Semester IICourse No :MAT411/ AMAT 411 Advanced Abstract Algebra –II Credits :6

Objective: To become familiar with algebraic structures such as rings, fields and to study their properties.

Unit- IPreliminaries of rings, subring, ideal, prime, maximal ideas, nil, nilpotent ideals and their properties. Quotient ring, Homomorphism, isomorphism and related results. UFD, PID, Euclidean domain, polynomial rings and their properties.

Unit – II Vector spaces, subspaces, generating set, linear dependence and independence, basis and dimension, quotient space, homomorphism, dual space, inner product space and modules. Liner transformation and their properties,

Unit – III Extension fields, irreducible polynomials, algebraic extension and their properties, splitting field, normal extension, multiple roots, finite fields.

Unit – V Automorphism groups, fixed field, fundamental theorm of Galois theory, polynomials solvable by radicals.

Outcome: The student will become familiar with various algebraic structures and their properties.

Text Books: 1) Topics in Algebra by I. N. Herstein, Wiley 1999.
2) Basic Abstract Algebra by Bhattacharya, Jain and NagPaul, Cambridge (Indian Edition) 2007.
Chapter 3, 4 from[1], Chapter 15, 16, 17 from [2,]

Reference book: Contemporary Abstract Algebra by J. A. Gallian,Narosa 2010.

Semester IICourse No :MAT412 / AMAT 412 Real Analysis –II Credits: 6

Objective: The objective of this paper is to learn Measure theory, Lebesgue Integral and Mathematical inequalities

Unit – I Measure on the real line. Lebegue outer measure, measurable sets. Regularity. Measurable functions. Borel and Lebegue measurability. Examples.

Unit – IIIntegration of functions of a Real variable. Integration of a simple function. Integration of non-negative functions. The general integral. Integration of series. Examples.

Unit – IIIRiemann and Lebeque Integrals, Differentiation. The four derivates, Functions of bounded variations. Lebegue's differentiation theorem, Examples.

Unit – IVAbstract Measure spaces. Measures and outer measures Extension of a measure. Uniqueness of the extension. Completion of a measure spaces. Integration with respective to a measure. Examples.

Unit – VThe L^p spaces. Convex functions. Jensen's inequality. The inequalities of Holder and Minkowski Comp leteness of L^p (μ) Convergence in measure. Almost uniform convergence. Examples.

Professor and Head
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Semester – II
Paper – I (B)- Advanced Abstract Algebra -II

Unit- I
Normal series, solvable groups, nilpotent groups and related results.(15 lectures)

Unit – II
Structure theorems of groups, direct products, finitely generated abelian groups, Invariants of a finite abelian group. (15 lectures)

Unit - III
Modules, definition and examples, sub modules and direct sums, R – homomorphisms, quotient modules, completely reducible modules, free modules, representation and rank of a linear mapping. (15 lectures)

Unit – IV
Noctherian and Artinian modules and rings, Wedderbum – Artin theorem, uniform modules, primary modules, Noether –Lasker theorem similarity of linear transformations (15 lectures)
Unit – V
Reduction to triangular form, nilpotent transformation, index of nil potency, invariants of a nilpotent linear transformation, Jordan blocks, Jordan forms, (i) smith normal form (15 lectures)
Text Book:
P. B. Bhattacharya, S. K. Jain and S. R. NagPaul, Basic Abstract Algebra, Cambridge University Press, Indian Edition, 1997
Chapter 15, 16, 17 and 18 complete

Reference Books:

1. I. N. Herstein: Topics in algebra, Wiley Eastern Ltd., New Delhi, 1975.
2. S. Lang: Algebra, 3rd edition, Addison-Wesley, 1993.
3. I. S. Luther and I.B.S. Passi: Algebra, Vol. I and Vol. II Narosa, New Delhi.
4. D. S. Malik, J. N. Mordeson and M. K. Sen: Fundamentals of Abstract Algebra, Mc Graw-Hill, and International Edition, 1997.
5. S. K. Jain, A. Gunawardena and P. B. Bhattacharya: Basic Linear Algebra with MATLAB, Key College Publishing (Springer-Verlag), 2001.
6. J. B. Fraleigh, a first curse in Abstract Algebra, Narosa Publications.