BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE PILANI
K K BIRLA GOA CAMPUS
INSTRUCTION DIVISION
FIRST SEMESTER 2017-2018
Course Handout (Part-II)

Date: 01/08/2017

In addition to part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No.   : **MATH F211**
Course Title   : **MATHEMATICS III**
Instructor In-charge   : **MANOJ KUMAR PANDEY**
Instructors   : **Anil Kumar, Akshay Sakharam Rane, Gauranga Charan Samanta, Manoj Kumar Pandey, Pradeep Boggarapu , Jajati K. Sahoo, Danumjaya Palla.**

1.   Objective of the Course:

The Course reviews and continues the study of differential equations with the objective of introducing classical methods for solving ordinary differential equations as well as partial differential equations. This course serves as a basis for the applications of differential equations, Fourier series and Laplace transform in various branches of engineering and sciences. The course emphasizes the role of orthogonal polynomials in dealing with Sturm-Liouville problems.

2. Learning Outcomes

Upon completing this course students should be able to:

(i)   Solve first-order separable and linear differential equations, and use these methods to solve applied problems.

(ii)   Solve higher-order constant-coefficient linear differential equations and systems of differential equations, and use these methods to solve applied problems.

(iii)   Obtain power series solutions for certain classes of linear ordinary differential equations.

(iv)   Find Laplace transforms and inverse Laplace transforms, and apply these to solve linear differential equations.

3. Text-Book:

G. F. Simmons, *Differential Equations with Applications and Historical Notes,* TMH, 2nd Ed., 1991.

Reference Books:

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley & sons, 8th Ed., 2005.
2. W. E. Boyce and R. C. Diprima, *Elementary Differential Equations and Boundary Value Problems*, John Wiley & sons, 9th edition, 2013.
3. Earl A. Coddington, *An Introduction to Ordinary Differential Equations,* Prentice Hall, 2013.
4. C. H. Edwards and David E. Penney, *Elementary Differential Equations*, Pearson, 6th Ed. 2008.

4. Course Plan: (Sections/Articles refer to Text-Book)

Lect. No.	Learning Objectives	Topic	Sections	Assignments (Page No-Problems)
1	To introduce the classical methods to solve 1st order differential equations (DEs)	First order equations	1-6	**Self Study**
2		First order equations	7-10	**49-** 1, 3-5, **53**-All, **59**-All **61**- 1 to 4
3		Reduction of order	11	**65**-1 to 3
4-5	To introduce the classical methods to solve 2nd order DEs	Second order equations	14, 15	**86**-4 to 10, **91**-1 to 9
6		Use of a known solution	16	**94**-All
7-11		Various methods to solve differential equations	17, 18, 19	**97**-All, **103**-All, **106-** All
12-13		Higher order equations and operator methods	22, 23	**127**-1 to 8, **135**-All
14-17	To introduce power series solutions to 2nd order DEs with variable coefficients	Series solutions	26 to 30	**175**-1, 2, **182**-1 to 7. **191**-1 to 5, **198**-1 to 5
18-19		Hypergeometric equation	31	**203**-All
20-22		Legendre polynomials	44, 45	**340**-1, 2, 4 **347**-1 to 5
23-25		Bessel functions	46, 47	**356**-1 to 6, **363**-1 to 5
26-28		Eigenvalues and Eigen functions, Sturm Liouville Problems	40, 43	**308**-1
29-30	To introduce systems of equations	Systems of equations	54, 55, 56	**420**-1, 2; **426**-5 to 9 **433**-1 to 5
31-34	Use Laplace transform to solve differential equations	Laplace transforms	48, 49, 50, 51, 52	**384**-All, **388**-All, **394**-1 to 5, **397**-1 to 8, **410**-2, 3, 4
35-40	To introduce Fourier series	Fourier series	33, 34, 35, 36	**256**-1 to 6, **263**-1 to 5 **269**-All, **274**-1 to 7
41	To introduce partial differential equations (PDEs)	Partial differential equations		**Review**
42	To introduce classical methods to solve PDEs	One dim. Wave eqn.	40	
43		One dim. Heat eqn.	41	
44		Laplace eqn.	42	

5. Evaluation Scheme:

S. No.	Evaluation Component	Duration	Weightage (%)	Date and time	Remarks
1	Mid-Semester Exam	1 hour 30 minutes	30	11/10/2017, 9:00AM – 10:30 AM	Closed Book
2	Quizzes, Attendance and Assignments		20	To be announced	Open Book
3	Comprehensive Exam	3 hours	50	06/12/2017 (FN)	Closed Book

6. Make-up: Make-up will be given only in genuine cases of absence.

7. Chamber consultation hour: To be announced in the class.

8. Notices: All notices regarding MATH F211 will be displayed on LMS.

Instructor In-charge
MATH F211