Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NMED507	Theory of Plasticity	3	0	0	3

Course Objective
- To study the elastic plastic behavior of the engineering materials under various types of loads.   - To understand theory and design of material flow.   - To understand the basic governing equations involved for analysing flow behaviour of the materials.   - To understands the role of yield criteria in determining the elastic limit under multiaxial stress and the various theories involved.

Learning Outcomes
Upon successful completion of this course, students will: - have a broad understanding on the mechanism of plastic deformation from fundamentals of material science.   - have an understanding about plasticity theory and there uses for the solution of the problem .   - be able to solve the problem of generic engineering components under plastic deformation.

Unit No.	Topics	Lecture Hours	Learning outcomes
1	Mathematical preliminaries and Introduction to elasticity (pre-requisite of this course).	5	Understanding the Cartesian tensor algebra and the basic concept of classical elasticity theory
2	Introduction to plasticity theory: Stress and strain; constitutive responses; physics of plasticity; application of plasticity theory for different materials;	10	Understanding the basic materials behaviour beyond elastic limit, governing equations and flow behaviour.
3	Formulation of rate-independent plasticity; maximum dissipation postulate; yield criteria; Flow rules and hardening rules.	9	Student will learn the mathematical description of the non-linear behavior of solid materials.
4	Uniqueness theorems; extremum principles in plasticity; limit analysis; shakedown theorems. plane problems in plasticity; slip line theory and its applications; plastic stability;	9	Student will learn various plasticity theorem and their limitation to estimate deformations and collapsed loads in engineering applications.

5	Plastic buckling; global and local criteria of plastic stability; strain localization and shear bands	9	Basic understanding on the application of plasticity theory such as buckling and bending of beams.
	Total	42	

Text Books:

1. Plasticty Theory, J. Lubliner, 2nd ed., McGraw-Hill, 1999

Reference Books:

1. Fundamentals of the theory of plasticity, L. M. Kachanov
2. Nonlinear Solid Mechanics, D. Bigoni
3. Plasticity: Fundamentals and applications, P. M. Dixit and U. S. Dixit
4. Theory of Plasticity, J. Chakrabarty