MM-01

ADVANCED ABSTRACT ALGEBRA

M.M. 100

(Questions will be set from each unit/section)

Units	Topics
I	**Groups** - Normal and Subnormal series. Composition Series. Jordan-Holder theorem. Solvable groups. Nilpotent groups.
II	***Canonical forms*** - *Similarity of linear transformations. Invariant subspaces.* Reduction to triangular forms. Nilpotent transformation. Index of nilpotency. Invariants of a nilpotent transformation. The primary decomposition theorem. Jordan block and Jordan forms.
	Cyclic modules. Simple modules. Semi-simple modules. Schuler's Lemma. Free modules.
III	**Field theory** - Extension fields. Algebraic and transcendental extensions. Separable and Inseparable extensions. Normal extensions. Perfect fields. Finite fields. Primitive elements. Algebraically closed fields. Automorphisms of extensions. *Galois extensions. Fundamental theorem of Galois theory. Solution* of polynomial equations by radicals. Insolvability of the general equation of degree 5 by radicals.
IV	**Noetherian and artinian modules and rings** - Hilbert basis theorem. *Wederburn-Artin theorem. Uniform modules,* primary modules, and Noether Lasker theorem.
	Smith normal form over a principal ideal domain and rank.
V	Fundamental Structure theorem for finitely generated modules over a principal ideal domain and its applications to finitely generated abelian groups. Rational canonical form. Generalised Jordan form over any field.