

**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI**  
**INSTRUCTION DIVISION**  
**SECOND SEMESTER 2014-2015**  
**(Course Handout Part II)**

Dated:1/01/2016

In addition to Part-I (General Handout for all courses appended to the timetable) this portion gives specific details regarding the course.

**Course No.:** ME G535  
**Course Title:** Advanced Engineering Mathematics  
**Instructor-in-charge:** Murali Palla

☞ **Course description:**

Matrices and Linear Equations; Iterative solutions for solving linear equations. Applications of PDEs in engineering boundary problems problems eg., the wave equation, the heat equation and the potential equation; Calculus of variations; numerical methods.

**1. Scope and objective of the Course:**

This course aims at imparting theoretical aspects of the modern mathematical techniques and computing skills required to understand and solve engineering problems by analyzing the wave, heat and potential equations, separately. This is accomplished by deriving the mathematical models and interpreting the mathematical results in physical terms. The theoretical flavor of the course is complemented through simulation of these models using MATLAB, C . In toto, the principal objective of this course is to solve boundary value problems involving partial differential equations.

**2. Books:**

**(i) Textbook**

- T1. Methods of Applied Mathematics, Francis B. Hildebrand
- T2. Applied Mathematics, JD Logan, Wiley Interscience, Third Edition

**(ii) Reference Books**

- R1. Applied Partial Differential Equations, JD Logan, Springer
- R2. An Introduction to Nonlinear Partial Differential Equations, JD Logan, Wiley Interscience
- R3. Finite Difference Methods for Ordinary and Partial Differential Equations, Randall Leveque

**3. Course Plan:**

Topics to be covered

1. **Matrices and Linear Equations**, Solvability of linear equations, Characteristic value problems, Orthogonalization of vector sets, Definite forms, Functions of symmetric matrices. Numerical Solutions (Refer T1)

2. **Dimensional Analysis, Scaling and Applied Partial Differential Equations**: Dimensional analysis, classification of analysis of PDEs, Boundary Value Problems, Sturm Liouville's equations and their general properties.

(Refer T2, R1)

3. **Calculus of Variations**. Maxima and Minima, Variational Notation, Constraints and Lagrange multipliers, Variational problems of deformable bodies.

(Ref T1 and T2)

**4. Evaluation Scheme:**

<b>S. No.</b>	<b>Component</b>	<b>Duration</b>	<b>Weightage</b>	<b>Date &amp; time</b>	<b>Nature</b>
1	Assignments		20 %	TBA	
2	Mid-Semester	90 min	40 %	-	Openbook
3	Comprehensive	3 hours	40 %	7/5 AN	Openbook

**5. Make-up Policy:**

- Make-up will be granted for genuine reasons, only when prior-permission is obtained from Instructor-in-charge.
- **No makeup is possible for class assignments**

**6. Notices:** All notices concerning the course will be emailed to the students.

**Instructor-in-charge  
ME G553**