Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2021 - 2022
Course Handout Part II

Date: 20.08.2021

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	**:**	Jagan Mohan Jonnalagadda
Instructors	**:**	Anil Nemili, B Mishra, Deepika, G Murali Mohan Reddy, Jagan Mohan J, K Bhargav Kumar, Kishore Kumar, Manish Kumar, Nirman Ganguly, PK Sahoo, PTV Praveen Kumar, Sabyasachi Dey, Santanu Koley, TSL Radhika. Anshid Aboobacker, Ashwini S, Kadam Siddheshwar Atmaram, Laxmipriya Pati, Lohakare Santosh Vijay, Nitin Kumar Sharma, Priyanka Vishwakarma, Purohit Nisarg Bharatbai, Raja Solanki, Shaik Azharuddin, Shivangi Joshi, Suman Prabha Yadav, T Ranjan Panigrahi, Tapaswini Patro, Lakhan Valmik Jayabhaye, Zinnat Hassan

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, 12th 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		Second order equations	14,15
8		Use of a known solution	16

9-12	To learn about second and higher-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
15-16	To study an elegant method to solve higher order differential equations	Series solutions	26-30
17-19		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
Quiz 1	30 Minutes	12.5%	To be announced	Open book
Mid Semester	90 Minutes	35%	19/10/2021 11.00 - 12.30PM	Open book
Quiz 2	30 Minutes	12.5%	To be announced	Open book
End Semester	120 Minutes	40%	14/12 AN	Open 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