Name of the Teacher: Aarti Sharma

Class: M.Sc. Mathematics (1st  Semester), MM-401: Advanced Abstract Algebra-I

**Lesson Plan**

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| **S No** | **Period** | **Topics to be Covered** | **Academic Activity to be Organized** |
|  | **17-31 July 2017** |  Automorphisms and Inner automorphisms of a group G. The groups Aut(G) and Inn(G). Automorphism group of a cyclic group. Normalizer and Centralizer of a non-empty subset of a group G. Conjugate elements and conjugacy classes. Class equation of a finite group G and its applications. Derived group (or a commutator subgroup) of a group G. perfect groups. | **Oral Presentations** |
|  | **01-31 Aug 2017** | Zassenhau’s Lemma. Normal and Composition series of a group G. Scheier’s refinement theorem. Jordan Holder theorem. Composition series of groups of order pn and of Abelian groups. Caunchy theorem for finite groups. ∏ - groups and p- groups. Sylow ∏-subgroups and Sylow p-subgroups. Sylow’s Ist, IInd and IIIrd theorems. Application of Sylow theory to groups of smaller orders..  | **Oral Presentations** |
|  | **01-30 Sept 2017** | Characteristic of a ring with unity. Prime fields Z/pZ and Q. Field extensions. Degree of an extension. Algebraic and transcendental elements. Simple field extensions. Minimal polynomial of an algebraic element. Conjugate elements. Algebraic extensions. Finitely generated algebraic extensions. Algebraic closure and algebraically closed fields.  | **Group Discussion** |
|  | **01-31 Oct 2017** | Splitting fields., finite fields.. Normal extensions. Separable elements, separable polynomials and separable extensions. Theorem of primitive element. Perfect fields. Galois extensions. Galois group of an extension. Dedekind lemma Fundamental theorem of Galois theory. Frobenius automorphism of a finite field. Klein’s 4-group and Diheadral group. Galois groups of polynomials. Fundamental theorem of Algebra. | **Group Discussion** |
|  | **01-13 Nov 2017** | Solvable groups Derived series of a group G. Simplicity of the Alternating group An (n>5). Non-solvability of the symmetric group Sn and the Alternating group An (n>5). Roots of unity Cyclotomic polynomials and their irreducibility over Q Radicals extensions. Galois radical extensions. Cyclic extensions. Solvability of polynomials by radicals over Q. Symmetric functions and elementary symmetric functions. Construction with ruler and compass only..  | **Oral presentation**  |

**Topics of Assignments/ Class Tests to be given to the Students:**

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| **Assignment 1** | Sylow’s theormes |
| **Assignment 2** | Fundamental Theorem ofGolois  |
| **Class Test** | **Unit 2** |