

**B.A./B.Sc. II (Semester IV)**  
**Mathematics**  
**(Applicable from January 2020)**

**Paper I: Differential Equations**

**Unit I**

Second order linear differential equations with variable coefficients: Use of a known solution to find another, normal form, method of undetermined coefficient, variation of parameters, Series solutions of differential equations, Power series method.

**Unit II**

Bessel, Legendre and Hypergeometric functions and their properties, recurrence and generating relations.

**Unit III**

Origin of first order partial differential equations. Partial differential equations of the first order and degree one, Lagrange's solution, Partial differential equation of first order and degree greater than one. Charpit's method of solution, Surfaces Orthogonal to the given system of surfaces.

**Unit IV**

Origin of second order PDE, Solution of partial differential equations of the second and higher order with constant coefficients, Classification of linear partial differential equations of second order, Solution of second order partial differential equations with variable coefficients, Monge's method of solution.

**Paper II: Mechanics**

**Unit I**

Frame of reference, work energy principle, Forces in three dimensions, Poinot's central axis, Wrenches, Null lines and planes.

**Unit II**

Virtual work, Stable and Unstable equilibrium, Catenary, Catenary of uniform strength.

### **Unit III**

Velocities and accelerations along radial and transverse directions, and along tangential and normal directions, Simple Harmonic motion, Motion under other law of forces. Elastic strings, Motion in resisting medium, Constrained motion, Motion on smooth and rough plane curves.

### **Unit IV**

Motion of particles of varying mass, Rocket motion, Central orbit, Kepler's laws of motion,, Motion of particle in three dimensions, Rotating frame of reference, Rotating Earth, Acceleration in terms of different coordinates systems.