MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Department/Centre : Department of Mathematics

Course Code : MAT-101

Course Name : Mathematics-I

Credits : 4 **L -** 3 **T -** 1 **P -** 0

Course Type : Core

Prerequisites : Single Variable Calculus

Course Contents

Matrix Algebra: Rank of a matrix, Solution of linear simultaneous equations. Eigenvalues and Eigenvectors of a matrix, Cayley- Hamilton theorem (Statement only), Diagonalization of a matrix.

(Lectures: 08)

Differential Calculus: Functions of two variables: Limit, Continuity, Partial derivatives, Euler's theorem on homogeneous functions, Chain rule, Jacobians, Taylor's theorem for two variables (Statement only), Error approximations. Extrema of functions of two or more variables, Lagrange's method of undetermined multipliers.

(Lectures: 10)

Integral Calculus: Review of curve tracing, Double and Triple integrals, Change of order of integration. Change of variables. Gamma and Beta functions. Applications of Multiple integrals.

(Lectures: 12)

Vector Calculus: Differentiation of vectors, gradient, directional derivative, divergence, curl and their physical meaning. Identities involving gradient, divergence and curl. Line integrals. Green's, Gauss and Strokes' theorem (Statement only) and their applications.

(Lectures: 10)

Books recommended for reading

1. Kreyszig E., Advanced Engineering Mathematics, 10th Edition, Wiley, 2011.
2. Jain R.K. and Iyengar S.R.K., Advanced Engineering Mathematics, 5th Edition, Narosa Publishing House, 2016.
3. Hass J., Heil C. and Weir M.D., Thomas' Calculus, 14th Edition, Pearson Education, 2018.
4. Zill D.G. and Wright W.S., Advanced Engineering Mathematics, 4th Edition, Viva, 2011.
5. O'Neil P.V., Advanced Engineering Mathematics, 8th Edition, Cengage Learning, 2017.
6. Grewal B.S., Higher Engineering Mathematics, 44th Edition, khanna publishers, 2021.

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Department/Centre : Department of Mathematics

Course Code : MAT-102

Course Name : Mathematics II

Credits : 4 **L -** 3 **T -** 1 **P -** 0

Course Type : Core

Prerequisites : Mathematics I

Course Contents

Ordinary Differential Equations: Solution of linear differential equations with constant coefficients using operator method. Euler-Cauchy equations, Solution of second order differential equations by changing dependent and independent variables. Method of variation of parameters, Introduction to series solution method about an ordinary point.

(Lectures: 10)

Partial Differential Equations: Formation of first and second order partial differential equations. Solution of first order partial differential equations: Lagrange`s equation, Charpit's method. Linear partial differential equations with constant coefficients.

(Lectures: 09)

Laplace Transform: Laplace and inverse Laplace transform of some standard functions, Shifting theorems, Laplace transform of derivatives and integrals. Convolution theorem, Initial and final value theorem. Laplace transform of periodic functions, Error functions, Heaviside unit step function and Dirac delta function. Applications of Laplace transform.

(Lectures: 10)

Fourier series: Fourier series and its convergence. Fourier series of even and odd functions. Fourier half-range series.

(Lectures: 05)

Fourier Transforms: Fourier integrals, Fourier sine and cosine integrals. Fourier and inverse Fourier transform, Fourier sine and cosine transforms and their elementary properties. Convolution theorem. Application of Fourier transforms.

(Lectures: 06)

Books recommended for reading

1. Kreyszig E., Advanced Engineering Mathematics, 10th Edition, Wiley, 2011.
2. Jain R.K. and Iyengar S.R.K., Advanced Engineering Mathematics, 5th Edition, Narosa Publishing House, 2016.
3. Zill D.G. and Wright W.S., Advanced Engineering Mathematics, 4th Edition, Viva, 2011.
4. O'Neil P.V., Advanced Engineering Mathematics, 8th Edition, Cengage Learning, 2017.
5. Grewal B.S., Higher Engineering Mathematics, 44th Edition, khanna publishers, 2021.