

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Civil Engineering
 (Applicable from the academic session 2018-2019)

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| CE(BS)302 | Mathematics-III (Transform & Discrete Mathematics) | 2L + 0T | 2 Credits |
| (Prerequisite 2c, 5b-d, 6b) | | | |
| Module 1 | Transform Calculus -1 Polynomials – Orthogonal Polynomials – Lagrange’s, Chebysev Polynomials; Trigonometric Polynomials; Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs and PDEs by Laplace Transform method. | 6 L | |
| Module 2 | Transform Calculus-2 Fourier transforms, Z-transform and Wavelet transforms: properties, methods, inverses and their applications. | 6 L | |
| Module 3 | Sets, relations and functions Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses. | 4 L | |
| Module 4 | Propositional Logic Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory. | 4 L | |
| Module 5 | Partially ordered sets Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices. Boolean and pseudo Boolean lattices. | 4 L | |
| Module 6 | Algebraic Structures Algebraic structures with one binary operation – semigroup, monoid and group. Cosets, Lagrange’s theorem, normal subgroup, homomorphic subgroup. Congruence relation and quotient structures. Error correcting code. Algebraic structures with two binary operations- ring, integral domain, and field. Boolean algebra and boolean ring (Definitions and simple examples only). | 4 L | |
| Module 7 | Introduction to Counting Basic counting techniques – inclusion and exclusion, pigeon-hole principle, permutation, combination, summations. Introduction to recurrence relation and generating functions. | 3 L | |
| Module 8 | Introduction to Graphs Graphs and their basic properties – degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, trees. | 3 L | |
| Reference | 1. C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000. 2. R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, World Scientific, 1999. 3. R.L. Graham, D. E. Knuth, and O. Patashnik, Concrete Mathematics, 2nd Ed., Addison-Wesley, 1994. 4. K. H. Rosen, Discrete Mathematics and its Applications, 6th Ed., Tata McGraw-Hill, 2007. 5. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Ed., Jones and Bartlett, 2010. 6. N. Deo, Graph Theory, Prentice Hall of India, 1974. 7. S. Lipschutz and M. L. Lipson, Schaum's Outline of Theory and Problems of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 1999. 8. J. P. Tremblay and R. P. Manohar, Discrete Mathematics with Applications to Computer Science, Tata McGraw-Hill, 1997. 9. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006. 10. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010. 11. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000. 12. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008. | | |