Syllabus
BRIDGE COURSE IN PHYSICS

COURSE CODE: PH1GCMBR01

Total Instructional Hours: 35 hrs

Aims and Objectives

The course aims to enhance the learning environment of students by bridging the gap between the higher secondary and college level. The course is devised to build a concrete foundation in the core subject and hence to create an interest in the subject. The course includes lecture sessions, discussions, and minor quizzes.

Module I

Mathematics for Physics (9 hrs)

Basic Concepts of Trigonometry, Three-Dimensional Geometry, Vectors, Matrices, Functions, Curves and Surfaces, Derivatives and Integrals

Reference Texts:

1. Plane Trigonometry, Part 1, S. L. Loney, S. Chand Publications
2. Solid Geometry, Q. Zameeruddin, V. K. Khanna, Vikas Publishing house
3. Elements of Vector Algebra, R. Jha and A. Singh, Notionpress Publications
4. A Text book of Matrices, Har Swarup Sharma and H. B. Pandey, Ratan Prakasan Mandir
5. Differential Calculus, Shanti Narayan and P. K. Mittal, S Chand Publications
6. Integral Calculus, Shanti Narayan and P. K. Mittal, S Chand Publications

Module II

Motion (8 hrs)

Motion in a plane. Cases of uniform velocity and uniform acceleration. Uniform circular motion. Law of conservation of linear momentum. Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on level circular road, vehicle on banked road).

Work done by a constant force and a variable force; conservative forces; conservation of mechanical energy (kinetic and potential energies); non-conservative forces; motion in a vertical circle, elastic and inelastic collisions in one and two dimensions

Reference

1. Mechanics, DS Mathur

Module III

Rigid body dynamics (9 hrs)

Centre of mass of a rigid body. Moment of a force, torque, angular momentum, conservation of angular momentum. Equilibrium of rigid bodies, rigid body rotation and equation of

rotational motion, comparison of linear and rotational motions; moment of inertia, radius of gyration.

Reference

1. Mechanics, DS Mathur

Module IV

Waves and Oscillations (9 hrs)

Periodic motion – period, frequency, displacement as a function of time. Periodic functions. Simple harmonic motion (SHM) and its equation; phase; oscillations of a spring – restoring force and force constant; energy in SHM – kinetic and potential energies. free, forced and damped oscillations (qualitative ideas only), resonance.

Wave motion. Longitudinal and transverse waves, speed of wave motion. Displacement relation for a progressive wave. Principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics.

1. Mechanics, DS Mathur

2. Properties of Matter and Acoustics, Murugesan and K Sivaprasad

References

1. Mechanics - JC Upadhyaya
2. Classical Mechanics – Takwale and Puranic
3. Properties of Matter – Mathur
4. Properties of Matter and Acoustics – Murughesan and K Sivaprasad