Course Type	Course Code	Name of Course	L	T	P	Credit
DSC1	NMEC101	Engineering Mechanics	3	0	0	3

Course Objective

The main objective is to equip students with the knowledge of principles of Mechanics (Statics and Dynamics) so that analytical ability is developed in them to approach, tackle and solve real-life engineering problems.

Learning Outcomes

Upon successful completion of this course, students will be able to:

- Solve particle and rigid body equilibrium problems using the equation of equilibrium.
- Determine the forces and moments acting on a loaded beam/ flexible cables or members of trusses and frames.
- Develop an idea of various coordinate systems and their mutual transformation.
- Solve problems related to kinematics and Kinetics of particles
- Solve problems related to kinematics of rigid bodies.
- Apply the concepts of Mechanics to approach and solve engineering problems in a simple logical manner.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**MODULE I:** Introduction, Idealization of Mechanics, Equilibrium of rigid bodies: Equivalent Force Systems; Wrench; Equilibrium of a Rigid Body in Three Dimensions	5	Students will have the ability to understand the concept of mechanical equilibrium. They will be able to draw the free-body diagram before solving the mechanics problem. They will have an idea of the vector approach, particularly to solve the 3D problem.
2	**MODULE II:** Analysis of structures: Trusses, Frames and Machines	4	Students will get the concept of structure. They shall learn the analysis procedure of various kinds of engineering structure
3	**MODULE III :** Friction: Wedges, Screw Jack and Belt Friction; Axle and Disk Friction	4	Students will learn how to solve the frictional problem of a machine parts.
4	**MODULE IV:** Distributed forces: Centroids of Lines, Areas and Composite Plates; Center of Gravity; Moment of Inertia and Product of Inertia	4	Students will get the idea of centre of gravity, centroid, moment of Inertia and Product of Inertia
5	**MODULE V:** Method of Virtual Work: Stability and Equilibrium	3	Students will learn to solve the structural problem using concept

			of virtual work with stability analysis.
6	**MODULE VI:** Kinematics of Particles: Motion Relative to a Frame, Tangential and Normal Components, Radial and Transverse Components	3	Students will get the knowledge of displacement, velocity and acceleration of particles and their relationship in engineering problem.
7	**MODULE VII:** Kinetics of Particles: Rate of Change of Angular Momentum, Impulse; Equations of Motion in Terms of Radial and Transverse Components, Work-Energy principle	3	Students will be able to understand the effect of forces on the motion of particles and they will be able to solve the kinetic problem in different coordinate system.
8	**MODULE VIII:** Kinematics of Rigid Bodies (planar motion): Rotation of a Rigid Body about a Fixed Axis, General Plane Motion; Instantaneous Center of Rotation in Plane Motion;	6	Students will understand the planar motion of two dimensional rigid body.
9	**MODULE IX:** Kinematics of Rigid Bodies (spatial motion): Spherical motion, Chasles theorem, Coriolis Acceleration, Euler angles.	5	Students will understand the spatial motion of three dimensional rigid bodies.
10	**MODULE X:** Kinetics of Rigid Bodies in 3D; angular momentum, kinetic energy, Euler's Equations of Motion, Gyroscopic motion with steady precession.	5	Students will learn the vector approach for analyzing 3D kinetics of rigid bodies.

Text book:

1. Vector Mechanics for Engineers by Beer and Johnston, McGraw Hill Education

References:

1. Engineering Mechanics: Statics and Dynamics by Irving Herman Shames, Pearson Education
2. Engineering Mechanics by J.L. Meriam and L. Kraige, WILEY