Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2023 - 2024
Course Handout Part II

Date: 11.08.2023

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	: Dr. K. Bhargav Kumar
Instructors	: TSL Radhika, Jagan Mohan J, Santanu Koley, PK Sahoo, GMM Reddy, K. Bhargav Kumar, Jhuma Sen Gupta, Komal Kumar, Lakhan Valmik Jaybhaye, Zinnat Hassan, Sai Swagat Mishra, Nitin Kumar Sharma, Amit Kumar Pal, Sangeeta Dhawa, Sushil Pathak, Dheeraj Singh Rana, Gaurav Narayanrao Gadbail, Lohakare Santosh Vijay, Lokesh Kumar Duchaniya, Kadam Siddheshwar Atmaram, Tapaswini Patro, Shubham Atmaram Narawade, Rahul Vijay Bhagat, Debasmita Mohanty, Suman Prabha Yadav, Debismita Nayak, Aaqid Mohi Ud Din Bhat.

1. **Scopes and Objective of the Course:**
This course reviews and continues with differential equations to introduce classical methods for solving higher order ordinary differential equations, partial differential equations, and boundary value problems. It also introduces an elegant way to solve some differential equations occurring in mathematical physics. Further, this course presents the Fourier series and Laplace transform technique that finds applications in various branches of engineering and sciences. It also emphasizes the role of orthogonal polynomials in dealing with Sturm - Liouville problems.

2. **Text Books:**

1. Simmons, G. F., Differential Equations with Applications and Historical Notes, TMH Edition 2003, 12 th Reprint 2008.

Reference Books:
1. Shepley L. Ross: Differential Equations, John Wiley & Sons Inc., 2018.
2. Braun, M.: Differential Equations and Their Applications, Springer – Verlag, 1982.
3. Kreider, D. L. & Others: An Introduction to Linear Analysis, Addison – Wesley Limited, 1966.

3. **Course Plan:**

Lecture No.	Learning Objectives	Topics to be covered	Chapter in the Text Book
1	To study methods for solving first-order differential equations	Introduction to first-order equations	1-7
2-4		First-order equations	8-10
5		Reduction of order	11
6-7	To learn about second and higher-	Second order equations	14,15
8		Use of a known solution	16

9-12	order differential equations and various methods for solving them	Various methods to solve differential equations	17-19,22,23
13-14	To understand the method of solving system of differential equations	Systems of equations	54-56
	To study qualitative properties of solutions of differential equations	Sturm separation theorem and Sturm comparison theorem (Self - Study)	24, 25
15-17	To study an elegant method to solve higher order differential equations	Series solutions	26-30
18-19		Hypergeometric equation	31
20-22	To learn about some special functions of mathematical physics	Legendre polynomials	44,45
23		Chebyshev polynomials	Appendix D
		Hermite polynomials (Self - Study)	Appendix B
24-27		Bessel functions	46,47
28-31	To study Laplace transform technique for solving differential and integral equations	Laplace transforms	48-53
32-33	To learn trigonometric series expansion of discontinuous functions	Fourier series	33-36
34-37	To learn methods to solve boundary value problems	Eigenvalues and eigenfunctions, Sturm - Liouville problems	40, 43
38-40	To learn methods to solve linear partial differential equations	One-dimensional wave equation, One-dimensional heat equation, Laplace's equation	40, 41, 42

4. **Evaluation Scheme :**

Evaluation Component	Duration	Weightage	Date & Time	Nature of Component
Assignment 1	-	10%	To be announced	Open book
Mid Semester	90 Minutes	35%	10/10 - 9.30 - 11.00AM	Closed book
Assignment 2	-	10%	To be announced	Open book
Compre	180 Minutes	45%	08/12 FN	Closed book

* The total marks of all the components taken together will be 200.

5. Chamber Consultation Hour: To be announced by the individual instructor.
6. Notices: All notices regarding this course will be displayed on CMS.
7. Make-up Policy: Make-up for any component will be given only for very genuine cases and it also depends upon the feasibility. Prior permission has to be obtained from Instructor-in-charge.
8. **Academic Honesty and Integrity Policy**: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

INSTRUCTOR-IN-CHARGE
MATH F211