

Mathematics Complete Course

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Linear Algebra

Part I

<https://unacademy.com/class/linear-algebra-part-i/UO70HZCA>

Matrix, Definition, Matrix elements, Concise matrix representation, a_{ij} form, Row, Column, Order of Matrix, Types of Matrix, Column Matrix, Row Matrix, Square matrix, Diagonal Matrix, Principal Diagonal ;

Part II

<https://unacademy.com/class/linear-algebra-part-ii/JZSLNHU3>

Identity Matrix or Unit Matrix, Scalar Matrix, Null Matrix or zero Matrix, Sub Matrix, Triangular Matrix, Upper Triangular Matrix, Lower Triangular Matrix, Symmetric and skew Symmetric Matrix, Smart Method, Operations on Matrices, Equality of Matrices, Addition of Matrix, Additive inverse, Theorem of symmetric and skew symmetric Matrix ;

Part III

<https://unacademy.com/class/linear-algebra-part-iii/7S4KMQM1>

Matrix Multiplication, Commutative, Associative and Distributed law of Matrix multiplication, Matrix Decomposition, LU Decomposition ;

Part IV

<https://unacademy.com/class/linear-algebra-part-iv/DGVC5H2Z>

Transpose of Matrix, Properties of Transpose, Inverse of Matrix, Minor, Co-factor, Adjoint, Determinant, Mondal jugaad for inverse of 2×2 matrix, Mondal jugaad for inverse of 3×3 matrix;

Part V

<https://unacademy.com/class/linear-algebra-part-v/BWGWFBC>

Inverse of Matrix, Properties of Inverse, Minimum Multiplication in Matrix Multiplication;

Part VI

<https://unacademy.com/class/linear-algebra-part-vi/00Z7KCFR>

Special Matrix, Idempotent Matrix, Nilpotent Matrix, Involutory Matrix, Singular Matrix, Orthogonal Matrix, Property of Orthogonal Matrix, System of linear equation, Rank of Matrix;

Part VII

<https://unacademy.com/class/linear-algebra-part-vii/8R3ZDSU2>

Rank of Matrix, Mondal's jugaad for Rank, Echelon form, Row or Column Operations, Rank Properties;

Part VIII

<https://unacademy.com/class/linear-algebra-part-viii/N7T1WJL5>

Linear Equation, Homogeneous Equation and Non Homogeneous Equation, Co-efficient Matrix, Augmented Matrix, Mondal's Jugaad for System of Linear equation, Trivial Solution, Non-Trivial Solution, Consistent, Inconsistent, Unique solution, Infinite Solution, No Solution,

Part IX

<https://unacademy.com/class/calculus-part-i/1PA5SF6D>

Linearly Dependent and Independent Vector, Nullity, Cramer's Rule, Eigen Value and Eigen Vector visualization;

Part X

<https://unacademy.com/class/calculus-part-ii/MFBDCPGV>

Eigen values and eigen vector , example to find eigen value , properties of eigen values , questions discussion ;

Part XI

<https://unacademy.com/class/calculus-part-iii/D3NZLYKV>

Rest properties of eigen values , Normalised vector , Orthogonal vector , Ortho normal , Eigen vectors , Questions discussion ;

Part XII

<https://unacademy.com/class/calculus-part-iv/HBAYRIRL>

Rest part of eigen value , Algorithm , Multiplicity , Algebraic Multiplicity , Geometric multiplicity ;

Part XIII

<https://unacademy.com/class/calculus-part-v/71SZZ70B>

Cayley Hamilton Theorem , Properties of Eigen vector , Determinants of matrix , Properties of the determinant ;

Calculus

Part- I

<https://unacademy.com/class/calculus-part-vi/2SGAA0PA>

Calculus , (Limit , Continuity and differentiability of calculus) , Indeterminate form of calculus , L-hospital's rules , Questions discussion ;

Part II

<https://unacademy.com/class/calculus-part-vii/FBAFTT0M>

Calculus questions discussion , Algorithm of calculus , difference type of form , along with axis , Continuity ;

Part III

<https://unacademy.com/class/calculus-part-ix/WRC2BLBP>

Rest part of Continuity , Differentiability , Questions discussion ;

Part IV

<https://unacademy.com/class/calculus-part-x/DYQQOEB6>

Questions discussion , Mean value theorem , Rolle's mean value theorem ;

Part V

<https://unacademy.com/class/calculus-part-xi/QO5Z75SP>

Lagrange's mean value theorem, Mean value theorem for integrals, Intermediate value theorem, Cauchy's mean value theorem, Partial derivatives, questions discussion ;

Part VI

<https://unacademy.com/class/calculus-part-xii/BW7ZZGIS>

Higher order partial Derivatives, Clairaut's Theorem, Homogeneous function, Euler's theorem, Total derivatives, Chain rule, Maxima and Minima ;

Part VII

<https://unacademy.com/class/calculus-part-xiv/0ASKQBXB>

Questions discussion, Maxima and Minima condition for two variables ;

