General Sir John Kotelawala Defence University

Faculty of Engineering

Department of Mathematics

Course Code	:	MA 1203
Course Name	:	Calculus
Credit Value	:	3

Learning Outcomes:

LO 01 : **Determine** the continuity and differentiability of a function at a given point.

LO 02 : **Evaluate** derivatives and integrals of single variable functions, and line integrals.

LO 03 : **Discuss** convergence of sequences and series.

LO 04 : **Determine** Fourier series for periodic functions

LO 05 : **Determine** the Laplace transforms and inverse Laplace transforms.

LO 06 : **Solve** ordinary differential equations.

Contents:

1. **Differentiation and Integration:** Concept of a functions, basic functions, logarithmic and exponential functions, hyperbolic functions, Periodic functions, Inverse of functions, limit of functions, continuity, differentiability, derivatives of functions, sketch graphs of functions, Rolle's theorem, Mean value theorem, Definite and indefinite integral, line integrals.

2. **Infinite Series:** Difference between sequences and series, Convergent and divergent series, Ratio test, Comparison test, Integral test, Power series, Taylor's series and Maclaurin's, Definition of Fourier series. Coefficients of Fourier Series (FS), Fourier Series for functions of period 2π, Dirichlet's conditions, Sum of Fourier series, Construction of Half range Sine and Cosine Series, Fourier Series for even and odd function, complex form of Fourier series.

3. **Laplace Transforms:** Definition of LT, LT of standard functions, Definition of Inverse LT, inverse formula, first shifting property, Transformations of derivatives and integrals, Unit step function, second shifting theorem, convolution theorem periodic function, differentiation and integration of transforms.

4. **Ordinary Differential Equations:** Formulation of differential equations, first order first degree differential equations, second order differential equations with constant coefficients, solution by D-operator, series solutions of differential equations. Solving ordinary differential equations by Fourier and Laplace transformations.

References:

1. Erwin Kreyszig, (2010) Advanced Engineering Mathematics, 10th edition, John Wiley, ISBN 978-0-470-45836-5

2. H. K. DASS, (2008), Advanced Engineering Mathematics, S. Chand Publishing, , ISBN:81-219-0345-9.

3. Peter V. O'Neil,(2012), Advanced Engineering Mathematics, Cengage Learning, , ISBN-13: 978-1-111-42741-2

4. Alan Jeffrey,(2002), Advanced Engineering Mathematics, Harcourt Press, , ISBN: 0-12- 382592-X

5. Glyn James,(2011), Advanced Modern Engineering Mathematics (Fourth Edition), Pearson, , ISBN: 978-0-273-71923-6.