| Course Type | Course Code | Name of Course | L | T | P | Credit |
|---|---|---|---|---|---|---|
| DE | **NMCD525** | Algebraic Coding Theory | 3 | 0 | 0 | 3 |

| Prerequisite |
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| ● Advanced Algebra |

| Course Objective |
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| ● The objective of this course is to introduce the fundamental idea of the Coding Theory. |

| Learning Outcomes |
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| ● Applicable in Information and Communication theory. |

| Unit No. | Topics to be Covered | Contact Hours | Learning Outcome |
|---|---|---|---|
| 1 | Basic Concepts: Idea behind use of codes, block codes and linear codes, repetition codes, nearest neighbour decoding, syndrome decoding, requisite basic ideas in probability, Shannon's theorem (without proof). | 9 | The main outcome of this unit is to develop the idea of Linear codes and repetition codes and their applications in decoding. |
| 2 | Good linear and nonlinear codes: Binary Hamming codes, dual of a code, constructing codes by various operations, simplex codes, Hadamard matrices and codes constructed from Hadamard and conference matrices, Plotkin bound and various other bounds, Gilbert-Varshamov bound. | 8 | The main outcome of this unit to develop the idea of different kind of linear and nonlinear codes and their corresponding bounds. |
| 3 | Reed-Muller and related codes: First order Reed-Muller codes, RM code of order r, Decoding and Encoding using the algebra of finite field with characteristic two. | 7 | The main outcome of this unite to develop the idea of Reed Muller codes which is very useful in study of public key cryptosystem. |
| 4 | Perfect codes: Weight enumerators, Kratchouwk polynomials, Lloyd's theorem, Binary and ternary Golay codes, connections with Steiner systems. | 8 | The main outcome of this unit is to develop the idea of some important codes like Golay codes, and Perfect codes which are use full in decoding. |
| 5 | Cyclic codes: The generator and the check polynomial, zeros of a cyclic code, the idempotent generators, BCH codes, Reed Solomon codes, Quadratic residue codes, generalized RM codes. | 10 | Learning outcome: The main outcome of this unit is discuss the different codes like BCH, Reed Soloman codes which are very useful in Study of public key cryptosystem. |
| **Total** | | **42** | |

**Text Books:**

1. S. Ling and C. Xing, Coding Theory: A First Course, Cambridge University Press, 2004

**Reference Books:**

1. J. H. van Lint, Introduction to Coding Theory, Springer, 1999.
2. W. C. Huffman and V. Pless, Fundamentals of Error Correcting Codes, Cambridge   University Press, 2003.