COURSE NAME: MECHANICS **COURSE CODE: MT(N)305**
CREDIT: 04

SYLLABUS

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Vector Multiple Product and Differentiation of Vector- Triple product, Geometrical interpretation of scalar triple product, Reciprocal system of vectors, Differentiation of vectors. **Green, Gauss and Stok's Theorem**- Introduction of vector functions, Line integral Surface integral, Volume integr green's theorem, The divergence theorem of Gauss, Stoke's theorem. **Gradiant Divergent and Curl**- Partial derivatives of vectors, Gradient of scalar field, Divergence of vector point function, Curl of vector point function, Laplacian operators. **Introduction of Mechanics**- Basic Concept of Mechanics, what is stress, what is displacement, what is strain, Basic equation of mechanics, Equilibrium Equation, Strain Displacement relation, Compatibility equation, Constitutive relation **Equilibrium of a rigid body**: Moment of a force about a point, Sigh of the moment, General theorem of moments, Couple. **Definition of virtual work,** Principle of virtual work, Force which can be omitted in forming the equation of virtual work. **Conservative forces and inverse square law**: Conservative and non-conservative forces. **Moment of inertia:** Equation of motion, angular momentum vector, Moment of inertia and radius of gyration Physical significance of MI, theorems of parallel and perpendicular axes, Rotational kinetic energy. **Formulation of moment of inertia:** Formulation and derivation of moment of inertia for some simple symmetric systems (rod, rectangular lamina, circular lamina, solid sphere, cylinder). **Rectilinear Motion:** Simple harmonic motion (SHM) and its geometrical representation, SHM under elastic forces, Motion under inverse square law, Motion in resisting media, Concept of terminal velocity, Motion of varying mass.. **Constrained motion in a plane smooth curve**: Motion on a smooth curve in a vertical plane, Discuss the motion of a particle, Use of principle of conservation of energy. Cycloid motion. **Common catenary**: Common catenary Intrinsic and Cartesian equations of the common catenary, Approximations of the catenary. **Kinematics in two Dimension:** Angular Velocity, Rate of change of Unit Vector, Relation Between Angular and Liner Velocity, Component of velocity and acceleration along the coordinate axes in two dimensions. Meaning of central orbit, Differential equation of the orbit, (p, r) equation of the orbit, Apses and apsidal distances, Areal velocity, Characteristics of central orbits