Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ES12/ES22	Engineering Mechanics	3	1	--	3	1	--	4
		Examination Scheme						
		ISE	MSE		ESE			
		10	30		100 (60% Weightage)			

Course Outcomes:

ES12/ES22 Engineering Mechanics	Learners will be able to…
CO1	Determine resultant of coplanar force system or equivalent force system (force & couple)
CO2	Construct the Free Body Diagram of real world problems and apply the conditions of equilibrium to determine the reactive forces for a given coplanar force system
CO3	Analyse the equilibrium of rigid bodies subjected to dry friction by using the laws of friction
CO4	Determine vectorically the resultant force and the reactive force for a 3-Dimensional force system
CO5	Determine the position, velocity and acceleration in different frames of reference for motion of a particle and plot the motion curves for rectilinear motion. Also Locate the Instantaneous Center of Rotation & determine the angular velocity for rigid bodies
CO6	Determine velocities of particle after collision

Module No.	Unit No.	Topics	Ref.	Hrs.
1 **System of Coplanar Forces**	1.1	Resultant of Concurrent forces, Parallel forces, Non-Concurrent Non-Parallel system of forces, Moment of force about a point, Couples, Varignon's Theorem. Distributed Forces in a plane.	1, 3	7
2 **Equilibrium of System of Coplanar Forces**	2.1	Condition of equilibrium for concurrent forces, parallel forces and Non-concurrent Non-Parallel or general force system and Couples. Equilibrium of connected bodies.	1, 3	4
	2.2	**Types of supports**, loads, Beams, Determination of reactions at supports for various types of loads on beams.	2,3	3
3 **Friction**	3.1	Introduction to Laws of friction, Cone of friction, Equilibrium of bodies on inclined plane, Application to problems involving wedges, ladders.	1, 3	5
4	4.1	Rectangular Components of Forces in Space, Resultant of	1, 2	5

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Forces in space		Space forces, Moment of a Force about a point, axis and line. Equilibrium of a particle in space.		
5 Kinematics	5.1	**Kinematics of Particle** Motion along straight and curved path, Rectangular component of velocity and acceleration, Tangential & Normal component of acceleration, Motion curves(a-t, v-t, s-t curves), Projectile motion,	1, 2	7
	5.2	**Kinematics of Rigid Bodies** Instantaneous center of rotation for the velocity, velocity diagrams for bodies in plane motion, (up to 2 linkage mechanism)	1, 2	4
6 Kinetics of Particles	6.1	**Impulse and Momentum:**-Principle of Linear Impulse and Momentum. Law of Conservation of momentum. Impact and collision.	1, 2	4
				39 hrs

Recommended Books:

1. F.P. Beer, E.R. Johnston Jr., *Vector Mechanics for Engineers – Statics and Dynamics*, 9th ed., NY, USA, McGraw-Hill, 2010.
2. E.W. Nelson, C.L. Best, W.G. McLean, *Engineering Mechanic: Statics and Dynamics*, 5th ed., NY, USA, Schaum's Outline Series, McGraw-Hill, 1998.
3. A.K. Tayal, *Engineering Mechanics: Statics and Dynamics*, 13th ed., Delhi, Umesh Publications, 2005.