GALGOTIAS UNIVERSITY

ADMISSION NUMBER												

School of Basic Sciences

Bachelor of Science in General
Semester End Examination - Nov 2023

Duration : 180 Minutes
Max Marks : 100

Sem V - C1UC501T - Group and Ring Theory and Linear Algebra

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	Describe the characteristic polynomial for a matrix with example.	K1	(2)
2)	Estimate the number of conjugacy classes of a non-abelian group of order 343.	K2	(4)
3)	Show that the units of R and R[x] are same.	K2	(6)
4)	Verify the rank-nullity theorem for $T : R^3 \to R^3$ defined as T(x, y, z)=(x-y+2z, 2x+y, -x-2y+2z).	K3	(9)
5)	Verify the rank-nullity theorem for $T : R^3 \to R^3$ defined as T(x, y, z)=(x+z, x+y+2z, 2x+y+3z).	K3	(9)
6)	Show that the polynomial $x^2 + x + 2$ is irreducible over F={0,1,2} mod 3. Use it to construct a field with 9 elements.	K5	(10)
7)	Examine, whether a group of order 33 is simple or not.	K4	(12)
8)	State and prove the rank nullity theorem.	K5	(15)
9)	Prove that the basis is the largest linearly independent and smallest spanning set.	K5	(15)
10)	Conclude that a group of order pqr, (p<q<r) is not simple.	K6	(18)