

NWFP University of Engineering & Technology Peshawar

Document Type: **Course Outline**

Department: **Civil Engineering**

Course No.: **BSI-206**

Serial No.: _____

Course Title: **Differential Equations**

Type: **Theory**

Credit Hours **03**

Approved Under Reference: _____

Verified By: _____

Signature: _____

Date: _____

Effective From: _____

Effective For Session: _____

Effective To: _____

Ordinary Differential Equations:

Basic concepts of ordinary differential equation, General and particular solutions, Initial and boundary conditions, Linear and nonlinear differential equations, Solution of first order differential equation by separable variables and its applications in our daily life situations, The techniques like change of variable, homogeneous, non-homogeneous, exact, non-exact, linear and nonlinear Bernoulli could be used in case of complications. Solution of second order differential equation by theory of operators and its applications as forced and free oscillations, The extension of second order solution criteria to higher order differential equations, Solution of the system of differential equations by theory of operators and its applications in our daily life situations.

Partial Differential Equations:

Basic concepts, Linear and nonlinear p.d.equations, Quasi linear and Quasi nonlinear p.d.equations, Homogeneous and non-homogeneous p.d.equations, Solutions of p.d.equations, Boundary and initial conditions as Dirichlet condition, Neumann condition, Robbins/Mixed condition, Classification of p.d.equations as Elliptic, Parabolic and Hyperbolic.

Analytic solution by separation of variables of the Steady-State Two-Dimensional Heat equation/Laplace equation and Unsteady-State One-Dimensional Heat equation/Diffusion equation with homogeneous and nonhomogeneous boundary conditions. D'Alembert's solution of Two-Dimensional Wave equation with homogeneous and nonhomogeneous boundary conditions.

Fourier Series:

Periodic waveforms and their fourier representations, Calculating a fourier series, Fourier series of odd and even functions, Half range fourier series, Fourier series solution for the above p.d.equations.

Books Recommended

- Kreyszig, E. Advanced Engineering Mathematics, Wayne and Erson.
- Abell & Braselton, Brooks /Cole, Modern Differential Equations, Second edition