

CONTENTS

	Page
Chapter 1 VECTORS Definitions. Addition and Subtraction. Zero vector. Composition of vectors. Multiplication of vectors by scalars. Orthogonal triad of unit vectors. Position vector. Dot or scalar product. Cross or vector product. Vector calculus.	1
<hr/>	
Chapter 2 OPERATIONS WITH FORCES Moment of a force. Moment of a couple. Replacement of a force by a force and couple. Operations with coplanar force systems.	14
<hr/>	
Chapter 3 RESULTANTS OF COPLANAR FORCE SYSTEMS Coplanar forces. Concurrent system. Parallel system. Non-concurrent, non-parallel system. Graphical solutions.	23
<hr/>	
Chapter 4 RESULTANTS OF SPATIAL FORCE SYSTEMS Spatial forces. Definition of resultant. Concurrent system. Parallel system. Non-concurrent, non-parallel system.	33
<hr/>	
Chapter 5 EQUILIBRIUM OF COPLANAR FORCE SYSTEMS Vector equations of equilibrium. Scalar equations for concurrent system. Scalar equations for parallel system. Scalar equations for general system. Graphical conditions for equilibrium. Suggestions for solving problems.	40
<hr/>	
Chapter 6 TRUSSES AND CABLES Assumptions in solving trusses. Method of joints. Method of sections. Graphical solutions of trusses. Parabolic cables. Catenary.	57
<hr/>	
Chapter 7 EQUILIBRIUM OF SPATIAL FORCE SYSTEMS Vector equations of equilibrium. Scalar equations for concurrent system. Scalar equations for parallel system. Scalar equations for skew system.	73

CONTENTS

	Page
<p>Chapter 8 FRICTION</p> <p>General concepts and definitions. Laws of friction. Jack-screw. Belt friction. Brake bands. Rolling resistance.</p>	84
<hr/>	
<p>Chapter 9 FIRST MOMENTS AND CENTROIDS.....</p> <p>Vector definition of centroid of an assemblage. Centroid of a continuous quantity. First moments and units. Theorems of Pappus and Guldinus. Center of pressure.</p>	101
<hr/>	
<p>Chapter 10 KINEMATICS OF A PARTICLE.....</p> <p>Definition. Position, velocity and acceleration in rectilinear motion. Simple harmonic motion. Curvilinear motion. Cartesian or rectangular components. Tangential and normal components. Radial and transverse components (polar coordinates). Units.</p>	123
<hr/>	
<p>Chapter 11 DYNAMICS OF A PARTICLE.....</p> <p>Newton's laws of motion. Units. Acceleration. Discussion of types of dynamics problem.</p>	148
<hr/>	
<p>Chapter 12 KINEMATICS OF A RIGID BODY IN PLANE MOTION.....</p> <p>Definition. Position vector, velocity and acceleration of any point of rigid body in plane motion. Special cases — translation and rotation. Instantaneous axis of rotation. Coriolis' law and its proof.</p>	170
<hr/>	
<p>Chapter 13 DYNAMICS OF A RIGID BODY IN TRANSLATION.....</p> <p>Effective force on a particle. D'Alembert's principle. Scalar equations for translation. Inertia-force method.</p>	198
<hr/>	
<p>Chapter 14 AREA MOMENTS OF INERTIA.....</p> <p>Axial moment of inertia of element of area. Polar moment of inertia of element of area. Product of inertia of element of area. Axial moment of inertia of area. Polar moment of inertia of area. Product of inertia of area. Parallel axis theorem. Axial moments, polar moments and products of inertia of composite areas. Moments of inertia of area with respect to a rotated set of axes. Mohr's circle.</p>	209
<hr/>	
<p>Chapter 15 MASS MOMENTS OF INERTIA.....</p> <p>Axial moment of inertia of element of mass. Axial moment of inertia of mass. Parallel axis theorem. Radius of gyration. Units. Table of centroidal moments of inertia of five frequently encountered masses.</p>	224

CONTENTS

		Page
Chapter 16	DYNAMICS OF A RIGID BODY IN ROTATION	232
	Equations of motion for any fixed axis. Equations of motion for rotation about an axis of symmetry. Inertia-force method. Center of percussion.	
<hr/>		
Chapter 17	DYNAMICS OF A RIGID BODY IN PLANE MOTION	248
	Equations of motion relative to mass center. Note on use of other points as moment centers.	
<hr/>		
Chapter 18	WORK AND ENERGY	264
	Definition of work. Power. Efficiency. Kinetic energy. Work-energy relations for a particle. Kinetic energy of a body in translation, rotation and plane motion. Potential energy. Law of conservation of energy.	
<hr/>		
Chapter 19	IMPULSE AND MOMENTUM	285
	Linear momentum of particle. Linear impulse. Linear impulse – linear momentum relations for a particle and an assemblage of particles. Moment of momentum (angular momentum). Moment of relative momentum. Scalar equations in translation, rotation and plane motion. Conservation of linear momentum. Conservation of angular momentum. Impact. Variable mass.	
<hr/>		
Chapter 20	MECHANICAL VIBRATIONS	312
	Definitions. Degrees of freedom. Simple harmonic motion. Linear free vibrations. Angular free vibrations. Free vibrations with viscous damping. Forced vibrations without damping. Forced vibrations with damping. Critical speeds of shafts. Vibration measuring instruments.	
<hr/>		
Chapter 21	SPECIAL TOPICS: BEAMS AND VIRTUAL WORK	335
	Part A. Types of beams. Shear and moment in beams. Sign convention. Determination of shear and moment. Shear and moment diagrams and information obtained from them.	
	Part B. Virtual displacement of a particle. Virtual work. Conditions for equilibrium of a particle, a rigid body and a system. Stable equilibrium. Unstable equilibrium. Neutral equilibrium. Determination of type of equilibrium.	
<hr/>		
	INDEX	351