University of Moratuwa, Faculty of Engineering, Department of Mathematics-20180102
BSc Engineering Honors Degree-16 batch-(691)
Semester 3: 2018/01/02-2018/04/06-14 weeks
CE(126)+CH(80)+TT(58)-(264)-Tue 13.15: 15.15-JG
EE(100)-(100)- Thu 13.15: 15.15-NCSLB GF
BM(16)+ER(50)+ EN(101)+MT(50)+ME(120)-(327)-Fri 13.15: 15.15-NA1

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Module Code	**MA2013**	**Title**	**Differential Equations**			
Credits	**02**	**Hours/ Week**	**Lectures**	**02**	**Pre-requisites**	MA 1023
			Lab/Tutorials	**-**		

Learning Outcomes

At the end of this module the student should be able to

- Apply Fourier series approximations for periodic functions in real world situations.
- Solve initial-boundary-value problems involving partial differential equations.
- Apply Laplace transform and Fourier transform methods to solve differential equations in engineering applications

Outline Syllabus

Fourier Series Approximation

- Fourier coefficients, Dirichlet's condition, odd and even functions. Half range series.
- Trigonometric approximation to discrete data.

Partial Differential Equations

- Classification of second-order partial differential equations.
- Solutions by separation of variables.
- Fourier series application to boundary value problems.

Laplace Transform and Applications

- Laplace transforms of elementary functions and some basic theorems on Laplace transform.
- Application of Laplace transforms to solution of differential equations and system of differential equations.
- Transfer functions, convolution theorem, concepts of stability and controllability.

Fourier Transform and Applications

- Non-periodic function, Fourier transforms, properties of Fourier transform and applications.

Detailed Syllabus

ODEs: Legendre, Leguerre, Bessel, Airy
PDEs: Laplace, Heat, Wave, Schordinger's
Methods: Wronskian(done in S2), Power Series Method, Laplace Transform, Complex Inversion Formula, Fourier Series, Fourier Transform, Convolution, Separation of variables.

Method of Assessment

End of semester examination: 2 hour closes book paper: 70%
Mid semester examination: 1 hour open book paper: 10%
In-class quiz(there will be an in-class quiz every week): 12%
Take-home quiz: 08%

References

Differential Equations; A.C. King, J. Bellingham and S.R. Otto; Cambridge University Press