Part VIII

<https://unacademy.com/class/calculus-part-xv/58XUZ74L>

Questions discussion, Condition for Maxima and Minima in three variable, Maximum value of function in any surface, Miscellaneous , Lower bounded, upper bounded ;

Part IX

<https://unacademy.com/class/calculus-part-viii/ZELPMN8E>

Questions discussion, Types of integral calculus, ILATE rule, Basic method of integration ;

Part X

<https://unacademy.com/class/calculus-part-xvi/ZVMSECXN>

Rest part of basic method of integration , Questions discussion ;

Part XI

<https://unacademy.com/class/differential-equations-part-i/D349SA0Q>

Questions discussion , Gamma Function , Beta function , Newton's Leibnitz Theorem ;

Part XII

<https://unacademy.com/class/differential-equations-part-ii/8R68N623>

Questions discussion , Quadrature rule , Zeroth degree polynomial , 1st degree polynomial , 2nd degree polynomial , Multiple integrals ;

Part XIII

<https://unacademy.com/class/differential-equations-part-iii/2F7V4JDC>

Rest part of multiple integrals , Horizontal strip , Line , Area calculation by integration , Triple integration , Questions discussion ;

Part XIV

<https://unacademy.com/class/differential-equations-part-iv/Y53FHSR3>

Questions discussion , Area of a quadrant of the ellipse , The volume of a cylinder formed by a circle ;

Part V

<https://unacademy.com/class/differential-equations-part-v/FFZTJQGB>

Length of the arc in the Cartesian form , Length of the arc in parametric form , volume of the solid revolution of the arc around x-axis , The volume of solid revolution when Arc around y-axis , Change of variable (Jacobian) , Cartesian to polar , Taylor series , Questions discussion;

Differential Equations

Part I

<https://unacademy.com/class/differential-equations-part-vi/JR2GPTUJ>

Cartesian to polar coordinates , Cartesian to cylindrical co-ordinate , Cartesian to spherical co-ordinate , Angle of intersection of two circle , Differential equations , Definition of differential equations , Order and degree , Questions discussion ;

Part II

<https://unacademy.com/class/differential-equations-part-vii/0FJKF30T>

Rest part of differential equations , Linear differential equations , Types of differential equation , Ordinary differential equation , Integrating factor , Questions discussion ;

Part III

<https://unacademy.com/class/differential-equations-part-viii/Y7PI49HR>

Question discussion , Reducible to variable - separable , Homogeneous equation , linear equation of first order , Integrating factor based questions ;

Part IV

<https://unacademy.com/class/differential-equations-part-ix/04Q2P1VQ>

Bernoulli's equation , Exact differential equations , Questions discussion ;

Part V

<https://unacademy.com/class/differential-equations-part-x/3YH661IM>

Equation Reducible to exact equation , Linear differential equations of nth order , Linear differential equation with constant coefficients , When the roots are distinct and real , when roots are equal , when one pair of roots be imaginary , Rules of finding the particular integral , Questions discussion ;

Part VI

<https://unacademy.com/class/differential-equations-part-xi/3I7A0JPG>

Rest part of rules for finding the particular integral , Wronskian , Euler - Cauchy Method , Questions discussion ;

Laplace Transforms

Part I

<https://unacademy.com/class/laplace-transforms-i/W4UTFPRN>

Laplace transform , Definition , Transforms of elementary function , linearity property of Laplace transform , First shifting property , Questions discussion ;

Part II

<https://unacademy.com/class/laplace-transforms-ii/7LYK05NJ>

Change of scale property , Laplace transform of derivative , Laplace transform of integral , Multiplication by t^n , Division by t , Inverse Laplace transform , Concept of partial fraction ;

Part III

<https://unacademy.com/class/numerical-methods-i/WJLMB7OY>

Rest part of partial fraction , Convolution theorem , Application of Laplace in differential equation , initial value theorem of laplace transform , final value theorem of laplace transform , Questions discussion ;

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Numerical Methods

Part I

<https://unacademy.com/class/numerical-methods-ii/HIAB3AKC>

Unit step function, second shifter property, Unit impulse function, Numerical Methods started (00:49:34), Application of numerical methods, numerical solution of system of linear equation, Gauss elimination method, Gauss-Seidel method ;

Part II

<https://unacademy.com/class/numerical-methods-iii/3J51EBYA>

Method of factorization or Triangularisation method (Doolittle's method), LU decomposition, Crout's method, numerical solution of a nonlinear algebraic and transcendental equation, Newton Raphson method ;

Part III

<https://unacademy.com/class/numerical-methods-iv/4XKB6HRF>

Bi-section method, method of false position or regula falsi method, Secant method, Numerical integration, Trapezoidal method, Questions discussion ;

Part IV

<https://unacademy.com/class/probability-statistics-i/D8VTC0UQ>

Error , Simpson's 1/3 rule or Simpson rule , Simpson's 3/8 rule , Questions discussion ;

Part V

<https://unacademy.com/class/probability-statistics-ii/WUM4H1KV>

Errors , absolute error , relative error , Truncation error , Simpson's 1/3 rule error , Simpson's 3/8 rule error , Solution of ordinary differential equation , Runge kutta fourth order , Questions discussion ;

