University of Moratuwa, Faculty of Engineering, Department of Mathematics-20190906
BSc Engineering Honors Degree
Batch 18-Semester 2(**696**)-2019/09/09:2019/12/13-14 weeks
ME(120)+ER(50)-(**170**)Mon-08.15:10.15-NA1
BM(15)+EE(101)+EN(101)-(**217**)Mon-13.15:15.15-NA1
CE(126)+CH(83)+MT(50)+TT(50)-(**309**)Wed-13.15:15.15-NA1

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Module Code	**MA1023BC**	**Title**	**Methods of Mathematics-Part B&C**			
Credits	**2**	**Hours/ Week**	**Lectures**	**2**	**Prerequisites**	**MA1013**
			Lab/Tutorial	**2/3**		

Learning Outcomes

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

- Solve a non-linear equation in a single variable, to a desired accuracy.
- Integrate a function of a single variable numerically, to a desired accuracy.
- Solve first order non-linear ordinary differential equations.
- Solve initial value problems involving second order linear ordinary differential equations.
- Application of multivariate calculus to solve simple engineering problems.

Outline Syllabus

B-Ordinary Differential Equations & Multivariate Calculus

- Riemann integration;
- First order ordinary differential equations: Variable separable, homogeneous and exact equations.
- Second order differential equations: Reducible forms.
- Functions of several variables: partial differentiation, chain rule, directional derivatives.
- Maxima and minima, Lagrange multipliers;
- Taylor series expansion of multivariate functions.

C-Numerical Methods

- Algorithms and errors;
- Numerical solution of non-linear equations. Bisection and false position methods, simple iterations. Newton-Raphson method;
- Estimation of errors and acceleration of convergence. Approximations of functions.
- Numerical integration; Trapezoidal rule, Simpson's rule.

Method of Assessment (for the whole course MA1023)

- End of semester examination: 3 hour closed book paper: 70%
- Mid semester examination: 1 hour open book paper: 12% (on 2019/10/28 from 6.30-7.30pm)
- Part B&C-Quizzes: 12% (one quiz in each lecture, 2 will be dropped)
- Part A-Quizzes: 6%

References

- *Calculus*-Volume1 and 2, Tom M. Apostol
- *Mathematical Analysis,* Tom M. Apostol
- *Advanced Calculus,* David V. Widder
- *Advanced Calculus*-Gerald B. Folland
- *Advanced Engineering Mathematics*-Michael D. Greenberg
- *Numerical Analysis*-Richard L. Burden, J. Douglas Faires
- *Numerical Methods for Scientific and Engineering Computation,* M.K. Kain, S.R.K. Iyenger, R.K. Jain
- *Numerical Analysis*: Mathematics of Scientific Computing, D. Kincaid, W. Cheney