

YEAR – II	BASICS OF NEWTONIAN & CLASSICAL MECHANICS	PH303S
SEMESTER – III		HRS/WK - 8
CORE - 3		CREDIT - 6

Objectives

- To make the students to understand the basic ideas of mechanics in the field of dynamics, Statics, hydrostatics, hydrodynamics.
- To understand concepts of projectiles and friction
- To study the concepts space science
- To acquire knowledge of classical physics

UNIT-I

(24 hours)

Statics: Centre of gravity- Centre of gravity of a solid and hollow cone- Solid and hollow hemisphere- Thrust- Centre of pressure- Vertical rectangular lamina. **Hydrostatics:** Law of floatation- Metacenter- Metacentric height of a ship. **Hydrodynamics:** Equation of continuity of flow- Energy of the fluid- Euler's equation of unidirectional flow - Bernoulli's theorem.

UNIT-II

(24 hours)

Dynamics: Rigid body- Moment of inertia- Radius of gyration- moment of inertia of a solid cylinder, cylindrical shell, solid sphere, spherical shell, hollow sphere with external and internal radii- Bifilar pendulum- Compound pendulum- Determination of g and k .

UNIT-III

(24 hours)

Projectile: Projectile motion- Range of a projectile, maximum height reached and angle of projection for maximum height- Projectile on an inclined plane- Resultant velocity at a given instant.

Friction: Laws of friction- Sliding friction - Angle of friction- Cone of friction- acceleration down an inclined plane- Rolling friction and stability.

UNIT IV

(24 hours)

Space Science: Rockets and satellites- Basic principles of rocket motion- Rocket equation, thrust and acceleration- Escape velocity of multistage rockets- Liquid, solid and cryogenic- Propellant rockets- Space shuttle- Orbital velocity- Launching of satellites- Types of satellite Orbits.

UNIT-V**(24 hours)**

Classical Mechanics: Mechanics of a system of particles- Generalised Co-ordinates- transformation equations- configuration space- principle of Virtual work- D' Alembert's principle- Lagrange's equations and its applications-Compound pendulum - Atwood's machine.

TEXT BOOKS:-

1. Narayana moorti and Nagarathnam,1997,Statics,Hydrostatics and Hydrodynamics,III Edition
2. Murugesan,2005,Mechanics and mathematical methods,S.Chand and Co
3. Gupta Kumar and sharma,2001,classical Mechanics
4. Rana.N.C.&Joag,P.S.Classical Mechanics,Tata McGraw Hill
5. Herbert Goldstein., Classical Mechanics ., Narosa Publications

Reference books:

1. MathurD.S., 2006 II Edition, Mechanics,S.Chand& co.
2. HallidayD,Resnick.R and Walker.J, 2001- Fundamentals of Physics, 6th Edition, Wiley,N.Y
- 3.Feynmann R.P, Leighton R.B and Sands M, Ther feymann Lectures on Physics, Vols 1,2 and 3-Narosa, New Delhi.(1998)
4. Hans and Puri, Mechanics- I Reprint6 2003
5. Brijlal and Subramaniyam, Mechanics and Electrodynamics, Edition 2005
6. Bhatia V.B., Classical Mechanics, Tamil Nadu Book House

Question Pattern

Time: 3 Hours

Max. Marks: 75

Section – A (10 X 2 = 20)

(Answer ALL the questions)

(Two questions from each Unit)

Section – B (5 X 5 = 25)

(Answer all the questions)

(One question from each Unit; either or pattern and any one of the questions will be a problem; both part)

Section C (3 X 10 = 30)

(Answer any Three Questions out of five)

(One Question from each unit and it may have subdivisions)