Probability and Statistics

Part I

<https://unacademy.com/class/probability-statistics-iii/IZT28V31>

Stability analysis , Probability and statistics started (00:27:00) , introduction , Definition of probability , Questions discussion ;

Part II

<https://unacademy.com/class/probability-statistics-iv/MTE85CH8>

Axioms of probability , Basics of set theory , Union and intersection of sets , Types of event , Complementary events , Questions discussion ;

Part III

<https://unacademy.com/class/probability-statistics-vi/MQRE9HI1>

Rest part of complementary event , Independent event , Mutually exclusive events , Questions discussion ;

Part IV

<https://unacademy.com/class/probability-statistics-v/4PUFPTQ5>

Exhaustive events , Equally likely events , Rules of probability , Sum rule , Product rule , Basic concepts of permutation and combination , Questions discussion ;

Part V

<https://unacademy.com/class/probability-statistics-vii/LYASTTB>

Combination with and without repetition , without replacement use of the combination , Questions discussion ;

Part VI

<https://unacademy.com/class/probability-statistics-viii/6Z8KIGDH>

Conditional probability , with replacement , Questions discussion ;

Part VII

<https://unacademy.com/class/probability-statistics-ix/NGKNF5NR>

Rest part of conditional probability , Questions discussion ;

Part VIII

<https://unacademy.com/class/probability-statistics-x/JWL7DV50>

Rule of total probability , Baye's theorem , Probability distribution method ;

Part IX

<https://unacademy.com/class/complex-variables-i/SKZGMMN7>

Expected value of a discrete random value , Variance (of discrete random variable) ,
Continuous random variables , Questions discussion ;

Part X

<https://unacademy.com/class/complex-variables-ii/IVK42UA8>

Expectation for continuous random variable , Variance for continuous random variable ,
Property of expectation , Standard deviation , Types of discrete distribution ,
Binomial distribution ;

Part XI

<https://unacademy.com/class/complex-variables-iii/Y929O04J>

Questions discussion , Binomial distribution - (mean , variance , standard deviation) ,
Hypergeometric distribution , Geometric distribution ;

Part XII

<https://unacademy.com/class/complex-variables-iv/1LDPOUM1>

Poisson distribution , Types of continuous distribution , Uniform distribution , mean and
standard deviation - uniform distribution , Exponential distribution , Normal distribution , Shape
of probability density function ;

Part XIII

<https://unacademy.com/class/vector-calculus-i/TBO1M9PZ>

Shape of cumulative distribution function for normal distribution ,
New chapter started Statistics (01:02:05) , Mean , Median , Mode , properties related to
mean median and mode , relation between mean median and mode with frequency
distribution , Variance , Standard deviation , Coefficient of variance ;

Vector Calculus

Part I

<https://unacademy.com/class/vector-calculus-ii/9OGOJL0L>

Vector , introduction , Vector projection of an vector on an another vector , vector product or cross product , Scalar tripple product , Vector triple product , Scalar point function , vector point function , Vector operator "del" , Gradient of a scalar point function , Geometrical interpretation of gradient ;

Part II

<https://unacademy.com/class/vector-calculus-iii/POO5K10Y>

Angel between two surface , Directional derivative of a scalar field , Directional derivative of a scalar field , Vector identity , Divergence of a vector point function ;

Part III

<https://unacademy.com/class/fourier-series/GZ73VQUQ>

Physical interpretation of divergence , Solenoidal vector , Polar co-ordinate , Curl of a vector point function , Physical interpretation of curl , Important relations , Surface , closed and opened surface , line integral ;

Part IV

<https://unacademy.com/class/laplace-transforms-iii/LADT72Y3>

Green's theorem , Stove's theorem , Gauss divergence theorem , Questions discussion ;

Part V

<https://unacademy.com/class/vector-calculus-iv/CDYPP9R7>

Questions discussion ;

Complex Variables

Part I

<https://unacademy.com/class/complex-variable-part-iii/6KDSLKOM>

Complex variable , Introduction , Properties of IOTA , Representation of complex number , Cartesian representation , Operations in the complex number , Multiplication , Conjugate , Division , Properties of a complex number , Modulus , Argument , Properties of argument , Cube root of unity , Properties of cube not of unity , General properties ;

Part II

<https://unacademy.com/class/complex-variable-part-iv/WUQ9GGVN>

Polar representation , De moivre's theorem , Polar to Cartesian , Complex functions , Analytic function , Cauchy - Riemann theorem , Residue , Pole of the complex function , Singular point , Method of finding residue , Simple pole , Pole of order m ;

Part III

<https://unacademy.com/class/complex-variable-part-iv/K5GMMI28>

Cauchy's Theorem , Cauchy - residue theorem , Questions discussion ;

Part IV

<https://unacademy.com/class/complex-numbers-part-v/69QXLOII>

Cauchy's integral theorem , Complex integration , Fourier series started (01:01:59) , Introduction , Questions discussion ;