UNIVERSITY OF DELHI

(i) PHYSICS COURSES IN ANALYTICAL CHEMISTRY and

(ii) PHYSICS COURSES IN INDUSTRIAL CHEMISTRY

(SEMESTER-I)

based on

Undergraduate Curriculum Framework 2022 (UGCF)
(Effective from Academic Year 2022-23)

University of Delhi

Semester –I
DSCs:-

Course Title	Nature of the Course	Total Credits	Components			Eligibility Criteria/ Prerequisite	Contents of the course and references may be seen at
			L	T	P		
Mechanics	DSC-1	4	2	0	2		Annexure – I
Wave and Optics	DSC-2	4	2	0	2		**(Not Available)**
Thermal Physics and Statistical Mechanics	DSC-3	4	2	0	2		**(Not Available)**

GE-1: Pool A (Pool for Odd Semester)

Course Title	Nature of the Course	Total Credits	Components			Eligibility Criteria/ Prerequisite	Contents of the course and references may be seen at
			L	T	P		
Mechanics	Physics GE-01	4	3	0	1		**Same Annexures as GE Courses of B.Sc. (H) Physics**
Mathematical Physics	Physics GE-02	4	3	1	0		
Waves and Optics	Physics GE-03	4	3	0	1		
Introduction to Electronics	Physics GE-04	4	2	0	2		
Solid State Physics	Physics GE-05	4	3	1	0		
Introductory Astronomy	Physics GE-06	4	3	1	0		
Biological Physics	Physics GE-07	4	3	1	0		
Numerical Analysis and Computational Physics	Physics GE-08	4	2	0	2		
Applied Dynamics	Physics GE-09	4	3	1	0		
Quantum Information	Physics GE-10	4	3	1	0		

Contents of the course and reference are enclosed.

Discipline Specific Core Course:
Mechanics Credit: 04 (Theory: 02, Practical: 02)

THEORY: (Credit: 02; 30 Hours)

Vectors: Review of vector algebra. Scalar and vector product

(2 Hours)

Ordinary Differential Equations: First order homogeneous differential equations, second order homogeneous differential equation with constant coefficients

(4 Hours)

Brief review of Newton's laws of motion, dynamics of a system of particles, centre of mass, determination of centre of mass for continuous systems having spherical symmetry. Conservation of momentum and energy, work – energy theorem for conservative forces, force as a gradient of potential energy, angular momentum, torque, conservation of angular momentum

(9 Hours)

Idea of simple harmonic motion, differential equation of simple harmonic motion and its solution, kinetic energy and potential energy, total energy and their time average for a body executing simple harmonic motion

(4 Hours)

Newton's law of gravitation, motion of a particle in a central force field, Kepler's laws, weightlessness, geosynchronous orbit, basic idea of global positioning system

(4 Hours)

Elasticity: Concept of stress and strain, Hooke's law, elastic moduli, twisting torque on a wire, tensile strength, relation between elastic constants, Poisson's ratio, rigidity modulus

(3 Hours)

Postulates of special theory of relativity, Lorentz transformation relations, length contraction, time dilation, relativistic transformation of velocity

(4 Hours)

References:
Essential Readings:

1) Schaum's Outline of Vector Analysis, 2nd Edn., Murray Spiegel, Seymour Lipschutz, Tata McGraw-Hill, (2009)

2) An Introduction to Mechanics (2/e), Daniel Kleppner and Robert Kolenkow, 2014, Cambridge University Press.

3) Mechanics Berkeley Physics Course, Vol. 1, 2/e, Charles Kittel, et. al., 2017, McGraw Hill Education

4) Mechanics, D. S. Mathur and P. S. Hemne, 2012, S. Chand.

Additional Readings:

1) University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
2) University Physics, H. D. Young and R. A. Freedman, 14/e, 2015, Pearson Education.
3) Fundamentals of Physics, Resnick, Halliday and Walker 10/e, 2013, Wiley.
4) Engineering Mechanics, Basudeb Bhattacharya, 2/e, 2015, Oxford University Press.

PRACTICAL (Credit: 02; 60 Hours)

Every student should perform at least 06 experiments from the following list.

1) Measurements of length (or diameter) using vernier calliper, screw gauge and travelling microscope.
2) Determination of height of a building using a sextant.
3) Study of motion of the spring and calculate (a) spring constant and, (b) acceleration due to gravity (g)
4) Determination of moment of inertia of a flywheel.
5) Determination of Young's modulus of a wire by Optical Lever Method.
6) Determination of modulus of rigidity of a wire using Maxwell's needle.
7) Determination of elastic constants of a wire by Searle's method.
8) Determination of value of g using bar pendulum.
9) Determination of value of g using Kater's pendulum.

References:

1) Advanced practical physics for students, B. L. Flint and H. T. Worsnop, 1971, Asia Publishing House.
2) Engineering practical physics, S. Panigrahi and B. Mallick, 2015, Cengage Learning India
3) Practical physics, G. L. Squires, 2015, 4/e, Cambridge University Press.
4) A text book of practical physics, I. Prakash and Ramakrishna, 11/e, 2011, Kitab Mahal.
5) B. Sc. practical physics, Geeta Sanon, R. Chand, 2016