelp.net/en/calculators/algebra-1/descartes-rule-of-signs-calculator/?p=x%5E3%2B3x%5E2-x%2B1 **Unit 3:** 1. https://www.youtube.com/watch?v=9IVYVtAuuQs **Unit 4:** 1. https://www.youtube.com/watch?v=-h3GsWp6-n0 2. https://www.youtube.com/watch?v=L7P2JZRE9bE

Recapitulation & Examination Pattern		
Internal Continuous Assessment:		
Component	**Marks**	**Pattern**
Mid Semester	20	**Section A:** Contains **10** MCQs/Fill in the blanks/One Word Answer/ True-False type of questions. Each question carries **0.5 mark.** **Section B:** Contains **07** descriptive questions out of which **05** questions are to be attempted. Each question carries **03 marks**.
Activity	10	Will be decided by subject teacher
Class Test	05	Contains **05 descriptive questions.** Each question carries **01** mark.
Online Test/ Objective Test	05	Contains **10 multiple choice questions.** Each question carries **0.5** mark.
Assignment/ Presentation	05	Assignment to be made on topics and instruction given by subject teacher.
Attendance	05	As per policy.
Total Marks	**50**	

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Course created by: **Dr. Sheeba Rizvi**

                      Dr. Toukeer Khan

Signature:

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Approved by: Prof. Nadeem Ur Rahman

Signature:

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