

ALGEBRA -III (RINGS AND LINEAR ALGEBRA- I)

Total marks: 100 (Theory: 75, Internal Assessment: 25)

5 Periods (4 lectures +1 students' presentation),

1 Tutorial (per week per student)

(1st& 2nd Weeks)

Definition and examples of rings, properties of rings, subrings, integral domains and fields, characteristic of a ring.

(3rd& 4th Weeks)

Ideals, ideal generated by a subset of a ring, factor rings, operations on ideals, prime and maximal ideals.

(5th& 6th Weeks)

Ring homomorphisms, properties of ring homomorphisms, Isomorphism theorems I, II and III, field of quotients.

[2]: Chapter 12, Chapter 13, Chapter 14, Chapter 15.

(7th& 8th Weeks)

Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.

(9th& 10th Weeks)

Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation, algebra of linear transformations.

(11th& 12th Weeks)

Isomorphisms, Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix.

[1]: Chapter 1 (Sections 1.2-1.6, Exercise 29, 33, 34, 35), Chapter 2 (Sections 2.1-2.5).

REFERENCES:

1. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, *Linear Algebra* (4th Edition), Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.

2. Joseph A. Gallian, *Contemporary Abstract Algebra* (4th Edition), Narosa Publishing House, New Delhi, 1999.

SUGGESTED READING:

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