

- **Curriculum (with CO & PO mapping):**

BTBS 101/201

Engineering Mathematics – I

Unit 1: Linear Algebra- Matrices Inverse of a matrix by Gauss-Jordan method; Rank of a matrix; Normal form of a matrix ; Consistency of non- homogeneous and homogeneous system of linear equations ; Eigen values and eigen vectors ; Properties of eigen values and eigen vectors (without proofs); Cayley Hamilton's theorem (without proof) and its applications. [6 Hours]

Unit 2: Partial Differentiation Partial derivatives of first and higher orders; Homogeneous functions – Euler's Theorem for functions containing two and three variables (with proofs); Total derivatives; Change of variables. [06 Hours]

Unit 3: Applications of Partial differentiation Jacobians - properties; Taylor's and Maclaurin's theorems (without proofs) for functions of two variables; Maxima and minima of functions of two variables; Lagrange's method of undetermined multipliers. [06 Hours]

Unit 4: Reduction Formulae and Curve Tracing Reduction formulae for $\int_0^{\pi/2} \sin^n x \, dx$, $\int_0^{\pi/2} \cos^n x \, dx$, $\int_0^{\pi/2} \sin m x \cos n x \, dx$; Tracing of the curves given in Cartesian, parametric & polar forms. [06 Hours]

Unit 5: Multiple Integrals Double integration in Cartesian and polar co-ordinates; Evaluation of double integrals by changing the order of integration and changing to polar form; Triple integral; Applications of multiple integrals to find area as double integral , volume as triple integral and surface area. [08 Hours]

Text Books :

- 1) Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
- 2) Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
- 3) A Course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledgeware, Mumbai.
- 4) A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
- 5) Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.

Reference Books:

- 1) Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
- 2) A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd. , Singapore.
- 3) Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata McGraw-Hill Publishing Company Ltd., New Delhi.

General Instructions: The tutorial classes in Engineering Mathematics-I are to be conducted batchwise. Each class should be divided into three batches for the purpose. The internal assessment of the students for 20 marks will be done based on assignments, surprise tests, quizzes, innovative approach to problem solving and percentage attendance. The minimum number of assignments should be eight covering all topics.

Engineering Mathematics – II

Unit 1: Complex Numbers Definition and geometrical representation ; De-Moivre's theorem(without proof) ; Roots of complex numbers by using De-Moivre's theorem ; Circular functions of complex variable

– definition ; Hyperbolic functions ; Relations between circular and hyperbolic functions ; Real and imaginary parts of circular and hyperbolic functions ; Logarithm of Complex quantities. [07 Hours]

Unit 2: Ordinary Differential Equations of First Order and First Degree and Their Applications Linear equations; Reducible to linear equations (Bernoulli's equation); Exact differential equations; Equations reducible to exact equations ; Applications to orthogonal trajectories , mechanical systems and electrical systems. [07 Hours]

Unit 3: Linear Differential Equations with Constant Coefficients Introductory remarks - complementary function, particular integral ; Rules for finding complementary functions and particular integrals ; Method of variation of parameters ; Cauchy's homogeneous and Legendre's linear equations. [07 Hours]

Unit 4: Fourier Series Introductory remarks- Euler's formulae ; Conditions for Fourier series expansion - Dirichlet's conditions ; Functions having points of discontinuity ; Change of interval ; Odd and even functions - expansions of odd and even periodic functions ; Half -range series. [07 Hours]

Unit 5: Vector Differential Calculus General rules of vector Differentiation; Scalar and vector fields: Gradient , divergence and curl ; Solenoidal and irrotational vector fields; Vector identities . [07 Hours]

Unit 6: Vector Integral Calculus Vector Integration : line integral , surface integral and volume integral ; Green's lemma , Gauss' divergence theorem and Stokes' theorem (without proofs) . [07 Hours]

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3. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata McGraw-Hill Publishing Company Ltd., New Delhi.

General Instructions: 1. The tutorial classes in Engineering Mathematics-II are to be conducted batchwise. Each class should be divided into three batches for the purpose. 2. The internal assessment of the students for 20 marks will be done based on assignments, surprise tests, quizzes, innovative approach to problem solving and percentage attendance. 3. The minimum number of assignments should be eight covering all topics.

Other Mathematics Courses from Second Year onwards are different for different Engineering Programs, Mathematics department caters to all these courses listed under respective departments.