|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Course Code | Course Title | L | P | U |
| MA551 | **Modern Algebra - II** | 4 | 0 | 5 |

**Objectives of the course :**

This serves a course which will give deep understanding of modern algebra and its applications.

**Course Outcomes :**

1. To recall the basics of modern algebra
2. To study the group action
3. To study Sylow theorems
4. To study the Field Extensions, Splitting fields, Algebraic closures,
5. To study Separable and Inseparable Extensions,
6. To study Cyclotomic Polynomials and Extensions
7. To study Basic concept of Galois Theory.

**Mapping of Course Outcome(s):**

|  |  |
| --- | --- |
| PO/CO | Program Outcomes |
| PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| Course Outcomes | CO1 | S |  | S |  |  |  | S |
| CO2 | S |  |  | M |  |  |  |
| CO3 | S | M |  | M | L |  | S |
| CO4 | S |  |  | M |  | L | S |
| CO5 | S |  |  |  | L |  |  |
| CO6 | S | S |  | M |  | L | S |
| CO7 | S |  |  |  | L | L |  |

L-Low, M-Medium, S-Strong

**Syllabus :**

**Unit-I :** Group, Subgroup, Permutation groups, Cosets and Lagranges’ theorems, Cyclic groups,

**Unit-II :** Groups Acting on Sets, Examples, Orbit, Stabilizer, The Class Equation, Sylow first theorem, Sylow second theorem, Sylow third theorem, Examples, applications.

**Unit-III :** Extension Fields, Algebraic Elements, Algebraic Closure, Splitting Fields.

**Unit-IV :** Finite fields, Separable Extensions, Inseparable Extensions,

**Unit-V :** Polynomial codes, Field Automorphisms, the Fundamentals of Galois Theorem, Solvability by Radicals and other applications.

**Text Books : T1 :** Thomas W. Judson; Abstract AlgebraTheory and Applications.

**LACTURE WISE PLAN :**

|  |  |  |  |
| --- | --- | --- | --- |
| **Lecture No.** | **Learning objective** | **Topics to be covered** | **Reference** |
| 1-5 | To recall the basics of modern algebra  | Group | T1 |
| Subgroup | T1 |
| Permutation groups | T1 |
| Cosets and Lagranges’ theorems | T1 |
| Cyclic groups | T1 |
| 6-12 | To study the group action | Groups Acting on Sets | T1 |
| Examples | T1 |
| Orbit | T1 |
| Stabilizer | T1 |
| The Class Equation | T1 |
| 13-18 | To study Sylow theorems | Sylow first theorem, | T1 |
| Sylow second theorem | T1 |
| Sylow third theorem | T1 |
| Examples | T1 |
| applications | T1 |
| 19-25 | To study the Field Extensions, Splitting fields, Algebraic closures, | Extension Fields | T1 |
| Algebraic Elements | T1 |
| Algebraic Closure | T1 |
| Splitting Fields | T1 |
| Finite fields | T1 |
| 26-31 | To study Separable and Inseparable Extensions, | Separable Extensions | T1 |
| Inseparable Extensions, | T1 |
| 32-37 | To study Cyclotomic Polynomials and Extensions, | Polynomial codes. | T1 |
| 38-44 | To study Basic concept of Galois Theory. | Field Automorphisms  | T1 |
| The Fundamentals of Galois Theorem | T1 |
| Solvability by Radicals | T1 |
| other applications | T1 |

**: Evaluation Scheme :**

|  |  |  |  |
| --- | --- | --- | --- |
| **Component** | **Duration** | **Weightage(%)** | **Remarks** |
| Internal I |  | 25 |  |
| Mid Term Examination |  | 20 | Closed Book |
| Internal II |  | 25 |  |
| Comprehensive Examination |  | 30 | Closed Book |