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**FIRST SEMESTER 2019-2020**

# Course Handout Part II

01-08-2019

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* :** Anil Nemili

***Instructors* :** A Ramu, P.K. Sahoo, T.S.L. Radhika, K. Venkata Ratnam, Kishore Kumar, P T V Praveen Kumar, Jagan Mohan J,

Santanu Koley, Nirman Ganguly, A Karthik, K. Panduranga,

T Ranjan Panigrahi, Tusharakanta Pradhan

1. **Scopes and Objective of the Course:**

This Course reviews and continues with the study of differential equations with an objective to introduce classical methods for solving higher order ordinary differential equations, boundary value problems and partial differential equations. It also introduces an elegant method to solve some differential equations occurring in Mathematical Physics. Further, this course presents 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.

1. **Text Book: Simmons** G. F., Differential Equations with Applications and Historical Notes, TMH, 2nd Edition, 2003.

**Reference Book**: **1.** Kreider D. L. and Others: An Introduction to Linear Analysis, A.W., 1966.

1. Shepley L. Ross: Differential Equations, John Willy & Sons, 1984.
2. **Course Plan:** (Sections- refer to Text Book)

|  |  |  |  |
| --- | --- | --- | --- |
| **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 order differential equations and various methods for solving them | Second order equations | 14,15 |
| 8 | Use of a known solution | 16 |
| 9-12 | 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 |
| 32-34 | To learn trigonometric series expansion of discontinuous functions | Fourier Series | 33-36 |
| 35-38 | To learn methods to solve Boundary Value Problems | Eigen values and Eigen functions Sturm Liouville Problems | 40, 43 |
| 39-42 | To learn methods to solve linear partial differential equations | One dim. Wave equation,  One dim. Heat equation,  Laplace’s equation | 40, 41,42 |

1. **Evaluation Scheme :**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Evaluation Component** | **Duration** | **Weightage** | **Date & Time** | **Nature of Component** |
| Assignment-1 |  | 10% | To be announced | Open book |
| Mid-Semester Test | 90 min. | 35% | 28/9, 9.00 -- 10.30 AM | Closed book |
| Assignment-2 |  | 10% | To be announced | Open book |
| Compre. Exam. | 3 hrs. | 45% | 2/12 FN | Closed book |

**Total Marks: 300**

**5. Make-up:** Make up will be granted only in genuine cases in Mid-Semester Test. Permission must be taken in advance except in extreme cases.

**6. Chamber consultation hour:** To be announced in their class by the respective instructors.

**7. Notices:** All notices regarding MATH F211 will be put on CMS.

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**