ALGEBRA- V (RINGS AND LINEAR ALGEBRA -II)

Total marks: 100(Theory: 75, Internal Assessment: 25)
5 Periods (4 lectures +1 students' presentation),
1 Tutorial (per week per student)

(1st,2nd , 3rd& 4th Weeks)

Polynomial rings over commutative rings, division algorithm and consequences, principal ideal domains, factorization of polynomials, reducibility tests, irreducibility tests, Eisenstein criterion, unique factorization in Z[x]**.**
Divisibility in integral domains, irreducibles, primes, unique factorization domains, Euclidean domains.
[1]: Chapter 16, Chapter 17, Chapter 18.

(5th, 6th, 7th& 8th Weeks)

Dual spaces, dual basis, double dual, transpose of a linear transformationand its matrix in the dual basis, annihilators, Eigenspaces of a linearoperator, diagonalizability, invariant subspaces and Cayley-Hamiltontheorem, the minimal polynomial for a linear operator.
[2]: Chapter 2 (Section 2.6), Chapter 5 (Sections 5.1-5.2, 5.4), Chapter 7(Section 7.3).

(9th, 10th, 11th& 12th Weeks)

Inner product spaces and norms, Gram-Schmidt orthogonalisation process, orthogonal complements, Bessel's inequality, the adjoint of a linear operator, Least Squares Approximation, minimal solutions to systems of linear equations, Normal and self-adjoint operators, Orthogonal projections and Spectral theorem.
[2]: Chapter 6 (Sections 6.1-6.4, 6.6).

REFERENCES:

1. Joseph A. Gallian, Contemporary Abstract Algebra (4th Ed.), Narosa Publishing House, 1999.
2. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, *Linear Algebra* (4th Edition), Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.

SUGGESTED READING:

(Linear Algebra)

1. S Lang, Introduction to Linear Algebra (2nd edition), Springer, 2005
2. Gilbert Strang, Linear Algebra and its Applications, Thomson, 2007
3. S. Kumaresan, Linear Algebra- A Geometric Approach, Prentice Hall of India, 1999.
4. Kenneth Hoffman, Ray Alden Kunze, Linear Algebra 2nd Ed., Prentice-Hall Of India Pvt. Limited, 1971

(Ring theory and group theory)

1. John B.Fraleigh, A first course in Abstract Algebra, 7th Edition, Pearson Education India, 2003.
2. Herstein, Topics in Algebra (2nd edition), John Wiley & Sons, 2006
3. Michael Artin, Algebra (2nd edition), Pearson Prentice Hall, 2011
4. Robinson, Derek John Scott., An introduction to abstract algebra, Hindustan book agency, 2010.