Course: Discipline Specific Elective [Semester-5]

Semester	**5**
Paper Number	**Paper no:2 [HMTDS5021T]**
Paper Title	**Advanced Algebra**
No. of Credits	**6**
Theory/ Composite	**Theory**
No of periods assigned	**Th: 6**
Name of Faculty Member(s)	**Prof. Gaurab Tripathi**
Course Description/ Objective	• To learn the group action as a tool for counting and applying it in the context of group theory. • To learn about the product of groups • To learn about the partial break through on the converse of Lagranges theorem. • Learning the simplicity of A_n , $n \geq 5$. • Learning some computational aspects of number theory. • Basics of field extension.
Syllabus	**Advanced Algebra (78 classes)** Automorphism, inner automorphism, automorphism groups, automorphism groups of finite and infinite cyclic groups, applications of factor groups to automorphism groups, Characteristic subgroups, Commutator subgroup and its properties. **[12]** Properties of external direct products, the group of units modulo n as an external direct product, internal direct products, Fundamental theorem of finite abelian groups. **[12]** Group actions, stabilizers and kernels, permutation representation associated with a given group action. Applications of group actions. Generalized Cayley's theorem. Index theorem. **[15]** Groups acting on themselves by conjugation, class equation and consequences, conjugacy in Sn, p-groups, Sylow's

	theorems and consequences, Cauchy's theorem, Simplicity of An for n ≥ 5, non-simplicity tests. **[15]** Linear Diophantine Equation**,** Euler's **φ**-function, Quadratic Residue and Legendre symbol **[10]** Prime Subfield, construction of finite fields, extension fields, degree of a field extension, primitive element for an extension, simple extension, Algebraic and Transcendental elements, minimal polynomial of an algebraic element over a field, Degree of an extension, Algebraic and Transcendental Extension, [Any finite extension is any algebraic extension], Intermediate Field. **[15]**
Texts	Topics in Abstract Algebra—M. K. Sen, S. Ghosh, P. Mukhopadhyay
Reading/Reference Lists	(1) First Course in Abstract Algebra— J. B. Fraleigh (2) Abstract Algebra—D.S. Dummit and R. M. Foote (3) Algebra—M. Artin (4) Topics in Algebra—I. N. Herstein (5) Elementary Linear Algebra—Howard Anton, Chris Rorres
Evaluation	**CIA:20** **End Sem:80**