

Department of Physics
National Institute of Technology Manipur

B. Tech. Physics Syllabus

PH 101 | Physics-I | 3-0-0-6

Classical mechanics: Review of Newtonian mechanics, Motion in plane polar co ordinates, conservation principle, collision problem and centre of mass frame, rotation about fixed axis, non inertial frame and pseudo forces, rigid body dynamics.

Special theory of Relativity: Postulate of STR, Galilean transformation, Lorentz transformation, simultaneity, length contraction, time dilation, relativistic addition of velocities, energy-momentum relationships.

Quantum mechanics: Failure of classical concept, de Broglie's hypothesis, Heisenberg uncertainty principle and its applications, physical interpretation of wave function, Schrodinger equation, Probability and normalization, expectation values, Application in 1-dimension-particle in a box, finite potential well.

Text Books:

1. D, Kleppner and R.J Kolenkow, An introduction to Mechanics, Tata McGraw-Hill (2000)
2. R. Eisberg and R. Resnick, Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles, John-Wiley, 2nd Edition (1985)

References:

1. R.G Takwale and P.S Puranik, An Introduction to classical mechanics, Tata McGraw- Hill(1979).
2. R. Resnick, Introduction to Special theory of Relativity, John Wiley, Singapore (2000)
3. A. Beiser, Concepts of Modern Physics, John Wiley(Asia) (2000)
4. S. Gasiorowicz, Quantum Physics, John Wiley (Asia) (2000)
5. B.H. Bransden and C.J Joachain, Introduction to Quantum Mechanics, Longman (1993)

PH 102 | Physics-II | 3-0-0-6

Vector Calculus: Concept of vector operators: gradient, divergence and curl, Poisson's and Laplace equation, Line, surface and volume integrals, Gauss's divergence theorem and stokes theorem in Cartesian, spherical polar and cylindrical polar co ordinates, Green's theorem, Dirac delta function.

Electrostatics: Gauss's law and its application, Divergence and curl of electrostatic field, Boundary conditions, work and energy, conductors, capacitors, method of image, boundary value problem in Cartesian co ordinates system, dielectrics, polarization, bound charges, electric displacement, boundary condition in dielectrics, energy and force on dielectrics.

Magnetostatics: Divergence and curl of magnetostatics field, Lorentz force, biot savart laws, ampere's law and their applications, magnetic vector potential, force and torque on magnetic dipole, magnetic materials, magnetization, bound currents, boundary condition.

Electrodynamics: Ohm's law, motional emf, faraday's law, lenz's law, self and mutual inductance, energy stored in magnetic field, Maxwell equation, continuity equation, pointing theorem, wave solution of magnetic equation, propagation of em waves in free space.

Polarisation, reflection and transmission at oblique incidence.

Text Books

1. G.B Arfken and H.J Weber, Mathematical Methods for Physicist, Academic Press(1995)
2. D.J Griffiths, Introduction to Electrodynamics, 3rd edition, Prentice Hall of India (2005)

References:

1. M.N. O. Sadiku, Elements of Electromagnetics, Oxford (2006)
2. J.R. Reitz and F.J Millford. Foundation of Electromagnetic Theory, Narosa (1986)