20BSM203T					Ordinary Differential Equations					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs. / Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	--	--	100

COURSE OBJECTIVES

- To be able to understand the basic concepts of theory and applications of ordinary differential equations.
- To learn about the formation of differential equations corresponding to a given physical problems.
- To be able to demonstrate comprehension and understanding in the topics of the course through symbols and graphs.
- To learn power series solution method to solve differential equations.
- To be able to model real world problems using differential equations.

UNIT 1 FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS **10 Hrs.**

Definitions of order, degree, linear, nonlinear, homogeneous and non-homogeneous. Solution of first order equations – Variable Separable Form, Linear Differential Equations, Reduction to Linear Differential Equations, Exact Differential Equations, Integrating factors.

UNIT 2 HIGHER ORDER ORDINARY DIFFERENTIAL EQUATIONS **10 Hrs.**

Higher order linear ordinary differential equations with constant coefficients (homogeneous and non-homogeneous), Complementary function and particular integral, Cauchy-Euler equation, Method of undetermined coefficients, Method of Variation of parameters.

UNIT 3 SERIES SOLUTION OF LINEAR ORDINARY DIFFERENTIAL EQUATIONS **10 Hrs.**

Series solution of Ordinary differential equations, Convergence of series solution, Radius of convergence, Bessel and Legendre's differential equations.

UNIT 4 SYSTEM OF LINEAR ORDINARY DIFFERENTIAL EQUATIONS **10 Hrs.**

System of ordinary differential equations, Solution of initial value problems. Application to solving ordinary differential equations.

40 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – Understand various types of solution methods of solving ordinary differential equations.
CO2 – Demonstrate the series solution for ordinary differential equations about ordinary and singular points.
CO3 – Distinguish between linear, nonlinear, ordinary and partial differential equations with the aid of degree and independent variables.
CO4 – Analyse and evaluate the system of linear ordinary differential equations corresponding to various engineering problems.
CO5 – Develop an ability to formulate differential equations corresponding to a given physical problem.
CO6 – Create mathematical models with the aid of higher order ordinary differential equations to solve engineering problems.

TEXT / REFERENCE BOOKS

1. S.L. Ross, Introduction to Ordinary Differential Equations, Wiley, 4th ed., 1989.
2. M.D. Raisinghania, Ordinary and Partial Differential Equations, S. Chand Publication, 8th ed., 2010.
3. G.F. Simmons, Differential equations with applications and historical notes, Mc Graw Hill, 2nd ed., 1991.
4. N. Euler, A First Course in Ordinary Differential Equations, Bookboon, 2015.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100	**Exam Duration: 3 Hrs.**
Part A: 6 questions of 4 marks each	24 Marks
Part B: 6 questions of 8 marks each	48 Marks
Part C: 2 questions of 14 marks each	28 Marks