Recommended Syllabus

This is the recommended syllabus for the module detailed below. The module should contain all the topics listed below in some form, but be aware that there may be additional material covered that can also be examined.

MA249 Algebra II: Groups and Rings

1. Groups and subgroups, examples, rings and subrings, the issue of 1 in signature, fields, examples.
2. Isomorphisms, cyclic groups, orders of an element in a group, generators and relations, Cosets and Lagranges theorem, Eulers theorem, RSA, groups of order 4 and p.
3. Homomorphisms, examples of homomorphisms, kernels and images, normal subgroups and ideals, classification of groups of order 6 and 8.
4. Quotient groups and quotient rings, examples, isomorphism theorems, Cayley Theorem, Chinese remainder theorem.
5. Group actions on sets, groups, rings, graphs etc., orbit-stabilizer theorem, conjugacy classes, conjugacy classes in D_n, S_n and GL_n, simplicity of A_5.
6. Class equation, groups of order p^2, semidirect products, classification of groups of order $2p$.
7. Sylows theorems, classification of groups of order 12 and 15.
8. Polynomial rings, Euclidian domains, PID-s, UFD-s, rings of integers.
9. Gauss theorem about polynomial rings, matrix rings.
10. Ideals in matrix rings, idempotents, cyclotomic polynomials, discrete Fourier transform.

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