## Semester I

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| **Subject Name: Differential Equations** | **Duration : 6 hrs /Cycle** |
| **Subject Code: 1PGM4(2015 on)** | **Credit : 5** |

**Unit I: Linear Equation of the first order:** Introduction – Classification – Initial and boundary value problems – Purpose of theoretical considerations – First order linear equation – Exact equation – Separable equations.

**Unit II: Linear Differential Equation of the Higher Order:** Introduction – Higher order equation – A modeling problem – Linear independence – Equations with constant coefficients – Equations with variable coefficients Wronskian – Variation of parameters – Some standard methods.

**Unit III: Solutions in Power series:** Introduction – Second order linear equations with ordinary properties – Legendre equations and Legendre polynomials – Second order equations with regular singular point – Properties of Bessel functions.

**Unit IV: Partial Differential Equation of first Order:** Introduction – Origins of first order partial differential equations – Linear equation of first order – Integral surfaces passing through a given curve – Orthogonal to a given system of surfaces – Cauchy's method of characteristics – Compatible system of first order equations – Charpit's method – Special types of first order equation.

**Unit V: Partial Differential Equation of Second Order:** Introduction – The origin of second order equation – Linear partial differential equation with constant coefficients – Linear partial differential equation with variable coefficients.

**Text Books:** 1. Text Book of Ordinary Differential Equations – F.G. Deo, L. Lakshmikandan, V. Ragavendra, 2nd Edition, Tata-McGraw Hill (1997).

Chapters: 1(Sec. 1.1, 1.3, 1.4, 1.6 - 1.9), 2(Sec. 2.1 - 2.9), 3(Sec. 3.1 - 3.5).

2. Elements of partial differential equations – I.N. Snedon, International Student Edition, McGraw Hill (1957).

Chapter: 2(Sec. 2.1 - 2.11), 3(Sec.3.1, 3.4, 3.5).

**Reference Books:** 1. An Introduction to Ordinary Differential equations by Earl A. Coddington, PHI (2013).

2. Partial Differential Equations by K. S. Bhamra, PHI (2010).