**Course: Discipline Specific Elective [Semester-5]**

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| Semester | 5 |
| Paper Number/ Code |  Paper number: 2 Paper Code: HMTDS5021T |
| Paper Title | **Advanced Algebra** |
| No. of Credits | 6 |
| Theory/ Composite | Theory |
| No of periods assigned  | Th:6 |
| Name of Faculty Member(s) | Prof. Rabiul Islam |
| 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.
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| Syllabus | 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(6) Elementary Linear Algebra—Howard Anton, Chris Rorres |
| Evaluation  | CIA: 20End-Sem: 80[ 40 +40] |