

<b>Devi Ahilya University, Indore, India</b> <b>Institute of Engineering &amp; Technology</b>				<b>MSc – I Year (Applied Mathematics)</b> with Specialization in Computing & Informatics <b>Semester- II</b>			
<b>Subject Code &amp; Name</b>	<b>Instructions Hours per Week</b>			<b>Credits</b>			
<b>AM2PC2: Advanced Differential Equations</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>Duration of Theory Paper: 3 Hours</b>							

**Objectives:** To Study various properties like existence and uniqueness of solutions, methods for approximating solutions as well as applications by modeling virtually in different fields.

**Prerequisite(s): Nil.**

### **COURSE OF CONTENTS**

#### **UNIT I**

Existence of solution, uniqueness of solution, method of successive approximation, system of differential equation, dependence of solution on initial condition and parameters, maximum and minimum solution, variation of solutions.

#### **UNIT II**

Exact Linear Differential Equations of nth order – condition of exactness for a linear equation of order n. Integrating factors. Non-linear differential equation of particular forms-exact non-linear differential equations. Riccati,s Equation, Homogeneous equations.

#### **UNIT III**

Series Solutions of second order Linear Differential Equations, Method of Frobenius, Total differential Equation- Necessary & Sufficient condition for the total Differential Equations, Solution of a Total Equation involving four variables.

#### **UNIT IV**

Partial Differential equations of first order – formulation and Classification of partial differential equations, Langrange’s linear equation, Particular forms of non-linear partial differential equations, Charpit’s method.

Linear partial differential equations with constant coefficients. Homogeneous equations, Non homogeneous equation.

#### **UNIT V**

Partial differential equations of second order with variable coefficients, Monge’s Methods, Separation of variables, canonical forms, Elliptic, Parabolic and Hyperbolic differential equations, Green’s Functions.

#### **BOOKS RECOMMENDED:**

- [1] Rai Singhania, Advanced Differential Equations & Integral Transform.
- [2] Zafar Ahsan, Differential Equations and their Application, Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.
- [3] Sankara Rao, K., Introduction to Partial Differential Equations, Prentice Hall of India Pvt. Ltd., New Delhi 1997.
- [4] Earl A. Coddington, An Introduction to ordinary Differential Equations, Tata McGraw Hill, 2009.