

16BSP202					Mechanics					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- ☐ To acquire the basic knowledge of vector calculus and various co-ordinate systems.
- ☐ To apply Newton's second law in real world problems.
- ☐ To understand the various types of motion under central force.
- ☐ To discuss the basic concepts of mechanics of continuous media.

UNIT 1 Scalar and Vector field	12 Hrs.
Vectors and their properties; vector operations (Addition, Subtraction, dot product, cross product, triple product); partial differentiation; scalar and vector field; divergence, gradient and curl of the vector field, electric and magnetic field, divergence and stoke's theorem, definitions for electricity and magnetism, relations between flux and field lines, Gaussian surface, Gauss's law, Comparison between coulomb's law and Gauss's law, Cartesian, cylindrical and spherical co-ordinate system.	
UNIT 2 Applications of Newton's Second law	08 Hrs.
Newton's second law, Equations of motion, motion under Gravity, motion against resistive forces, dry friction, fluid friction, System for varying mass, Uniform circular motion, Numerical based on Newton's second law.	
UNIT 3 Motion under central force	10 Hrs.
Motion under a central force, Conservation of angular momentum, Kepler's laws, Gravitational Field and potential due to spherical bodies, Gauss and Poisson equations, Gravitational self-energy, Two-body problem; Reduced mass, scattering by hard spheres, Centre of mass and laboratory reference frames, Collisions in 2D & 3D, Calculation of final velocities of colliding particles and scattering angle. Galilean transformation, frame of references with linear acceleration, Galilean invariance.	
UNIT 4 Mechanics of Continuous media	10 Hrs.
Elastic constants of an isotropic solid, Poisson's ratio, Relations connecting the elastic constants, Determination of Young's Modulus of a Material, Determination of Poisson's ratio, Dynamical method (Maxwell's needle) of determination of the coefficient of rigidity (η) of a wire. Bending of beam, Bending Moment, The cantilever, moment of inertia, General theorem of moment of inertia, calculation of moment of inertia for particular cases, kinetic energy of rotation, moment of inertia of fly wheel.	
Max. 40 Hrs	

COURSE OUTCOMES

On completion of the course, student will be able to

- CO1 - recognize various properties of vector calculus and understand different co-ordinate systems.
- CO2 - apply basic knowledge of Newton's second law to solve real world problems.
- CO3 - demonstrate an ability to identify and analyze various motion under central forces.
- CO4- generalize the various properties of Galilean transformation.
- CO5- understand underlying principles of mechanics of continuous media.
- CO6 – reproduce the expression of moment of inertia of various cases.

TEXT/REFERENCE BOOKS

1. Mechanics by D. S. Mathur (S Chand & Co. Ltd., N Delhi, 2006)
2. Berkley physics course (Vol. I) Asian student Edition
3. Classical Mechanics: J.R. Taylor (2005) University Science Books
4. Mechanics by Somnath Dutta, S. Chand

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Part A/Question: <Details>

Part B/Question: <Details>

Exam Duration: 3 Hrs

<> Marks

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