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Academic Session;2021-2022 Semester Name;TRIMESTER-I Course Year Name;FY - IX

Subject Name : Mechanics

Sr No	Unit	Topic Details
1	UNIT-I	Centre of gravity and Centroids: Centroids of linear objects (1-D)
		Resultant of general coplanar force systems
		Analysis of bodies in equilibrium: bodies subjected to general coplanar force systems
		Equilibrium of two forces, Equilibrium of three forces
		Concept of equilibrium, free body diagram, physical, Analytical and graphical conditions of equilibrium, Types of supports
		Centroids of of laminar objects (2-D)
		Introduction to Engineering Mechanics, effects of forces on bodies, basic concepts [Space, Time, Mass, Force], Idealization of bodies in Engineering Mechanics
		Concept of resultant of a force systems, Equivalent systems, Resultant of concurrent and parallel force systems (Coplanar only)
		Resolution and Composition of Forces, Moment of a force about a point and about a line, Varignon's theorem of moments, couples, different types of force systems.
		Axioms in Engineering Mechanics
2	UNIT-II	Analysis of Cables subjected to concentrated loads.
		Beams: Reactions of determinate beams subjected to different types of transverse loads
		Analysis of Trusses: Method of Sections
		Analysis of Trusses: Method of Joints
		Analysis of Trusses: Concept of two force member, Introduction to trusses, Assumptions, Types of Trusses, Deficient, Perfect and Redundant Trusses.
		Analysis of Frames: Two force member of a frame, multi force members, analysis by method of members
3	UNIT-III	Resultant and equilibrium of concurrent space force systems
		Operations with space forces, Moment of a force about a point and about a line
		Belt Friction (Flat Belt only), Band Brakes
		Block and wedge friction
		Analysis of equilibrium of bodies including frictional forces
		Introduction to frictional force, preliminary concepts, laws of friction, Ladder

Sr No	Unit	Topic Details
		Resultant and equilibrium of parallel space force system
4	UNIT-IV	Rectilinear motion with Variable acceleration: $a=f(t)$, $a=f(v)$, $a=f(x)$, Simple harmonic motion
		Introduction to Dynamics, Kinematics and Kinetics, Rectilinear motion: uniform motion, uniformly accelerated motion, motion under gravity
		Analysis of Rectilinear motion using Graphical representation i.e. Motion curves
		Dependent motion
		Curvilinear Motion: Rectangular coordinate system, motion of projectiles
		Curvilinear motion: Path variables (Normal and Tangential components of acceleration)
		Curvilinear motion: Polar co-ordinates (Radial and transverse components of velocity and acceleration)
		Relative Motion
5	UNIT-V	Newtons 2nd law of motion: Curvilinear motion (Path variables)
		Concept of Dynamic Equilibrium, Newton's second law of motion applicable to Rectilinear motion, Rectangular co-ordinates
		Newtons 2nd law of motion: Curvilinear motion (Polar co-ordinates)
		Direct central impact, Coefficient of restitution, elastic, semi-elastic and plastic impact
		Conservation of Momentum
		Principle of Impulse and Momentum
		Conservative Forces, Conservation of Energy.
		Work of a force: W.D. by Gravitational force (GPE), W.D. by a spring force (EPE), K.E., efficiency
		Work -Energy Principle
6	UNIT-VI	Absolute motion analysis
		Planar rigid body motion, translation of R.B., rotation about a fixed axis
		Relative motion analysis: Acceleration
		Relative motion analysis: velocity, instantaneous centre of zero velocity (I.C.R.)
		Relative motion analysis using rotating axes (Coriolis Acceleration)