A PROPOSED MODIFICATION
OF
THE ALGEBRA PORTION OF THE ADMISSION TO CANDIDACY EXAMINATION

Group Theory: basic notions and results (especially those pertaining to automorphisms, homomorphisms, normal subgroups, quotient groups, and conjugacy); the isomorphism theorems; group actions; the theorems of Lagrange, Cayley, Sylow and Jordan-Hölder-Schreier ; symmetric groups and permutation representations; free, nilpotent, solvable, and simple groups, finitely generated groups and their presentations, the classification of finitely generated Abelian groups.

Ring Theory: Ideals and homomorphisms, localization, free and projective modules, basic theorems about factorization and UFD's , structure theory of modules over a PID, including applications to canonical forms of a matrix, chain conditions, Hilbert basis theorem, integral ring extensions, the Hilbert Nullstellensatz.

Field Theory. General field theory including separable and inseparable extensions, normal extensions, transcendental extensions, cyclotomic extensions, finite fields, and algebraic closure; Galois theory, solvability by radicals, cyclic extensions.

Resource Texts: General Expositions (listed alphabetically by author)

* Michael Artin, Algebra, Prentice Hall, 1991.
* David S. Dummit and Richard Foote, Abstract Algebra, (3rd Edition), Wiley, 2003.
* Larry C. Grove, Algebra, Dover Publications, 2004.
* Thomas Hungerford, Algebra, Springer Verlag, 2003.
* I. Martin Isaacs, Algebra, A Graduate Course, American Mathematical Society, 1994.
* Nathan Jacobson, Basic Algebra I, Dover Publications, 2009.
* Joseph J. Rotman, Advanced Modern Algebra, Prentice Hall, 2002.
* Serge Lang, Algebra, (2nd edition), Addison-Wesley, 1992.
* van der Waerden, Algebra (Vol. 1.) (7th Edition), Springer Verlag, 2003.

Resource Texts: Expositions on Special Topics(listed alphabetically by author)

* Emil Artin, Galois Theory: Lectures Delivered at the University of Notre Dame, Dover Publications, 1997.
* Emil Artin, Algebra with Galois Theory (Courant Lecture Notes), American Mathematical Society, 2007.
* Kenneth M. Hoffman and Ray Kunze, Linear Algebra, 2nd Edition, Prentice Hall, 1971.
* Irving Kaplansky, Fields and Rings, 2nd Edition, University of Chicago Press, 1972.
* Joseph J. Rotman, An Introduction to the Theory of Groups, 4th Edition, Graduate Texts in Mathematics: Springer Verlag 1999.