



(M.Sc.) (Mathematics)
(Master of Science) (Mathematics) Semester (I)

Course Code	PS01CMTH55	Title of the Course	ODE & Special Functions
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	<ol style="list-style-type: none">1. Students will learn the series solution of differential equations.2. Students become aware about some well-known differential equations like Bessel, Legendre and Gauss hypergeometric differential equations.3. They will learn various methods for solving Pfaffian differential equations in three variables.
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Course Content		
Unit	Description	Weightage* (%)
1.	Interval of convergence of Power series, real valued analytic function, second order linear homogeneous differential equation: classification of singularities, series solution: near ordinary point.	25
2.	Series solution near point at infinity and regular singular point using Frobenius Theorem, a quick review of gamma function, Bessel's differential function, Bessel's function of first kind and its properties, Fourier-Bessel expansion theorem (statement only) and examples.	25
3.	Legendre's differential equation, Legendre polynomial and its properties, Rodrigue's formula, Fourier-Legendre's expansion theorem (statement only) and examples, Gauss' hypergeometric differential equation Gauss' hypergeometric function and its properties.	25
4.	Pfaffian differential equation: homogeneous method, Natani's method for finding solution, Picard's method of successive approximations, Picard's theorem.	25





Teaching-Learning Methodology	Classroom teaching.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	find series solution of second-order linear homogeneous ordinary differential equations near ordinary and regular singular points which might be helpful to understand the nature of the solution.
2.	understand some well-known differential equations which are helpful to understand many mathematical models in nature.
3.	solve Pffafian differential equations in three variables.

Suggested References:	
Sr. No.	References
1.	Simmons G. F., Differential Equations with Applications and Historical Notes, (Second Edition), McGraw-Hill International Editions, 1991.
2.	Sneddon I. N., Elements of Partial Differential Equations, McGraw-Hill Publ. Co., 1957.
3.	Raisinghania M. D., Advanced Differential Equations, (Sixth Revised Edition), S. Chand, 2013.
4.	Rabenstein A. L., Introduction to Ordinary Differential Equations, Academic Press, 1966





On-line resources to be used if available as reference material

On-line Resources

